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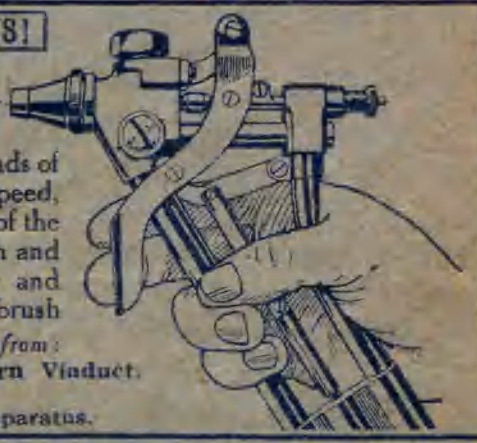

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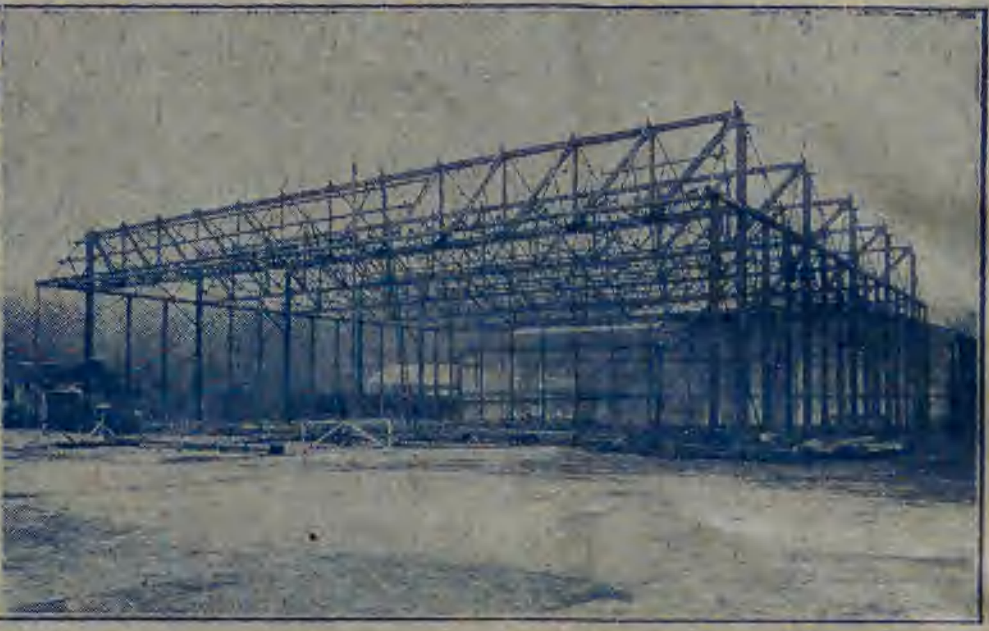

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"It may interest you to know that one of our Avro machines, doped with your Titanine, has been touring Great Britain since May, 1920, and has only been in a hangar on five occasions. The rest of the time the machine has been anchored in fields where the whole of the wing surface has been exposed to the weather. During last winter, nothing was thought of scraping one to three inches of snow off the wings before starting the day's flying. This was especially noticeable at Northwich in December last year. The machine in question—G EAKX—has carried 5,854 passengers and flown roughly 19,000 miles.

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FLIGHT
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First Aero Weekly in the World.
Founder and Editor: STANLEY SPOONER
A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Jan. 5	Lecture, "Specialised Aircraft," by Wing-Com. W. D. Beatty, before R.Ae.S.
Jan. 19	Lecture, "Aeroplane Installation," by Brig.-Gen. R. K. Bagnall-Wild, before R.Ae.S.
Feb. 2	Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.
Feb. 7 & 8	Second Air Conference at Guildhall
Feb. 16	Lecture, "Methods of Instruction in Aeroplane Flying," by Sq.-Leader Portal, before R.Ae.S.
Mar. 2.	Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.
Mar. 26–April 2	Nice Meeting
Mar. 30	Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.
July 6–20	French Gliding Competition
Aug. 6	Gordon-Bennett Balloon Race, Geneva
Sept.	Tyrrhenian Cup, Italy
Sept.	Italian Grand Prix

EDITORIAL COMMENT

Progress of Civil Aviation

ELSEWHERE in this issue we publish a brief *résumé* of the Fifth Half-Yearly Report on the Progress of Civil Aviation. As in the case of previous reports, the present one is signed by Sir Frederick Sykes, Controller-General of Civil Aviation. It is divided into two main parts, the first of which deals with Civil Aviation in Great Britain and the Empire, the second being devoted to Civil Aviation in Foreign Countries. As usual, a lot of interesting and useful data are included in the report, and the figures given, looking at the matter in the broadest possible light, are distinctly encouraging.

When, however, it comes to examining the part played by Great Britain, the matter assumes a somewhat different aspect. Good as the figures are, they do not disclose a very progressive and promising state of affairs as compared with what is being done, and particularly what is being planned, by other nations, chiefly in the matter of Government subsidy. For instance, out of a total number of aircraft arrivals and departures from and to the Continent of 2,360 during the six months under review, British machines account for only 671. It is true that we are not running services to Belgium and Holland, and that therefore the comparison should be made with the French service. Even then the figure for French machines only exceeds that of ours, being 1,058 against our 671. The total of Belgian and Dutch arrivals and departures is 631, or very nearly equal to ours, so that it would appear that, if it is worth while keeping the London-Paris services going, it is no less so with regard to Belgian and Dutch lines. However, the report states that in the spring a service to Belgium will be inaugurated.

Again, although the total number of passengers carried is as high as 31,853, those carried between the United Kingdom and the Continent only total 4,000. In other words, the majority of the rest were carried by joy-riding firms and firms doing "air-taxi" work, which, as Mr. Holt Thomas points out in a letter to *The Times*, is not air service in the ordinary sense of the words. Let us be clear, however, that in making these comparisons we are casting no reflections on the Department of Civil

Aviation, which is, we are sure, doing its best with the means at its disposal.

In an appendix to the report this Department deals in a most decisive and convincing manner with the question of the development of civil air communications within the Empire, and shows such a sane and practical grasp of the subject that one cannot fail to realise that, did the matter rest with General Sykes's Department, Imperial aviation would soon take the place which no one seriously doubts it is destined to take ultimately. But unfortunately the Department of Civil Aviation has to work with the scant material provided by the Treasury, and is thus vitally handicapped.

Mr. Holt Thomas's letter contains an excellent example of the way in which this country is lagging behind. Compared with our "28 per cent. share in the London-Paris service," America has, he reminds us, some 3,000 miles of Air Mail lines over which, in the month of October last, the mileage flown was 158,971 miles.

The report states that the Treasury has agreed to set aside a sum of £200,000 per annum for the next three years out of the total Vote for Civil Aviation purposes, to be used as direct assistance to "approved" firms. This figure looks fairly large. Yet when we come to examine those of other countries we find that by comparison it is insignificant. For instance, the subsidy proposed by France for 1922 is 41,382,000 francs, about £1,655,000 at normal rate of exchange. Germany's proposed subsidy is 11,000,000 marks for operational and 10,000,000 marks for constructional firms. Out of our £200,000 per annum approximately half, it is stated, will be devoted to the purchase of machines for use by the operational firms on the hire-purchase system. Even a small country like Holland is proposing a subsidy for 1922 of 370,000 florins (£30,000).

As we have repeated until we are tired of it, and quite apart from its very practical utility, civil aviation is to be regarded as a form of national insurance, and it amounts almost to criminal indifference to suggest we cannot afford it. We simply cannot afford not to foster it.

◆ ◆ ◆

The Suppression of Flying

Under this heading Mr. A. F. Prevost Battersby, in the *Observer* last Sunday, returns to the subject indicated, a theme which he reminds us he voiced some five years ago in the same paper. He seeks again "to rouse unimaginative humanity to a consciousness of its impending peril." Mr. Battersby then proceeds to repeat his old plea for the suppression of all flying, by reason of it being possible in the future, through the aeroplane, to achieve "the destruction within 24 hours of a score of cities, arsenals, dockyards and military centres before any sort of reprisal can be devised," and continues, "It is vain to talk of an air service adequate to deal with such a contingency," which, as Euclid has it, is absurd.

Thus Mr. Battersby lets loose again all his old scare lines, and in addition quotes various recent utterances by more or less responsible public speakers as evidence in support of his indictment, but he omits to point out that those very utterances have been put forward as imperative reasons why Britain should provide an adequate air service to deal with the very contingency which Mr. Battersby appears to think is likely to eventuate. In fact, as we said when commenting upon Mr. Battersby's original cry of agony five years ago, every argument he puts forward for suppression is an indictment of his own arguments. To attempt at this stage of aviation to stay further development of the navigation of the air is almost on a par with commanding the sea to retire.

No, the building up of a huge commercial aircraft industry in the coming years is as sure a certainty as anything in this world can be, and because such a beneficial opening for mankind *may* be abused by possible Huns of the future, is not sufficient reason to call a halt. As to Mr. Battersby's "facts," we need but quote one item as showing the flimsy basis upon which his "peril to humanity" bogey is erected:

"So accurate has bombing become that an expert has dropped three dummy bombs in succession down the funnels of a warship from a height of some 6,000 feet." It is evident that Mr. Battersby, whilst there is still time, should arrange to retire to a "dug-out" which he prophesies will constitute the future residences of the new poor, war profiteers, and all other wildfowl.

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Aerial Advertising —A Terrible Prospect

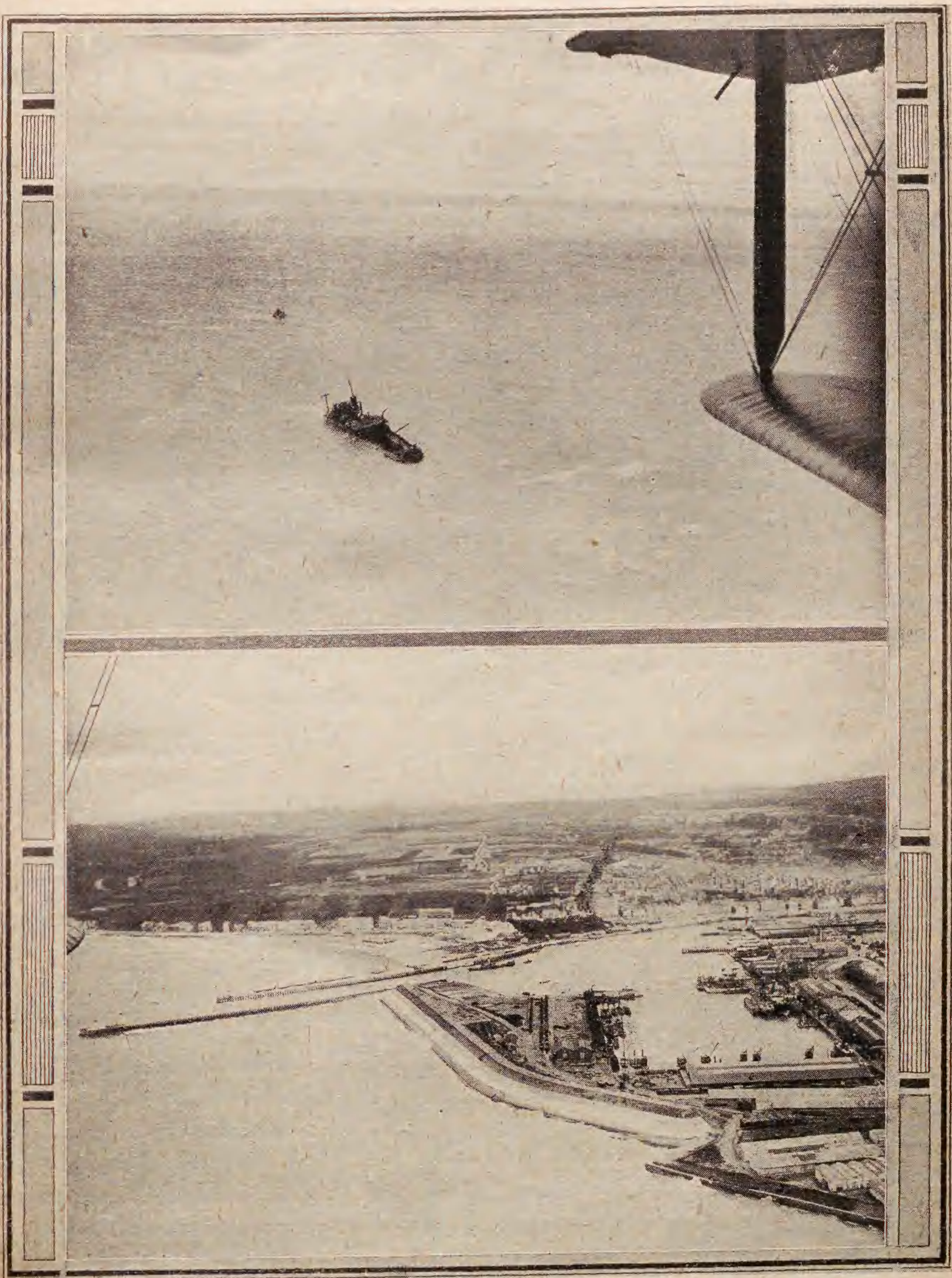
According to the *Star*—which, perhaps, is not to be taken too seriously—there is a scheme on foot for using the London-Lympne air route for the purpose of advertising the wares of a well-known firm of pickle and preserve manufacturers. It is, so the *Star* tells us, the intention to lay down enormous ground signs showing white on a black ground by day, and to be outlined by innumerable electric lamps by night, extolling the excellencies of the "57 varieties." As though this were not bad enough, it is further intended to employ small, fast aeroplanes, flown by "stunt" pilots to write smoke signs in the sky—signs that will be visible to all within a wide radius and which, on a quiet day, will be legible for quite a considerable time.

We are firm believers in the virtue of advertising. We do not believe that any business, great or small, can be created and maintained without the powerful aid of advertisement. But there are limits, and this grandiose scheme seems to surpass the limit of what is allowable either on the grounds of good taste—which has no particular appeal to a certain class of advertising man—or public policy. It is distinctly against the latter that such a scheme should be permitted. Our railways are lined by such outrages on good taste. If they were the least bit artistic we might endure them, but they are not. To these atrocities of the advertising world, are we to have added the terrors of enormous illuminated signs, shouting to the world that there is nothing like the 57 varieties, and must we endure the sight of smoke-screen inscriptions on the very clouds themselves? Not for a moment. And it will be as well if the authorities early make it abundantly clear that this sort of thing will not be permitted.

◆ ◆ ◆ ◆

Civilian Flying during 1921 in America

ACCORDING to a review compiled by the Aeronautical Chamber of Commerce of America, civilian flying increased considerably during 1921. Twelve hundred aircraft were operated by civilians, flying a total of more than 6,500,000 miles, and carrying approximately 275,000 passengers. The United States Air Mail also put up a very good record of efficiency over the transcontinental route during the last twelve months, having shown an average of 88.82 per cent. efficiency (completed trips on scheduled time).



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LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE:

No. 21.—*Top:* A Wreck off Boulogne; *Below:* Boulogne Harbour.

THE D.H. TYPE 34 COMMERCIAL BIPLANE

Napier "Lion" Engine

As will be seen from the accompanying general arrangement drawings, the D.H. 34 is a good deal like the famous D.H. 18 in its general lines. It has, however, been improved in several respects, as a result of the extensive experience gained with the 18's, and will represent a real step forward in the development of the truly commercial aeroplane.

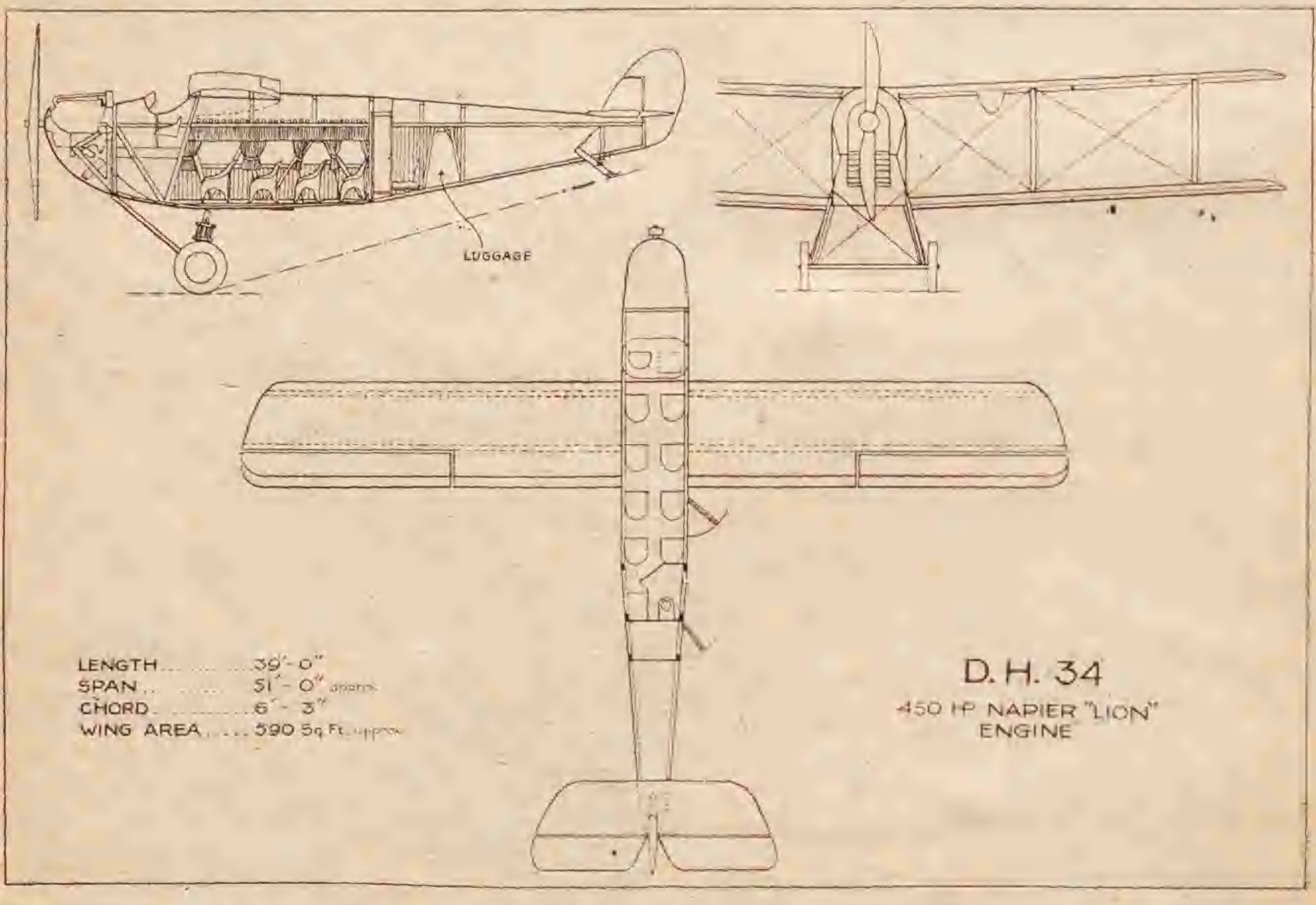
Apart from improvements in aerodynamic design, the D.H. 34 incorporates constructional simplification which makes for cheapness of manufacture. Its performance is also better than that of the 18, while the useful load is greater. The quick get-off and rapid pulling up after landing which characterise the 18 have been retained in the new type, so that altogether the machine has much to recommend it for commercial flying in the true sense of the word.

In the construction of the *fuselage* considerable simplification has been effected. This structure is now entirely covered with three-ply, so that there will be no trueing-up to attend to during use. Also, in case of a forced descent on the sea, this form of construction gives great flotation, as the cabin doors will be provided with means for watertight closing. The cabin occupies a large amount of the *fuselage* space, the main cabin being 12 ft. long by 4 ft. wide, by 7 ft. high. It is thus possible for the passengers to stand upright, and as there are numerous windows in the sides as well as roof lights, the cabin should be both light and airy, especially as ventilators are provided by means of which the used air is constantly sucked out through the roof, fresh air—either cold or hot as required—entering through pipes near the floor. Eight seats are arranged in the main cabin, a ninth being placed opposite the lavatory, and if desired the seat next to the pilot can be occupied by a passenger, thus bringing the total capacity up to 10. This gives a power expenditure of 45 h.p. per passenger carried, which is very good, especially as the cruising speed is 105 m.p.h. The pilot's cockpit is in front of the wings, thus giving an excellent view.

The engine installation is similar to that of the 18 already described in this journal. By undoing four bolts and the petrol and engine connections the whole engine unit can be removed. An underslung radiator is fitted which can be removed without disturbing the propeller. The petrol tanks are placed some distance out, under the top plane, and there are two independent low-pressure systems to a common filter and junction box. A fireproof bulkhead separates the engine from the rest of the machine. Danger from fire is further guarded against by the use of Blaisdell "Petro-Flex" at all points where relative movement occurs, and all rubber joints will be avoided.

In other respects, such as wings, tail, undercarriage, etc., the 34 is similar to the 18. The control system incorporates the differential *aileron* movement first experimented with in the type 29 cantilever monoplane. This has been found to give very good results. Ball-bearing controls are fitted throughout, and all cables passing over pulleys or through guides have been avoided. It is thought that this is a feature which will be appreciated by those responsible for running the machines, as control cables are a constant source of trouble.

The undercarriage is similar to that which has proved so successful on the 18's, its main feature being long shock absorber extension (12 ins.) and oleo damping gear. The whole undercarriage can be removed from the machine by undoing four bolts.

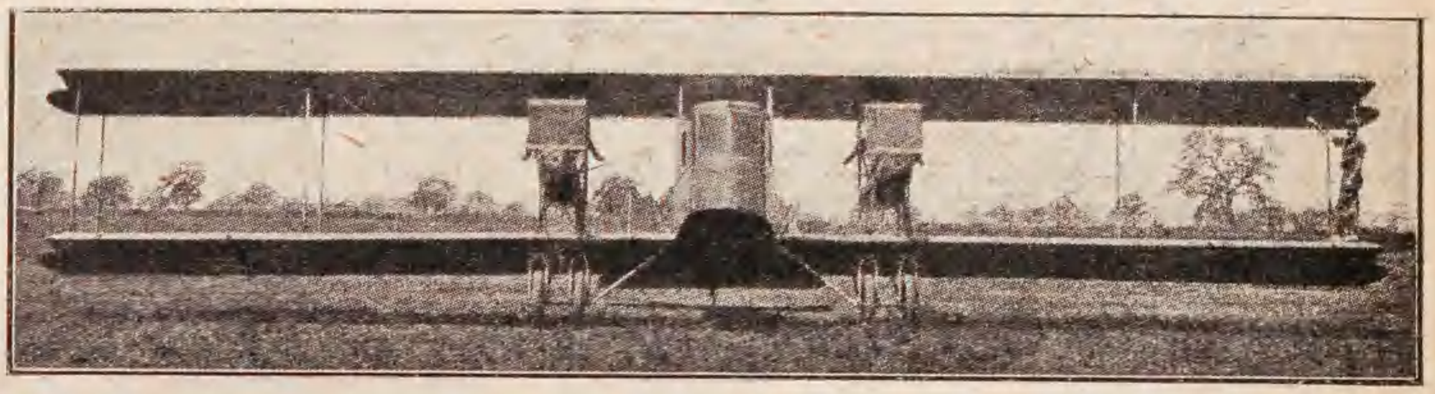

LUGGAGE
LENGTH.............39'-0"
SPAN.............51'-0" approx
CHORD.............6'-3"
WING AREA.....590 Sq Ft. approx
D. H. 34
450 HP NAPIER "LION"
ENGINE

The main characteristics of the D.H. 34 are as follows: Length o.a., 39 ft.; span, 51 ft.; height, 12 ft.; wing area, about 590 sq. ft.; weight of machine empty, but with water, 3,365 lbs.; pilot, 180 lbs.; useful load, 10 passengers with luggage, or about 2,000 lbs. of freight; 80 gals. of petrol, 575 lbs.; oil, 78 lbs.; wireless and electric lighting, 120 lbs.; total loaded weight, 6,218 lbs. approximately; wing loading, 10·5 lbs./sq. ft.; power loading, 13·8 lbs./h.p.; cruising speed, 105 m.p.h.; duration, 3½ hours at cruising speed.

Economical as was the D.H. 18, the 34 promises to be considerably more so, and the figure for ton-miles per gallon should work out very well as compared with other rapid means of transport, especially when it is remembered that this machine does its travel at the rate of over 100 m.p.h., while older means rarely average half of that speed. As there is a considerable reserve of power which can be used in case of head winds, etc., the machine should be able to maintain its average of 100 m.p.h. with good regularity, even under unfavourable conditions. Later on, when construction has progressed a little further, we hope to be able to publish sketches of some constructional details.

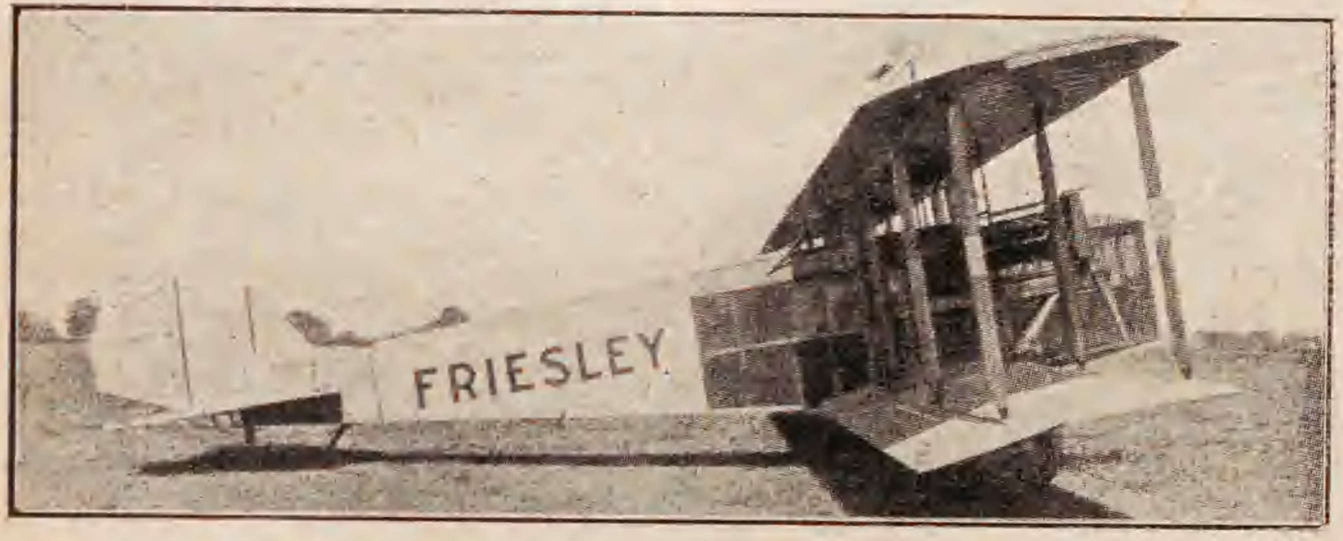
THE FRIESLEY "FALCON" CABIN BIPLANE

We give below some particulars, with accompanying illustrations, of an American-built 12-passenger twin-engined Liberty (low-compression) biplane, the Friesley "Falcon." This machine, which is of the enclosed cabin type, made its first public test flight last April at Friesley Field, California, piloted by B. M. Spencer (late of the U.S. Air Service), who was also responsible for the designing and building of the machine.



The Friesley "Falcon" Cabin Biplane: Front view.

The "Falcon" left the ground after a run of less than 100 yards at a speed of 45 m.p.h., and during its flight developed a speed of 90 m.p.h. with the engines throttled to 1,500 r.p.m. The balance proved to be perfect, and the ease of control, glide and landing exceeded the expectations of the designer. It landed at 40 m.p.h., and came to rest after a run of less than 200 ft. Only two private test flights had been carried out previous to this one, on the day before, each of about two minutes' duration.



The Friesley "Falcon" Cabin Biplane: Side view.

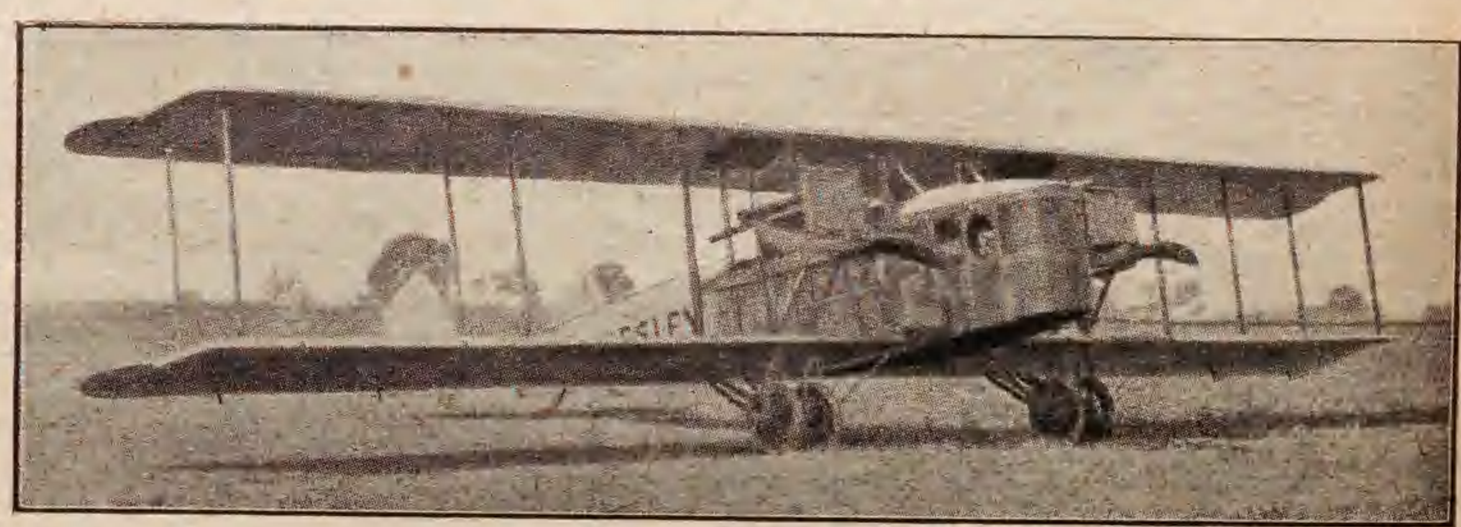
The cabin, formed by the fore half of the *fuselage*, is completely enclosed, and contains twelve wicker seats, arranged in two rows in tandem, with a space of 20 ins. between each seat. As the cabin has a clear width of 4 ft. 8 ins., there is thus a wide aisle down the centre. There is plenty of room for the passengers to stand erect, the height of the cabin being 5 ft. 8 ins. The cabin may readily be adapted for freight or mail work, and there being no cross-bracing of any description a large clear space is provided. The pilot's cockpit is in the extreme nose, and as this portion of the cabin extends out a considerable distance forward of the wings, the visibility is exceptionally good. Large windows are provided all round the sides of the cabin, and celluloid ports are also fitted in the roof, giving the pilot a good view overhead. All instruments are arranged on a desk immediately in front of the pilot, and under this desk, readily accessible, are the storage batteries for the engines.

Aft of the passengers' section is a luggage compartment measuring 4 ft. by 5 ft. by 4 ft.

Longerons of solid spruce are used for the *fuselage*, from nose to tail post, with bolted-on tie wire fittings. A hard wood block, glued and screwed and finally covered with tape, is placed where the fittings fasten to the *longerons*. *Fuselage* truss wiring is made up of $\frac{3}{16}$-in. 3 per cent. nickel steel rods, threaded right and left hand, and terminating in forks on each end.

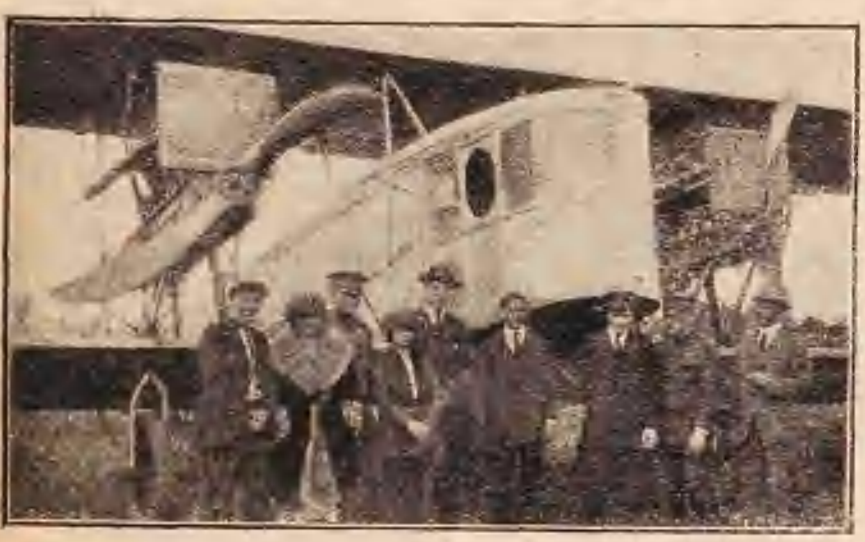
The *fuselage* is covered with plywood from the nose to a point immediately at the rear of the luggage compartment of the cabin, and from a point slightly forward of the tail skid to the stern post. The intermediate portion of the *fuselage* is covered with fabric. The tail skid is of steel tubing hung to a frame, also made of steel tubing, that fastens to all four *longerons*; the shock is taken by rubber cord.

One of the most unique features of construction in the "Falcon" is to be found in the rudder control. Instead of the conventional flapping wires running into the *fuselage*, the



The Friesley "Falcon" Cabin Biplane: Three-quarter front view.

control is conspicuous by its absence of exposed wires. Fastened to the rudder are short horns on which are pivoted two rods, which terminate in a semi-circular sliding yoke of steel tubing, that slides back and forth through a fitting mounted on the tail post. This yoke is actuated by the rudder control wires, which are completely enclosed. This allows a very clean-cut tail structure, and offers a minimum of resistance. The elevator control wires pass out of the tail and lead directly to the horns on the elevator—the total amount of exposed control wire being only about 2 ft. on each side. Rudders and *ailerons* are balanced. The stabiliser is adjustable by means of two screws controlled from the pilot's seat by a hand wheel.



THE FRIESLEY "FALCON" CABIN BIPLANE: Close up view, showing the 12-passenger cabin, and the two Liberty (low-compression) engines.

Fuel is carried in tanks situated under the floor of the cabin, and is pumped from these to a gravity tank of 40 gals. capacity, located on the top plane above each engine. The overflow is fed back through sight gauges in the pilot's cockpit. The oil tanks are situated on the engine bearers immediately behind the engine.

The engines are 12-cyl. low-compression Libertys, mounted midway between the planes, somewhat forward of the leading edge, and driving Paragon tractor screws of 9 ft. diam. by 7 ft. pitch.

A substantial landing gear is fitted, consisting of the double-yoke type housing a pair of Atlas spring wheels, there being one unit immediately under each of the power plants. Elimination of shock absorber cord and of the weakness of construction where this is employed are the features of this under-carriage.

The principal characteristics of the "Falcon" are as follows :—

Span	65 ft. 3 ins.
Overall length	40 ft.
Overall height	15 ft.
Chord	7 ft. 6 ins.
Gap	7 ft. 6 ins.
Wing section	U.S.A. 5
Angle of incidence (top)	3°
Angle of incidence (bottom)	2°
Area of main planes	897 sq. ft.
Area of *ailerons* (4)	120 sq. ft.
Area of stabiliser	53 sq. ft.
Area of rudders (2)	33·2 sq. ft.
Area of fins	26 sq. ft.
Weight of machine empty	5,600 lbs.
Weight of machine loaded	8,600 lbs.
Weight, sq. ft.	9·3 lbs.
Weight, h.p.	12·3 lbs.
Speed range	55–120 m.p.h.
Climb to 5,000 ft.	4 mins.

* * *

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING

A MEETING of the Committee was held on Wednesday, December 21, 1921, when there were present: Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S. (in the Chair), Wing-Comdr. W. D. Beatty, C.B.E., R.A.F., Mr. Ernest C. Bucknall, Col. F. Lindsay Lloyd, C.M.G., C.B.E., Lieut.-Col. F. K. McClean, Lieut.-Col. Alec Ogilvie, Mr. T. O. M. Sopwith, and H. E. Perrin, Secretary.

Election of Members.—The following new Member was elected: Christopher Rawson Mackenzie.

Racing Committee.—Reports of Meetings of Racing Committee held on November 28 and December 6, 1921, were received.

House Committee.—Report of Meeting of House Committee held on December 14, 1921, was received and adopted.

Finance Committee.—Reports of Meetings of Finance Committee held on December 14 and December 21, 1921, were received and adopted.

Flying Services Fund Committee.—Report of Meeting of Flying Services Fund Committee held on November 24, 1921, was received and adopted.

Air Conference, 1922.—The following were appointed to represent the Club at the Air Conference to be held in London in February, 1922:—Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., Lieut.-Col. F. K. McClean, Mr. T. O. M. Sopwith and H. E. Perrin.

Meeting of the Committee of the Fédération Aéronautique Internationale in Paris, January 9, 1922.—Lieut.-Col. M. O'Gorman was appointed to represent the Club at the Meeting of the Committee of the Fédération Aéronautique Internationale in Paris on January 9, 1922.

British Record.—The following British Record was passed:—Class "C," No. 4 B. *Greatest Speed* over a straight-line course of 1 kilometre (Fédération Aéronautique Internationale):—

Type, Gloucestershire Mars I.
Constructor, Gloucestershire Aircraft Co., Ltd., Cheltenham.
Motor, 450 h.p. Napier "Lion."
Pilot, J. H. James.
Place, Martlesham Heath.
Date, December 19, 1921.

Greatest speed (being the mean speed of four runs, in accordance with the regulations of the Fédération Aéronautique Internationale), 316.5 kilometres per hour (= 196.6 miles per hour).

Vacancy on Committee.—The acceptance by Wing-Commander W. D. Beatty of his appointment as Member of the Committee was reported.

Aviators' Certificates.—The following Aviators' Certificates were granted:—

7918	Stanley Baker, March 31, 1917.
7919	George Beacall Powell, December 8, 1921.

Custom Duties on Aircraft entering France.—It was reported to the Committee that the French Government had decided to levy duty on all British aircraft entering France after January 1, 1922.

The question of introducing the Tryptique having already been brought forward by the Club at the Conference of the Fédération Aéronautique Internationale in Madrid, it was decided to proceed with the negotiations through the Committee of the Fédération Aéronautique Internationale at its meeting in Paris on January 9, 1922.

* * *

R.A.F. Memorial Windows in Jerusalem

IN St. George's Cathedral, Jerusalem, two memorial windows have been completed to the memory of a New Zealand officer, Lieut. T. L. Steele, R.A.F., who flew out over the enemy lines near Nablus on April 10, 1918, and was never heard of again. The windows, given by his parents, were unveiled by Capt. Routh, R.A.F., and dedicated by the Bishop in Jerusalem, in the presence of Col.-Commandant Colville, Lieut.-Col. Ritchie and the men of the South Lancashire Regiment.

THE CURTISS MODEL CD-12 400 H.P. AERO ENGINE

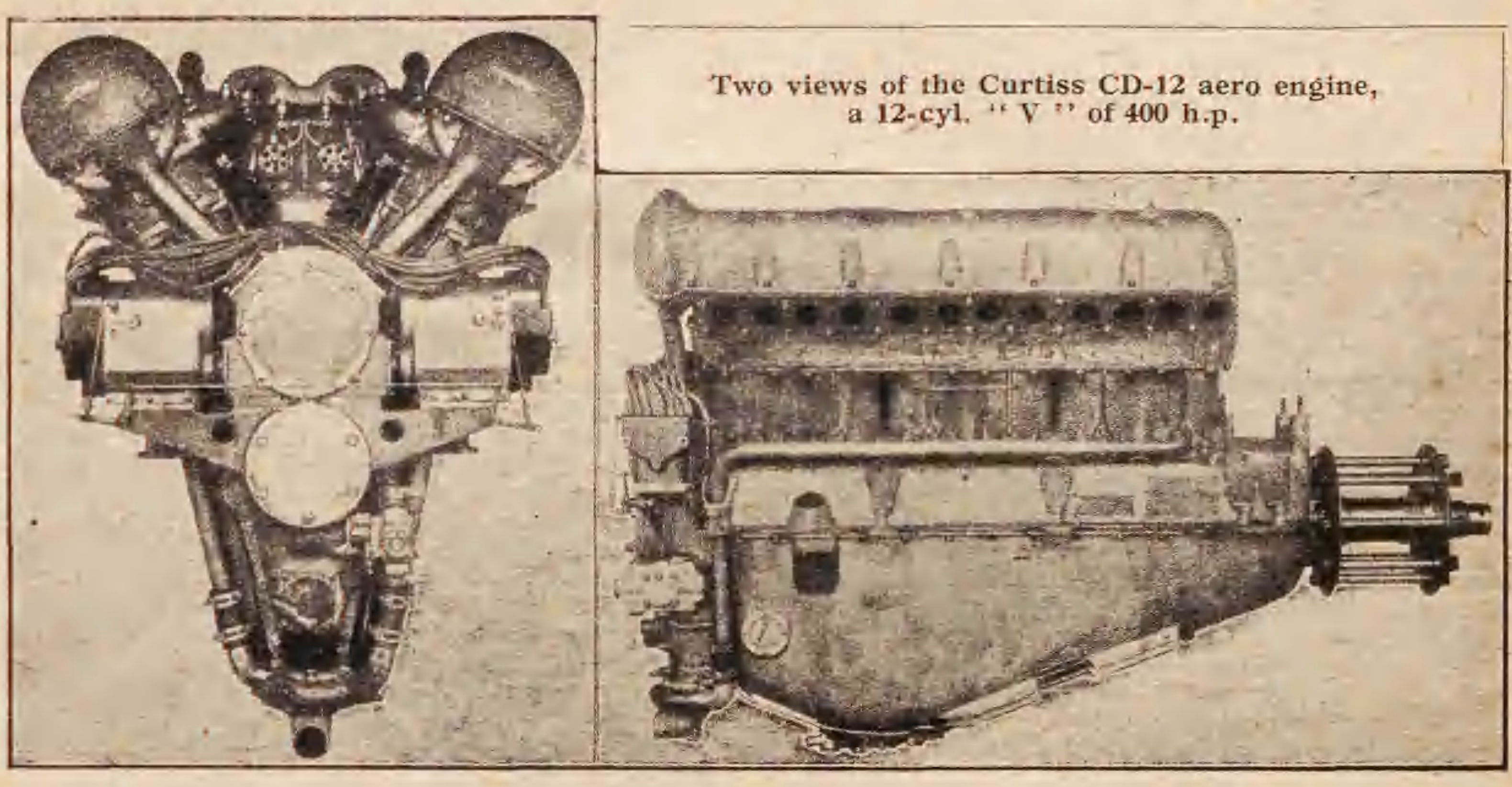
THE Curtiss model CD-12 400 h.p. aero engine is a development of the geared C-12 engine which made its first appearance four years ago, and which has, during that period, been subjected to thorough tests of various kinds. The CD-12, therefore, is not in any way an experimental model, but a production model. One of these engines was fitted to the Curtiss-Navy biplane which obtained first place in the second Pulitzer Race flown last November.

The CD-12, of which there are two types, a low-compression and a high-compression, is a 12-cylinder " V " with two rows of six cylinders set at 60°. The bore and stroke are 4½ ins. and 6 ins. respectively, and the engine has a total displacement of 1,145 cubic ins. The low-compression engine develops a b.m.e.p. of 137 lbs. per sq. in. in gauge, using high test fuel. With doped fuel the high-compression engine develops a b.m.e.p. of 143 lbs. per sq. in. The weight per b.h.p. comes out very low—2.27 lbs., including oil tank, water and radiator. In the low-compression model the b.h.p. at 2,000 r.p.m. is 385, and in the high-compression model at the same r.p.m. 405.

The general construction of the CD-12 is of the aluminium cylinder type, with inserted steel sleeves, and each cylinder is provided with two inlet and two exhaust valves, driven by overhead camshafts through bevel gears. The cylinder-head proper consists of an aluminium casting formed in one piece to take six separate sleeves. These sleeves are made of high carbon steel of hydraulic forgings, which are rough-machined, heat-treated and then machine-finished, with the exception of the final grinding of the bore, before assembly in the cylinder head. The sleeves are threaded at the closed end for a distance of 1½ in. At the lower end a gasket flange is formed, and on the outside of the barrel several stiffening flanges are located approximately 1 in. apart. An integral stud is formed on the closed end of the sleeve which passes through the water-jacket of the cylinder head after the sleeve has been screwed into the head, and a nut on this stud draws the closed end of the sleeve into perfect contact with the aluminium cylinder head. After the sleeves are in place the valve holes are bored and seated, being correctly placed and aligned with the proper fixtures. Brass bushings are inserted through the side of the head for the sparking-plugs, these bushings being tapered on the outside to ensure a tight joint. The water-jacket consists of a one-piece aluminium casting which slips over the lower end of the six sleeves. In order to make a water-tight joint at the lower end of this jacket, a composition gasket material, which resists the action of hot water, petrol and oil, is used. The upper joint, which is made between the jacket and the cylinder head with studs and nuts, is made tight with a copper asbestos gasket. The lower end of the water-jacket is constructed with proper bosses for holding the complete cylinder-head assembly to the crank-case, thereby forming a unit which is both compact and accessible for overhauling or inspection.

The pistons are made of an aluminium alloy, and are of the trunk type, carefully ribbed under the head to obtain strength and to dissipate heat. The ribs are arranged to allow even expansion from heat and to stiffen the pistons at the proper points. There are three rings per piston, the two upper rings being ⅛ in. wide and the lower ring $\frac{3}{32}$ in.—all being above the gudgeon-pin. An oil-collecting groove is located directly below the lower ring with oil holes drilled through the piston walls, two of which lead into the gudgeon-pin. The latter floats in the piston and connecting rod, and is held in place from lengthwise motion by means of snap rings made of piano wire.

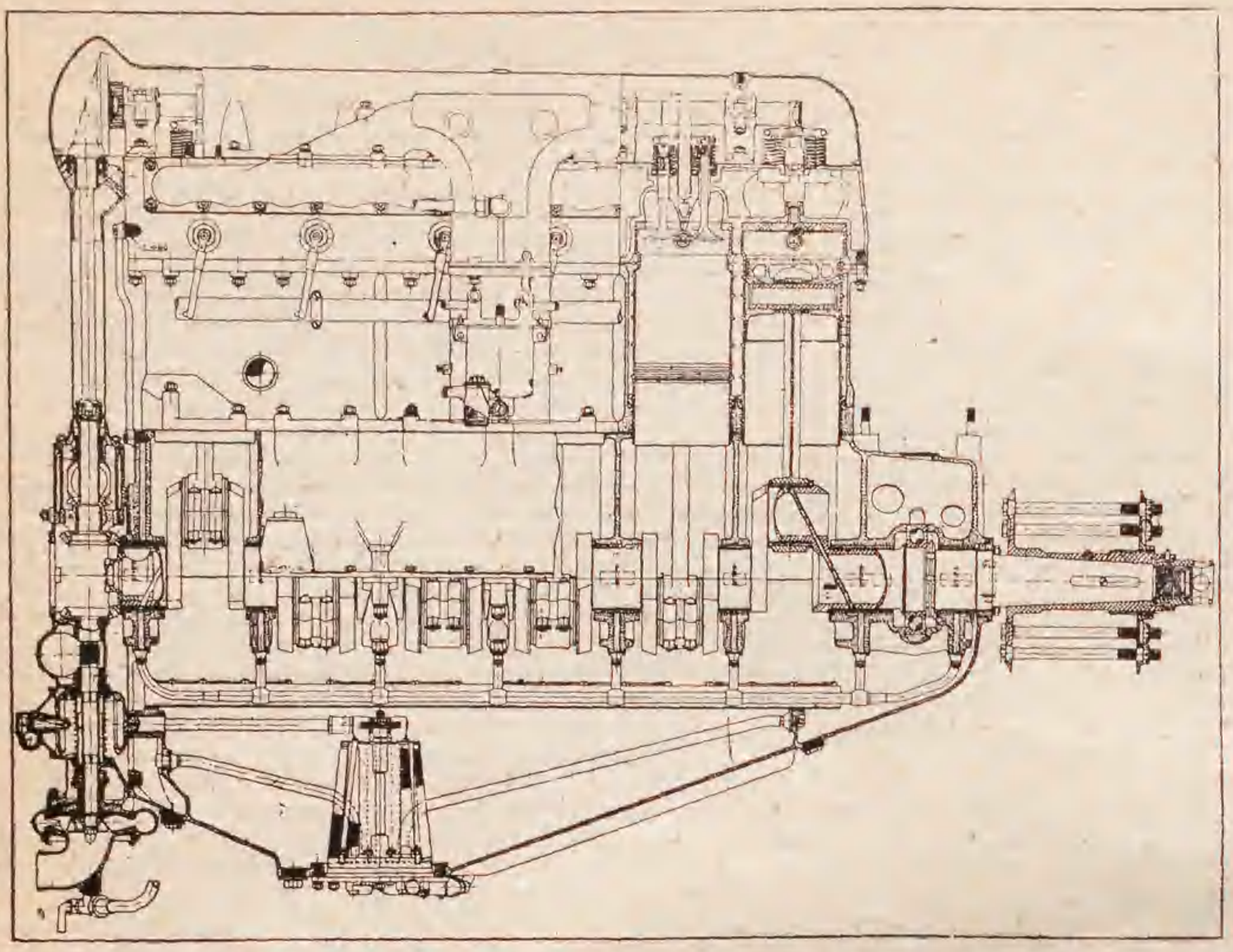
Inlet and exhaust valves are of the Tungsten steel tulip type, and are interchangeable. The cleared opening is 1⅝ in. in diameter, while the seat is $\frac{3}{32}$ in. wide. These valves seat directly in the steel cylinder head. The valve guides are made of cast iron pressed into the aluminium cylinder head, and need not be removed unless a replacement is desired. The camshafts are mounted on the top of the cylinder head on six aluminium brackets, the shafts running directly in the aluminium. There are separate intake and exhaust shafts, the intake shaft being driven from the exhaust shaft by means of spur gears. One cam operates two valves on each cylinder through a T-shaped tappet which works in a bushed hole in the cylinder head, and which removes all side thrust from the valve stems, giving an almost unlimited life to the valve guides themselves, as well as allowing the valves to seat perfectly. The valves are adjusted by a screw in the ends of the T tappets.



Two views of the Curtiss CD-12 aero engine, a 12-cyl. " V " of 400 h.p.

The crankshaft is of the conventional seven-bearing type, being made of 35-45 carbon-chrome nickel steel. The drop-forgings are heat-treated and then machine-finished. The crankshaft has an outboard bearing beyond the propeller thrust bearing, thereby giving a very long support at the propeller end of the engine. The crank-pins are 2½ ins. in diameter and 2⅛ ins. long. The main bearings are all 3 ins. in diameter, and vary in length from 1 in. to 3 ins. A bevel gear is bolted to the anti-propeller end of the crankshaft to drive all the accessories and camshafts. The propeller end of the crankshaft carries a 1-10 taper, fitted with a key for driving the propeller hub. The thrust bearing, which is mounted between No. 7 and No. 8 main bearings, consists of a deep-grooved radial annular bearing, which takes the thrust in either direction.

The upper half of the crank-case is cast from an aluminium alloy, and the bearings supporting the crankshaft are in single diaphragms strongly ribbed to the case. Bearing caps are used to form the other half of the bearings, and are of I-beam section. Each cap is fastened to the case with four studs fitted with castellated nuts. A large keyway is cut in the cap and crank-case, to prevent the former from shifting its position on the case when the engine is running. The bearings of the crank-case are fitted with bronze-backed babbet-lined bearing shells, which are held in place with countersunk-head brass screws. These latter hold the bearings in place, and also provide a better contact between the shell and the aluminium crank-case. The lower half of the crank-case is

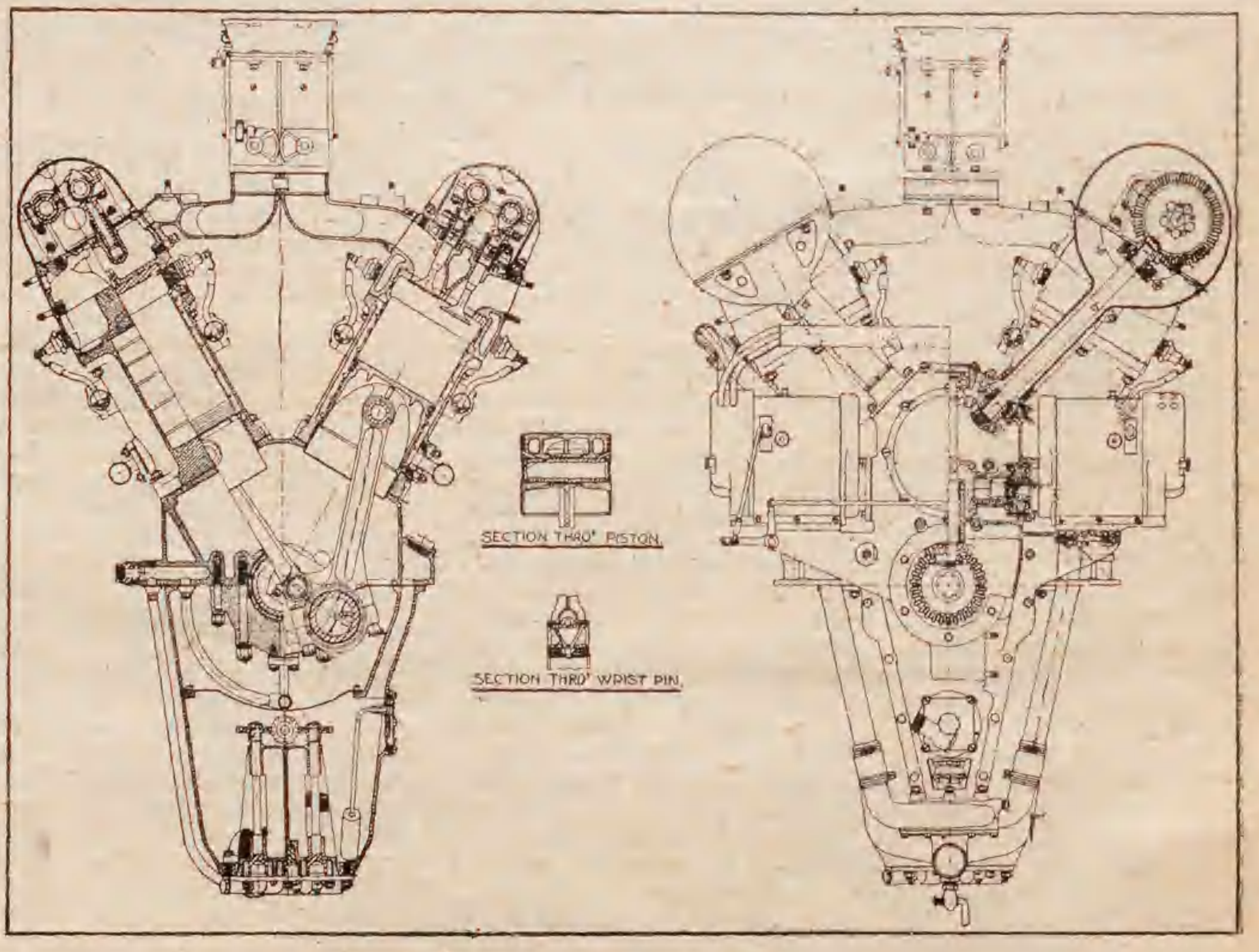


Side elevation, in part section, of the Curtiss C-6, 6-cyl. aero engine, which is similar in general detail to the CD-12.

flanged and bolted to the upper half at the centre line of the crankshaft. This case carries the oil-pump drive shaft and the oil reservoir, which is separated from the crank-chamber by a sheet-aluminium partition. The suction pumps are piped to each end of the case into small sumps, so that the crank-case cannot be flooded when the engine is out of normal position. An oil gauge of the cork-float type, with a dial on the outside of the crank-case, is fitted. On the anti-propeller end of the engine is mounted a casting which carries all the shafts necessary for driving the oil pump, water pump, revolution counter, electric starter, magnetos, generator, synchronisers and camshaft drive-shafts. This assembly consists of one unit and can be removed as such. All shafts and gears are put together with stud-toothed splines. The camshafts are driven through two drive-shafts by mitre gears. This is made possible by the use of a short vertical shaft extending from the crankshaft up to the point where lines from the exhaust camshafts form the proper angle for mitre gears. The generator drive is taken off the top of this vertical shaft, and the synchroniser drives are taken from the two camshaft drive-shafts by forming bevel gears on these shafts at approximately their centre. The tachometer drive is taken from a lower vertical shaft from bevel gears. This lower vertical shaft drives a water pump through a squared floating coupling, and also drives the oil pump through bevel and helical gearing, which is mounted on the top of the oil pump. A pad is formed on the gear-case to take the Bijur starter, which was developed for the Liberty engine. The magnetos are driven through flexible couplings and bevel gears from the upper vertical shaft. All the shafts in this gear-case run at one and a half crankshaft speed.

Connecting rods are of I-beam section of the articulated

Sectional end elevations of the Curtiss C-12 aero engine, which varies but slightly from the CD-12.



type. The master rod is always assembled in the left-hand side of the engine when the crankshaft is turning clockwise, so that the maximum pressure on the small rod will come in a line through its gudgeon-pin hole, wrist-pin hole and the crank-pin centre. These rods are steel drop-forgings, heat-treated and finished all over. The upper bushing is "non-gran" bronze, and the lower bushing is bronze-backed babbet, which is riveted in the rod and cap with brass rivets. The lower end of the small rod is forked, and carries two non-gran bronze bushes. Two 52-mm. Duplex Ball and Ball carburettors are fitted. Each venturi tube feeds three cylinders through a fan-shaped manifold, which is open to the three cylinders and carburettor without partitions. The two carburettor air intakes are interconnected with sheet-aluminium conduits, which can be led to the outside of the *fuselage*.

Ignition is furnished by two high-tension single-spark, 12-cylinder magnetos of the polar inductor type, driven through flexible couplings from the vertical shaft. There are two sparking-plugs per cylinder, connected to the magnetos by cables enclosed in aluminium tubes. The plugs are located at right angles to the centre line of the block and diametrically opposite. One magneto is wired to the "exhaust" plugs, and the other to the "inlet" plugs. These magnetos are equipped with a special switch which gives battery excitation for starting when the magnetos are fully retarded.

The cooling water is circulated by means of a centrifugal pump located at the lower end of the lower vertical shaft. This pump is of the double shrouded type, having an aluminium impeller with the intake on the lower side. Water is drawn from the radiators, entering the pump through the cover, and, after being discharged from the pump, is directed to the lower end of the water-jacket in each cylinder through tapered manifolds. The water surrounds the cylinder sleeves, and enters the cylinder heads through holes drilled in the latter, and circulates around the ports and passes out at a point between the valves on each cylinder into a tapered manifold. From this manifold the water passes back to the radiator. The water pump is equipped with a deep-grooved radial bearing, which takes the thrust of the rotor caused by the suction of the water pump. It is also provided with a suitable stuffing gland to prevent leakage.

Lubrication is by pressure feed from an oil pump located in the lower half of the crank-case and driven as previously described. The gear pump forces oil into a manifold, which directs the oil into the bottom of each main bearing. The main journals in the crankshaft are plugged, and receive oil through three equally-spaced holes in the journal. The oil then travels through a tube inserted from the journal to the crank-pin in the connecting-rod bearing. Tubes are also fitted in the articulated wrist-pin to carry oil from the connecting-rod bearings to the bearings in the small connecting rod. The cylinder walls and wrist-pins are lubricated by splash, whilst the upper vertical shaft is fed by pressure from a duct leading from the first main bearing. Oil is piped from the anti-propeller end of the crank-case from the last-mentioned duct to the camshafts through the foot of the first camshaft bearing. Each camshaft is drilled at each bearing, so that oil may find its way into the inside of the hollow camshafts, allowing oil to lubricate each camshaft bearing under pressure. The camshaft bearings do not receive the full oil pressure, as the holes in the first crankshaft main journal are so arranged that the camshafts receive index-feeding twice per revolution of the crankshaft. Oil from the camshaft bearing drains back into the front sump through the camshaft drive-shaft housings to the front gear-case, and lubricates the ball bearings which carry the camshaft drive-shafts. It also lubricates the lower vertical shaft, which is carried in two bronze bushings surrounded by a pocket of oil. The oil from the connecting-rod bearings and main bearings is drained into the front and rear sumps, to be drawn into the suction pumps through tubes connecting the pump with either end of the engine. The suction pumps then force oil into the oil reservoir below the oil partition. The pressure pump draws the oil through a truncated cone screen, thereby ensuring clean oil to be forced into the main bearings. A pressure-regulating adjustment is provided on the cover of the oil pump. This cover is also arranged for connecting an oil cooler in series with the outlet of the suction pump.

The petrol system which is used in the high-speed 'planes equipped with the CD-12 engine is laid out as follows:—A double opposed petrol pump, which is driven through worm gearing at approximately one-tenth of the vertical drive-shaft speed, and operates the pistons by means of a cam working in a slot in the connecting rod between the two pistons. This arrangement provides a crank-case in the pump which has a constant volume when the two pistons are reciprocating. Oil under pressure is supplied to this crank-case, and a suitable relief valve is provided to maintain a predetermined pressure. This oil pressure seals the pistons against petrol leakage, and lubricates the piston walls. The pump forces petrol to the carburettors, a small header tank being put in the line to dampen out pulsations. A relief valve is placed in the line to maintain a constant pressure to the carburettors. This relief valve overflows to the main tank.

The principal characteristics of the CD-12 are as follows:—

	Low comp.	High comp.
Rated h.p.	375	400
Normal r.p.m.	2,000	2,000
B.h.p.	385	405
Comp. ratio	5.7	6.1
		Lbs.
Weight, dry		700
,, with oil tank, water and radiator		922
	Low comp.	High comp.
	Lbs.	Lbs.
,, per b.h.p., dry	1.82	1.75
,, ,, with oil tank, etc.	2.4	2.27
Petrol consump., lbs./hr.	192.5	202.5
,, ,, b.h.p./hr.	0.5	0.5
Oil consump., lbs./hr.	3.00	3.24
,, ,, b.h.p./hr.	0.008	0.008
		Ins.
Bore		4½
Stroke		6
	Ft.	Ins.
Overall length	4	8½
,, width	2	4½
,, height	2	11

Personals

Married

On December 22, at St. Woollos, Newport, HENRY WOLFERSTAN BECK, R.A.F., was married to MATILDA GENEVIEVE LYNE.

On December 6, at Littleham Church, Exmouth, G. T. W. BURKETT, M.C. (formerly Australian Artillery and Lieut. R.A.F.), only son of Mr. G. Burkett and Mrs. Burkett, of Melbourne, Australia, was married to ADELAIDE HENRIETTA, elder daughter of Rev. F. W. Tracy and Mrs. Tracy, of 14, Morton Crescent, Exmouth.

Major HEREWARD DE HAVILLAND, D.S.O., M.C., third son of the late Rev. C. M. de Havilland, Rector of Crux Easton, was married at the Embassy Chapel, Madrid, on December 9, to MARY PROCTOR SWABY, only child of Mrs. J. de Solla, of Madrid, and the late Dr. William Percy Swaby.

The marriage took place at St. Augustine's Church, Johannesburg, on December 13, of SYDNEY MACKENZIE SPROAT and GLADYS MARY MEESON.

To be Married

The engagement is announced of ANTHONY CONNING KILBURN, late R.A.F., of Murrah Hall, Troutbeck, Cumberland, youngest son of Mr. and Mrs. C. Conning Kilburn, of Broadstone, Dorset, formerly of Calcutta, and MAUD, eldest daughter of Mr. and Mrs. C. TOPPIN, of The College, Malvern.

Deaths

ANTHONY PEER GROVES, second son of Margery and William Peer Groves, R.A.F., of 2, Chester Gate, London, N.W. 1, and Salford, died on December 17, from pneumonia.

LESLIE GRONOW WOOD, Flying Officer, R.A.F. ("SPLINTER"), second son of Dr. and Mrs. A. T. Wood, died on December 19, of illness contracted in Egypt.

THE NEW ROYAL AIR FORCE CLUB

DURING the War Lord Cowdray promised to give to the R.A.F. a Club-house, furnished and equipped complete, and that promise has been more than fulfilled in a magnificent building known as No. 128, Piccadilly, which was opened as the Royal Air Force Club on Monday, and which, including leases, represents a gift of £345,000. A preliminary view of the buildings was accorded to representatives of the Press on Saturday last, and at the following luncheon Brig.-Gen. More, Chairman of Committee, read a telegram from Lord Cowdray regretting his inability to be present, and concluding: "I shall be gravely disappointed if you do not find it in every way worthy of the Air Force, to which it is dedicated as a tribute. I have given it with thankfulness and pride." The Club-house consists of the two houses lately occupied by the Ladies' Lyceum Club, and also a large new building on Milton's Yard. The Lyceum Club building has been largely remodelled and an additional floor of bedrooms added to it, while the building on Milton's Yard used as a riding-school was demolished to make room for the new building, which has been designed as an extension of the Piccadilly building. It is interesting in this connection to note that during the building operations several pewter tankards of the eighteenth century were dug up bearing the inscription "The Running Horse"—probably one of the old coaching houses—and these are now on view in the hall of the new Club today.

Building operations commenced on September 8, 1919, and were confined at first to reconstructing the Piccadilly building with a view to its occupation in the summer of 1920, but in the meantime the negotiations for a long lease of Milton's Yard matured, and Lord Cowdray decided to complete the whole building forthwith. The work was continued as far as possible on the portion that had been started, while final plans were prepared for the new additions on Milton's Yard.

After many difficulties of rights-of-light, strikes, high prices and other troubles on that account, the new buildings were begun in the early part of 1921, and under the contract are due to finish on January 31, 1922.

If the planning of these buildings differs from that of other club buildings, it is in an attempt to meet the modern requirements of club members, who, in addition to the ordinary privileges of a London club, desire some of the additional advantages of an hotel, and also some facilities for taking exercise. To this end the Piccadilly portion of the building is entirely devoted to club life, with access from the main entrance in Piccadilly to the large dining, smoking, writing, billiard, card and other club rooms. The large dining-room on the Piccadilly front, extending over the whole length of the building, with a magnificent view over the park, is one of the attractions of this part of the Club.

In Park Lane there is a separate entrance for the use of members living in the Club or arriving with luggage, and close to this is a bureau, telephones, secretary's office, etc., where the business work of the Club is carried on. From this entrance a large ballroom on the first floor, the ladies' section of the Club, and two squash racquets courts are reached, so arranged that they may be used without interfering in any way with the members' club-rooms in the front of the building, but connected on the principal floors for convenience of access by the main corridors, which have been treated by the architects—Sir Aston Webb and Sons—to form an architectural feature of the building. On the upper floors, in addition to 70 members' bedrooms, with a full complement of bathrooms, a suite of rooms for private dinner parties, a barber's shop and men-servants' accommodation have been provided, reached by electric lifts and staircases from both the Piccadilly and Park Lane sections of the building.

Great care has been bestowed on the kitchen and service arrangements generally, which are very complete and up to date, as the successful working of a club of this kind depends very largely on the care and thought given to the service arrangements; and also the comfort of the Club's servants, who here have their proper share of comfortable recreation rooms, dining-rooms and sleeping accommodation.

The new parts of the building are fireproof throughout, and the whole is equipped with low-pressure heating, electric light and power, electric clocks, lifts, vacuum cleaners and a complete telephone installation. Refrigerating plant for ice-making and storage is also included in the equipment.

Messrs. Trollope and Colls are the general contractors, and they have also made the furniture for the public rooms.

The subscription to the Club is ten guineas for town members, seven guineas for country members and two guineas for foreign members.

LONDON TERMINAL AERODROME

Monday Evening, January 2, 1922.

THE aerodrome presented a busy scene—almost, indeed, like the height of summer—when a delegation of Japanese trade representatives paid us a visit on Saturday. A dozen cars were drawn up on the tarmac outside the Customs' House, and the Air Ministry was strongly represented.

General Sykes, General Festing, and members of the various branches of the Civil Department at the Ministry were present, pointing out to the visitors the many features of the aerodrome. Great interest was shown in the control tower, and a temporary ladder had been erected for the visitors to ascend into the hut on top. The ordinary cat-ladder was apparently considered too precarious, though the Japanese are always reckoned an agile race. The various Air Ministry machines were lined up for inspection, and the Handley Page W.8, and the Instone Air Line's Vickers-Vimy, were busy taking members of the delegation for joy-rides. The ease with which the W.8 gets off, and the machine's rapid climb, were the subject of much comment.

The staffs of the French firms are taking advantage of the winter dearth of business to visit their native land. M. Didier, for instance, has just returned from France, and assures me he has had a thoroughly good time.

London to Algiers by Air

M. DIDIER was able, incidentally, to give me some new details as to the Messageries Aérienne's proposed service from London to Marseilles. The company intends to use the new four-engined Spads on this service. The usual summer 9.30 a.m. Messageries machine from London to Paris will carry passengers for Marseilles over this section of the route, arriving in Paris at 11 a.m. A halt will be made at Le Bourget for lunch, after which the voyagers will embark in a new 16-seater Spad and fly to Lyons, where they will be timed to arrive at 3 p.m. Then, continuing to Marseilles, they will alight there at 5.30 p.m. It is hoped to arrange for the new airship service, running between Marseilles and Algiers, to connect at Marseilles with the aeroplane from London, thus making it possible to travel from London to Algiers in less than 24 hours.

On Tuesday last Handley Page Transport, in conjunction with the Victoria Hotel, put up a good advertising "stunt." A Christmas-tree was fitted in the fore-part of the cabin of one of their machines, and gaily decorated. A hamper, containing a full-course Christmas dinner, including turkey, was sent down to the aerodrome on the passenger-car from the Victoria Hotel, and a waiter in evening-dress—who was, by the way, a former Handley Page observer—travelled in the machine and served dinner to the passengers and pilot while *en route*.

"Air Expresses" in a Gale

ON Friday last, with a terrific gale raging, Mr. R. H. MacIntosh made another of his wonderful bad-weather flights. Two machines, both Handley Page O-400's, left Paris together, and made good time with the wind behind them as far as the French coast. Here they were caught by the full force of the Channel gale, which was blowing at a speed of somewhere in the eighties at the height the machines were flying. Mr. Wilcockson managed to land at the Berck aerodrome, but, after his passengers had alighted, and before anything could be done to the machine in the way of protecting it from the gale, it was caught broadside-on and lifted up on to one wing and then on to the other, being wrecked badly.

Mr. MacIntosh, who was just about to land, saw the accident, and decided it would be safer to carry on to Croydon, where there would be a proper staff to handle his machine. Although quite low down, and within a few hundred feet of the houses in the village of Berck, he put his engines full on and the machine rose straight into the air for about 3,000 ft. He had a tremendous fight to get across the Channel. At times both he and his mechanic had to hang on to the controls, and when he finally landed at Croydon, only managing to escape a crash by fine piloting, he had been 4 hours 35 minutes on the journey from Paris.

The Instone Air Line are erecting a new office in front of their original small office. This is, I understand, to be used as a parcels depôt, and is being got ready for the time when the new "goods only" machines begin running.

CIVIL AVIATION IN 1921

Half-Yearly Report of C.G.C.A.

[THE half-yearly report on the progress of Civil Aviation during the period April–September, 1921, was issued as a White Paper (Command No. 1559) on December 23. As usual it is signed by Sir Frederick Sykes, Controller-General of Civil Aviation, and contains statistics and other interesting data relating to the progress made all over the world during the period under review (April 1 to September 30, 1921). The report, which is obtainable from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, price 3*s*. net, is far too lengthy to publish in full, and we therefore propose to deal with only such portions of it as can be usefully reviewed and summarised. We thoroughly recommend all who are interested in aviation in any of its branches and applications to obtain a copy, and thus to be able to follow in detail the subjects and statements to which only the briefest reference can be made here.—ED.]

The fifth half-yearly report on the progress of Civil Aviation at home and abroad follows the lines of previous reports. Part I includes information regarding civil aviation in Great Britain and the Empire, and Part II its progress in foreign countries. In dealing with the question of relations with foreign countries, the report states that ratifications of the International Air Convention have been prepared by the British Empire, France, Japan, Belgium, the Serb-Croat-Slovene Kingdom, Greece, Portugal and Siam. Under Article 34 of the Convention ratification by a majority of the 26 signatory States (the British Empire counting for this purpose as six) is required before the International Commission for Air Navigation can be constituted. The ratification of only one more State is required before this can be done. The periodical Conferences between the Department of Civil Aviation and the French and Belgian Air authorities have been continued with, it is stated, satisfactory results.

The regulations adopted in 1919, which were based upon the principle that the owner of an aircraft should be responsible for the safety of the machine (the system of supervision by licensed ground engineers), are considered to have proved satisfactory. It is of interest to find it stated that negotiations are in progress with a view to establishing somewhat similar procedure in the case of foreign aircraft operating to and from England. Other countries have not as yet paid the same attention to the subject of maintenance.

Attention is called in the report to certain progressive improvements at Croydon, notably with regard to medical examination of alien passengers, and to the installation of bulk petrol storage and the establishment of a sub-post office.

In the matter of communications (Signals and navigation) progress has been made with direction-finding wireless, and it is stated that now that both Pulham and Croydon have been provided with stations working in conjunction, it is possible for aircraft to "fix" their position by bearings obtained simultaneously from the two stations. The radio-telephonic service with aircraft has been further developed. All British machines employed on the cross-Channel services carry telephones, and as soon as the ratification of the International Air Convention has been deposited, regulations will be issued which will make it compulsory for aircraft carrying ten or more passengers to be equipped with wireless.

Largely as a result of the experimental flights of "R.33," arrangements are now in course of completion whereby the Croydon-Lympne route could at short notice be opened for night flying.

Progress has been made in the compilation of data regarding aviation facilities in foreign countries, and records have been prepared showing existing facilities in a number of European countries. A gazetteer of the facilities in the British Isles is nearing completion.

Commercial Air Services

Apart from the statistics contained in tables at the end of the report, reference is made to the operation of the London-Paris air services under the temporary subsidy scheme entered into with the Handley Page and Instone companies. The services have been in operation throughout the summer of 1921 with, the report states, satisfactory results. It is pointed out that few machines of an improved economical commercial type were available, and that the temporary nature of the arrangement rendered it financially impracticable to provide large numbers of machines. In spite of these handicaps, there was a considerable increase in the average load carried per flight.

Reference is then made to the proposed "permanent" scheme of subsidy on a 25 per cent. basis and including the hire-purchase scheme by which firms are able to acquire machines of "approved" type at less than cost price. The report states, however, that by August 1, the date on which the scheme was to come into force, the experience gained during the summer had shown that the scheme as originally proposed was not likely to provide adequate assistance, and it was therefore amplified as follows: "An additional grant of £3 per passenger and 3*d*. per lb. of freight will be made to approved firms during the year ending February 28, 1923, while in addition a contribution towards the insurance of machines provided by the Air Ministry under the hire purchase system will be made in the form of 50 per cent. of the premiums up to a maximum of 10 per cent. of the value of the machines. This scheme, it is hoped, will become operative in March, 1922; meanwhile, special arrangements, similar to those now obtaining, are being continued for the operation of the London-Paris service during the winter months 1921-22."

The report states that, as it is considered that it would not be desirable to have unlimited competition, the number of firms has, for the time being, been limited to four. Of these, the Handley Page, the Instone and the Daimler Hire have been chosen to operate the London-Paris route, while one firm only, the Aerial Route Syndicate, Ltd., has been selected to run a London-Brussels service. It is stated that the Air Council do not contemplate approving more than three firms at any one time on the London-Paris route, although reserving the right to approve other firms should circumstances warrant it.

Some interesting information relating to developments in meteorology is given in the report, but we would refer those interested in this important branch to obtain the White Paper so as to derive the advantage of the complete report.

As regards licences and certificates, it is of interest to quote a few figures. During the period under review, 118 pilots' licences were renewed, 122 ground engineers, 104 certificates of registration of heavier-than-air machines and 4 lighter than air, and 45 airworthiness certificates for heavier-than-air craft. The corresponding numbers of new licences and certificates were as follows:—Pilots, 52; ground engineers, 38; heavier-than-air craft, 76; lighter-than-air craft, 2. Airworthiness certificates for heavier-than-air craft, 57.

It is interesting to note that a special certificate of airworthiness for racing machines has been approved, as such machines would be severely handicapped by having to conform to the rules applying to commercial machines.

Collection, Collation and Issue of Information.—With regard to the well-known "Notices to Airmen" (which are published in FLIGHT regularly), it is proposed in the future to make a slight modification in the manner of issue. Although numbered consecutively in the order of issue, they will appear under two heads—(*a*) Navigational and (*b*) General. In addition it is intended to issue a *Monthly Air Pilot* containing reprints of the Notices to Airmen, as well as other, and less urgent, information. The issue of an *Annual Air Pilot* is under consideration.

Airships.—On this delicate subject the report contains a brief statement of the facts which led to the suspension of all airship activity and the reduction of the personnel to care and maintenance parties. Reference is also made to various experiments made with airships during the period under review, notably experiments with mooring.

Regarding the progress of civil aviation in the Dominions, Colonies and foreign countries, the report contains some very interesting and valuable information, but we have not the space to refer to it at length here. Some of the numerous tables of data and statistics contained in the report and its appendices are, however, of interest.

For instance, the number of arrivals and departures of aircraft from and to the Continent between April and September, according to nationality, were as follows: British, 671; French, 1,058; Belgian, 339; Dutch, 292. The number of passengers carried on the same routes during the same period by machines of the different nationalities were: British, 4,006; French, 3,499; Belgian, 597; and Dutch, 420.

The total value of the imports (free and dutiable) by air from April to September was £206,357, and that of the exports was £110,400. The estimated number of outgoing letters posted for transmission by air was 42,840, and the number of incoming letters 38,696. The average efficiency of the outward air mail services was: On the London-Paris route, 95 per cent.; London-Brussels, 70 per cent.; London-Amsterdam, 89 per cent.

During the period under review (six months) there were two accidents resulting in the death of one or more occupants, two resulting in injury to occupants and six not involving injury to personnel, or a total of 10 accidents. The number of machine miles per flying accident was 32,200; the number of machine flights per flying accident, 1,718. Machine hours flown per accident, 415. Passengers killed per 1,000 carried, 0.03, and passengers injured per 1,000 carried, 0.03. These figures speak well for the safety of modern flying, and as they show a considerable decrease in accidents as compared with the corresponding period of last year, it may be assumed that as machines and organisation improved the percentage, small as it is, will be still further reduced.

An appendix by the Department of Civil Aviation states the case for civil aviation with remarkable clearness and without taking in any instance an exaggerated view of the service which aviation can and should render to humanity.

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NEW YEAR HONOURS

THE following appears in the New Year Honours list:—

The King has been pleased to give orders for the following promotions in and appointments to the Order of the Bath:—

K.C.B. (Military Division)

FELL, Group-Capt. (acting Air-Commodore) MATTHEW HENRY GREGSON, C.B., C.M.G., R.A.F. Med. Serv.

C.B. (Military Division)

BORTON, Group-Capt. AMYAS EDEN, C.M.G., D.S.O., A.F.C., R.A.F.

C.B. (Civil Division)

SMITH, WILLIAM SYDNEY, Esq., O.B.E., Superintendent of the Royal Aircraft Establishment, South Farnborough.

It is announced that the honour of Knighthood has been conferred upon Mr. A. S. Mays-Smith, President of the Society of Motor Manufacturers and Traders, and that Mr. Wm. M. Letts, C.B.E., has been promoted to Knight Commander (K.B.E.) of the Order of the British Empire, for public services. It may be added that Mr. W. M. Letts is Managing Director of Messrs. A. V. Roe and Co., Ltd.

AWARDS AND PROMOTIONS

The Air Ministry announces that the King has been pleased to approve of the following awards to officers of the Royal Air Force:—

Second Bar to the Air Force Cross.—Sqdn.-Leader William Ronald Read, M.C., D.F.C., A.F.C. (Capt., Dragoon Guards).

Bar to the Air Force Cross.—Sqdn.-Leader Roderic Maxwell Hill, M.C., A.F.C.

The Air Force Cross.—Flight-Lieut. Augustus Henry Orlebar, Flight-Lieut. David Arthur Stewart, M.C., D.F.C., Flying Officer Sidney Norman Webster.

Promotions

The following officers are promoted to the ranks stated, with effect from January 1:—

General List

Air-Commodore to be Air Vice-Marshal.—Philip Woolcott Game, C.B., D.S.O.

Group-Captains to be Air-Commodores.—Hugh Caswall Tremenheere Dowding, C.M.G., Bertie Clephane Hawley Drew, C.M.G., C.B.E., Charles Rumney Samson, C.M.G., D.S.O., A.F.C., Robert Hamilton Clark Hall, C.M.G., D.S.O.

Wing-Commanders to be Group-Captains.—Alfred Drummond Warrington-Morris, C.M.G., O.B.E., Norman Duckworth Kerr MacEwen, C.M.G., D.S.O., Hon. John David Boyle, C.B.E., D.S.O., Edward Featherstone Briggs, D.S.O., O.B.E., Peregrine Forbes Morant Fellowes, D.S.O.

Squadron-Leaders to be Wing-Commanders.—Dermott Lang Allen, A.F.C., Charles Humphrey Kingsman Edmonds, D.S.O., O.B.E., Richard Edmund Charles Peirse, D.S.O., A.F.C., Reynell Henry Verney, O.B.E., Thomas O'Brien Hubbard, M.C., A.F.C., Lawrence Arthur Pattinson, D.S.O., M.C., D.F.C., Hazelton Robson Nicholl, O.B.E., Arthur Thomas Whitelock, Robert John Ferguson Barton, O.B.E., William Lawrie Welsh, D.S.C., A.F.C., Hugh Lambert Reilly, D.S.O.

Flight-Lieutenants to be Squadron-Leaders.—William Bowen Hargrave, O.B.E., Hugh Vernon Champion de Crespigny, M.C., D.F.C., Ivor Thomas Lloyd, Eric John Hodsoll, Raymond Collishaw, D.S.O., O.B.E., D.S.C., D.F.C., Cyril Gordon Burge, O.B.E., Francis William Henry Lerwill, O.B.E., Charles Henry Elliott-Smith, A.F.C., Charles Oscar Frithiof Modin, D.S.C., Sir Christopher Joseph Quinton Brand, K.B.E., D.S.O., M.C., D.F.C.

Flying Officers to be Flight-Lieutenants.—Herbert Martin Massey, M.C., Geoffrey Arthur Henzell Pidcock, Cecil Alfred Stevens, M.C., Walter Travis Swire Williams, D.S.C., Samuel Marcus Kinkead, D.S.O., D.S.C., D.F.C., Seymour Stewart Benson, A.F.C., Edward Derek Davis, Peter Cundle Wood, Robert Allingham George, M.C., Frederick McBean Paul, Allen Robert Churchman, D.F.C., Bernard McEntegart, Peter Warburton, M.B.E., Frank Gerald Craven Weare, M.C., William Edmund Somervell, Alfred Conrad Collier, Kenneth Buchanan Lloyd, A.F.C., George Thomas Richardson, Maurice Henry Butler, D.F.C., William Geoffrey Meggitt, M.C., Eric John Webster, D.F.C., Herbert Edwin Tansley, M.C., Ian Cullen, A.F.C., George Cecil Gardiner, D.F.C., Arthur Vincent Howard Gompertz, Maurice Moore, Arthur Francis Quinlan, Percy John Barnett, M.C., Sydney Edward Toomer, D.F.C., Leslie Norman Hollinghurst, D.F.C., Clement Flegg Horsley, M.C., Charles Basil Slater Spackman, D.F.C., Ernest Lionel Ardley, Richard Michael Trevethan, M.C., Neville Byron Ward, Edward Reginald Openshaw, Reginald Thomas Brooke Houghton, A.F.C., Ralph Myddleton Bankes-Jones, James John Williamson, A.F.C., Owen Washington de Putron, Robert Hugh Hanmer, M.C., Victor Hubert Tait, James Matthews McEntegart, Robert William Edwards, James Alexander Gordon Haslam, M.C., D.F.C., Kenneth Lloyd Harris, Albert Grounds Peace, A.F.C., William Conway Day, M.C.

Stores List

Squadron-Leader to be Wing-Commander.—Walter John Dakins Pryce, O.B.E., D.C.M.

Flight-Lieutenants to be Squadron-Leaders.—William Boston Cushion, Eric Rivers-Smith, M.B.E., James Ambrose Stone, William Henry George Maton, M.B.E.

Flying Officers to be Flight-Lieutenants.—Arthur Benjamin Wiggin, William Arthur Kingston, Ernest William Crosbie, Frederick Thomas McElwee, Arthur Myrtle Saywood, Harry Leonard Woolveridge, Arthur Elias Sutton-Jones, Patrick John Murphy, John Henry Dale, Edward Ernest Porter, M.B.E., D.C.M., Edwin Harold Eldridge, Maurice Jewison James, M.B.E., Reginald Harry Smyth, M.C., Alfred Horace Comfort, Henry Sewell Alger, Leonard Arthur Lavender, Richard Adams, Lamont Smith, Charlie Young Mitchell, John Augustus Plunkett.

Medical Service

Squadron-Leader to be Wing-Commander.—Henry Wakeman Scott, M.B., B.A.

Flight-Lieutenants to be Squadron-Leaders.—Robert Ernest Bell, M.B., Gerald Struan Marshall, O.B.E., Eric William Craig, M.C., M.B., Robert Andrew George Elliott, M.B., B.A.

Flight-Lieutenant to be Honorary Squadron-Leader.—William Rous Kemp, B.A.

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German Gliders for Britain

As a direct result of the interesting experiments carried out in the Rhön Mountains in Germany during last summer, considerable interest is now being taken in the problems of gliding and soaring. Not only are the German experiments to be continued this year, but France has planned a gliding competition also. In this country, although, judging from the number of enquiries which we have received, there is considerable interest in the subject, nothing definite has been planned. The chief reason for this is probably that the problem of constructing scientific gliders has not hitherto received any attention here. We now learn, however, that the Aachen glider on which Klemperer remained aloft for 13 minutes may be introduced in this country if sufficient interest is found to exist. The agency for this type of glider has been acquired by Mr. J. T. P. Jeyes, of 38, The Crescent, Northampton, who will be pleased to give further information relating to the details of the Aachen glider.

THE ROYAL AIR FORCE

London Gazette, December 23, 1921.

General Duties Branch

Flight Lieut. G. E. Wilson is placed on half-pay, Scale B; Nov. 28. Pilot Offr. on probation D. J. Hugh-Jones is confirmed in rank; Oct. 28.

Memorandum

Hon. Sec. Lieut. W. J. Gayes relinquishes his hon. commn.; March 25, 1919 (since granted short service commn.).

London Gazette, December 30, 1921.

General Duties Branch

The follg. are granted permanent commns. as Flying Offrs., retaining their present seny.; Nov. 17.—C. F. Horsley, M.C., R. M. C. MacFarlane, M.C., C. E. Maitland, D.F.C. Flight Lieut. H. H. Balfour, M.C., is granted a permanent commn. as a Flying Offr., with effect from April 26, 1920 (*Gazette* May 4, 1920, apptg. him to a short service commn., is cancelled (since promoted).

The follg. Flight Lieuts. resign their permanent commns., and are permitted to retain rank of Major.—O. Stewart, M.C., A.F.C.; Dec. 22. J. R. McCrindle, M.C., O.B.E.; Jan. 1, 1922. Flight Lieut. W. Man, D.F.C., resigns his short service commn.; Dec. 8. Flight Lieut. G. H. Errington relinquishes his short service commn. on acct. of ill-health, and is granted rank of Maj.; Dec. 31. Flying Offr. F. Edwards is placed on the Retd. List, and is granted rank of Capt.; Dec. 31.

Stores Branch

Flight Lieut. H. P. Bridges resigns his permanent commn., and is permitted to retain rank of Capt.; Jan. 1, 1922. Flight Lieut. J. W. Gage is placed on the retired list on account of ill-health; Dec. 31.

The follg. Pilot Offrs. on probation to be Flying Offrs. on probation; Aug. 9.—J. W. Gray, F. O. Hall, B. C. Powell, H. A. Murton.

Medical Service

J. W. Harper, M.D., is granted a short service commn. as Flight Lieut. with effect from, and with seny. of Dec. 14. Capt. J. S. Smith, Army Dental Corps, is granted a temp. commn. as a Flight Lieut. while attached for duty with the R.A.F., with effect from Nov. 1, 1919, and with seny. of Jan. 27, 1919. He will continue to receive emoluments from Army Funds.

Nursing Service

The follg. ladies are confirmed in the appts. as Staff Nurses, to date from June 15.—Miss N. M. M. B. Brown, Miss N. C. M. Kelly.

Memoranda

Sec. Lieut. J. H. Jacques to be Lieut.; June 5, 1919.

The follg. relinquish their temp. commns. on ceasing to be empld., and are permitted to retain their ranks.—Lieut. F. O. Rose; Oct. 24, 1919 (substituted for *Gazette*, Nov. 7, 1919). Maj. P. L. Teed; Dec. 20. Lieut. J. H. Jacques relinquishes his temp. commn. on account of ill-health contracted on active service, and is permitted to retain his rank; June 8, 1919 (substituted for *Gazette*, June 20, 1919).

Lieut. A. T. Sheldrake, H.L.I. (T.F.), is granted a temp. commn. as a Sec. Lieut. (A.); Aug. 1, 1918 (since deceased).

Four Cadets are granted hon. commns. as Sec. Lieuts., with effect from the dates of their demobilisation.

Hon. Sec. Lieut. G. H. Atter is deprived of his commn. on conviction by the Civil Power; July 18.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

Squadron Leaders.—R. B. Ward, A.F.C., from No. 29 Group Headquarters (Coastal Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22. G. J. Watney, O.B.E., from Egyptian Group Headquarters (Middle East Area) to R.A.F. Depôt (Inland Area). 7.11.21. J. C. Quinnell, D.F.C., from No. 3 Flying Training School (Inland Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22.

Flight Lieutenants.—T. Q. Studd, D.F.C., from School of Army Co-operation (Inland Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22. G. H. Hooper, M.C., D.F.C., from No. 207 Squadron (Inland Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22. V. R. Scriven, A.F.C., from H.M.S. "Pegasus" (Mediterranean Group) to No. 267 Squadron (Mediterranean Group). 1.12.21. G. W. Biles, D.F.C., from Central Flying School (Inland Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22. C. H. Young, M.B., from R.A.F. Depôt (Inland Area) to No. 1 Flying Training School (Inland Area). 30.12.21. J. H. Porter, M.C., M.B., from No. 1 Flying Training School (Inland Area) to R.A.F. Depôt (Inland Area). 15.1.22. G. H. H. Maxwell, M.B., from School of Technical Training (Men) (Inland Area) to Inland Area Aircraft Depôt (Inland Area). 6.1.22. A. E. Barr-Sim, M.B., from R.A.F. Depôt (Inland Area) to School of Technical Training (Men) (Inland Area). 4.1.22. C. W. T. Baldwin, from Inland Area Aircraft Depôt (Inland Area) to R.A.F. Depôt (Inland Area). 6.1.22. H. McWilliams Daniel, M.B., from No. 31 Squadron (India) to Aircraft Park (India). 28.11.21.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN DECEMBER 18 AND DECEMBER 31, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon-Paris	36	110	12	25	30	2 30	D.H. 4 G-EAWH (1h. 59m.)	B. (2), D.H. 4 (1), D.H. 18 (2), G. (4), H.P. (2), Sp. (5), V. (1).
Paris-Croydon	38	76	9	29	28	3 27	D.H. 18 G-EAWW (2h. 19m.)	B. (3), D.H. 4 (1), D.H. 18 (2), G. (5), H.P. (3), Sp. (5), V. (1).
Totals for 2 weeks ...	74	186	21	54	58			

*** Not including "private" flights. † Including certain journeys when stops were made *en route*.**

‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).

F = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.

P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

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Egyptian Disturbances and Aeroplanes

A VERY effective measure to cope with the disorders in Egypt was, under martial law, announced last week in Suez, as follows:—"If aeroplanes perceive an assembly they will drop smoke bombs; if the assembly does not disperse they will drop shells and open fire with their machine-guns."

Washington Conference and Aircraft

So far nothing has been settled at Washington regarding aircraft limitations, but on December 30 a report was forthcoming from the Committee of Experts to which has been delegated the study of the possible control of aeroplanes in war. The findings, it is stated, of the experts would be discouraging if from the outset there had not been a feeling that little could be expected in this direction from a conference of limited membership. They suggest that the question can best be considered at a gathering of wider scope, and confess their inability to make practical proposals either as to the number of aeroplanes which a nation may have for military use or their form of build. It is, however, understood that the Sub-Committee on aviation will recommend in their report that there be no limitation to the construction of aircraft, but that there shall be a clear definition as to their use in war-time.

British Money for Helicopters

On dit that the Air Ministry is asking the sanction of the Treasury for the offer of a £50,000 prize for a design of helicopter which will reach an altitude of 2,000 ft., remain stationary there for half an hour, be able to descend with engine stopped, and have a horizontal speed at 2,000 ft. of at least 60 m.p.h., carrying the pilot and one hour's fuel. If there is any truth in the rumour, the machine is presumably intended for military purposes, as its value to commercial aviation is negligible. In any case, the technical science relating to helicopterism is so vague at the present day that the taxpayer's money would probably be quite safe for a number of years.

A Duration Record Broken.

IT is reported from Mineola that Ed. Stinson, the young American "stunt" pilot, and Lloyd Bertand have just succeeded in remaining in continuous flight for 26 hrs. 19 mins. 35 secs. They were flying an all-metal (? J. L.) monoplane, and started off from Long Island on Thursday morning last, in a snowstorm. The breaking down of the oil pump brought the flight to a close. The present duration record was established by MM. Bossoutrot and Bernard with 24 hrs. 19 mins. 7 secs.

Controversy over Michelin Cup

ACCORDING to reports from Paris, events in connection with the Michelin Cup have taken an unexpected turn. The performance put up by the Italian aviator Capt. Martinetti over an Italian circuit of 3,000 kms. has, the report states, been disputed by the French Aero Club on the grounds that Martinetti, they allege, failed to land at his point of departure after terminating the flight. There is also some talk of Martinetti having changed machines in the course of his flight, which is, of course, contrary to the regulations. It is not to be expected that the Italian Aero Club will accept this decision straight away, and probably some lively correspondence will follow during the next few days. If the reported decision of the French Aero Club is to stand, Poirée would appear to be the holder of the Cup for 1921, his performance having been the best French one, with an elapsed time of 37 hrs. 23 mins. In the meantime French aeronautical journals are suggesting that the regulations should be altered and the competition held during the summer months so as to avoid the danger of the autumn fogs.

Paris-Constantinople Line Initiated

THE two French pilots, MM. Deullin and de Marmier have just completed an out-and home flight between Paris and Constantinople, by way of blazing the trail for the regular service to be started later on. Leaving Paris on October 10 last, they covered the distance of 1,770 miles between the two capitals in 17 hours' actual flying time, having made long halts at Strasbourg, Prague, Budapest, Belgrade and Bukarest. They left Constantinople for home on November 7, and de Marmier arrived at Le Bourget on December 22, his flying time being 18 hrs. Deullin stopped at Nancy the same day. It is proposed to inaugurate a regular service shortly.

Siam and Aviation

DURING his "round-the-world" journeying Lord Northcliffe made a stay at Bangkok, and on December 23 he visited the aerodrome at Don Muaung, where Sir Ross Smith alighted during his Australian flight in 1919. *The Times* correspondent states that Lord Northcliffe was surprised to find the air station equal to most of those in Europe.

Siam, he states, has 25 landing-places and five aerodromes. At Don Muaung there are 115 'planes, including school machines, and a staff of 650 men.

It looks as if there should be a good opening for British development in this land of promise.

No. 1 Aeroplane Supply Depôt Reunion Dinner

IT is proposed to hold a Reunion Dinner of Officers of the late No. 1 Aeroplane Supply Depôt (St. Omer, Marquise and Cologne).

The dinner will take place at the Hotel Cecil on Saturday, January 28, 1922, at 7 p.m.

All those interested are asked to communicate with Capt. J. F. Bargman at "Inglefield," Osborne Road, South Farnborough, Hants.

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PUBLICATIONS RECEIVED

Report on the Health of the Royal Air Force for the Year 1920. Vol. 1, Air Publication 875. London: H.M. Stationery Office. Price 6s. net.

Fuel for Motor Transport. Second Memorandum by the Fuel Research Board. London: H.M. Stationery Office. Price 6*d*. net.

Converting a Business into a Private Company. By Herbert W. Jordan. London: Jordan and Sons, Ltd., 116-117, Chancery Lane, W.C. Price 1s. net.

A Short Course in Elementary Meteorology. By W. H. Pick, B.Sc. London: H.M. Stationery Office, Imperial House, Kingsway, W.C. Price 1s. 6*d*. net.

Report No. 115. Bending Moments, Envelope, and Cable Stresses in Non-Rigid Airships. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 68. Vortices and the Related Principles of Hydrodynamics. By A. Betz. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

SIDE-WINDS

A MOST informative and helpful data sheet relating to aluminium sheet, sections, bar, strip, wire and cable has just been compiled and issued by the British Aluminium Co., Ltd., of 109, Queen Victoria Street, London, E.C. The sheet gives in table form the weight, area, etc., relating to aluminium in these various forms, and should be very useful in the drawing-office. A copy may be had on application to the above address.

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APROPOS of the favourable comment which has been evoked concerning the new gas starter for aero engines which the Bristol Aeroplane Co., Ltd., have produced, they desire us to draw attention to the considerable amount of experimental work which had previously been carried out by the Royal Aircraft Establishment on gas starters. The work at the R.A.E. on gas starters was in the hands of the late Major Norman, the well-known authority on air-cooling, and a debt is due to his memory for the measure of development which was reached. Whilst the Royal Aircraft Establishment were responsible for the first idea of the power gas starter and for its early development, the apparatus the Bristol Aeroplane Co., Ltd., have produced is a result of further close study of the requirements which starters have to fulfil, and they have been able to place on the market a very compact light-weight starting engine to meet a need which has long been felt by the aircraft constructor. This is only another example of the valuable research work which the R.A.E. are continually carrying on, and which is of immense service to the development of British aeronautical equipment.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published December 29, 1921

24,426. H. MIDDLETON. Ornithopters or bird-winged flying machines (172,077.)

24,514. T. W. FOSTER and A. DOOLEY, sen. Universal swivel workshop stand for engines. (172,080.)

24,979. S. EVANS. Man-power aeroplanes. (172,103.)

25,110. F. H. PAGE and HANDLEY PAGE, LTD. Wings for aircraft. (172,109.)

25,689. SOC. ANON. DES AEROPLANES, G. VOISIN. I.C. engines. (150,740.)

25,906. GAS ACCUMULATOR CO. (UNITED KINGDOM), LTD., and A. G. WATSON. Devices for indicating direction of ground wind. (172,141.)

36,247. V. A. ALMONACID. Air screws. (172,229.)

Published January 5, 1922

19,220. GOODYEAR TYRE AND RUBBER CO. Balloons. (147,162.)

25,617. D. C. LINE. Man-power aeroplane. (172,410.)

25,723. A. M. FOTHERINGHAME. Combined magnetic compass and dip indicator. (172,412.)

28,111. A. PERADOTTO. Apparatus for indicating inclinations of aeroplane in flight. (151,996.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued*

(Continued from p. xiv.)

LUBRICATING OILS—
Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cheery," Cent. London.

MACHINING—
Arnott & Harrison, Ltd., Hythe Road, Willesden Junction. Willesden 2297.
Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—
British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—
Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

METAL PARTS AND FITTINGS—
Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.
Grahame-White Company, Ltd., Hendon, N.W. 9. Kingsbury 120.
London Office: 12, Regent Street, Pall Mall, S.W. 1. Regent 2084.
Monk Engineering Co., High St., Coventry.
Coventry 807; "Assistance," Coventry.
Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Jan. 19	**Lecture, "Aeroplane Installation," by Brig.-Gen. R. K. Bagnall-Wild, before R.Ae.S.**
Feb. 2	**Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.**
Feb. 7 & 8	**Second Air Conference at Guildhall**
Feb. 16	**Lecture, "Methods of Instruction in Aeroplane Flying," by Sq.-Leader Portal, before R.Ae.S.**
Mar. 2.	**Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.**
Mar. 26–April 2	**Nice Meeting**
Mar. 30	**Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**

EDITORIAL COMMENT

A Curious Attack on the R.A.F.

ONE of the most amazing attacks which has ever been made on the organisation of the Royal Air Force was launched in the *Pall Mall Gazette* on January 5, when that journal announced in glaring head lines and "shouted" from its placards that there is "Chaos in the Air Force," that the "Present state of the Force is a National Peril," and that "The aerial Defence of the Country is a Plaything of the 'Military Dictatorship.'" Those who, prompted by curiosity, waded through the mass of allegations most of which were alleged to be made by "one of the highest authorities" or "a distinguished officer," found Captain Guest swept aside as little more than a political chief, Sir Hugh Trenchard described as the "Dictator of the Air Force," the internal organisation of the R.A.F. referred to as thoroughly unsatisfactory, and the whole atmosphere as bad. The last epithet appears peculiarly apt in relation to the article itself, the atmosphere of which is so bad that one fails to grasp the sequence of the whole thing.

Most of the statements made are gross exaggerations, others are pure mis-statements of fact, while others again are merely ludicrous. The general impression left after reading the effusion is that it is partly due to some disgruntled R.A.F. or ex-R.A.F. officer (and not such a very "distinguished" one either, we imagine), and partly to some string (or leg?) pulling by someone at the Admiralty.

It has long been known that forces are incessantly at work at the Admiralty with the object of overthrowing the single Air Force, and re-instating a separate Naval Air Service. We have repeated so insistently for years the fallacy of that policy that there is no need to enter into the pros and cons. again now. These efforts are merely the manifestations of the nervousness of an obsolescent Service which sees its existence threatened.

To deal but briefly with some of the statements made: With regard to the personal criticisms of Sir Hugh Trenchard, little need be said. The loyalty of the Royal Air Force is not likely to be shaken by such attacks. Sir Hugh is too well known and (but for those inefficients who have found him a strict chief) well liked to be affected by remarks which obviously come from some one with a supposed grievance. As to the "Military Dictatorship," Sir Hugh Trenchard is, admittedly, an old Army officer, but has he ever let his better acquaintance with the Army override the claims of the Navy? Frankly, we think not. If proof were needed it may be adduced from a list of ex-naval officers who hold important posts in the R.A.F., compiled by Major Blake and published in the *P.M.G.* of January 6. It is sufficient, without going into details as to the posts held, to mention the names: Air-Commodore Steele, Commodore Briggs, Air-Commodore Lambe, Air-Commodore Swann, Air Vice-Marshal Vyvyan, Air-Commodore Scarlett, Group Captain Clarke Hall, Air-Commodore Masterman, Air-Commodore Samson and Wing-Commander Cave-Brown-Cave. All of these officers, with naval records, hold important and responsible positions. Is that an indication of Military dominance? Moreover, it may as well be stated for the benefit of those who are not aware of the fact, that while the squadrons working with the Army have had to use war types of machines, the Navy has had up-to-date machines, designed and built since the Armistice. Does that indicate that the water-tight compartment Navy is being treated as a Cinderella as regards *matériel?* The whole truth of the matter is that the Admiralty has practically and persistently refused co-operation with the R.A.F., generally on the flimsiest of grounds, as, by way of instance, that the officers could not be spared (for training) so long away from the sea.

As regards the allegations of lack of organisation: When the end of the War brought about an enormous reduction in the Army and Navy as well as in the R.A.F., an entirely new organisation had to be planned. It is inevitable that in the consequent upheaval mistakes might be made. Were none made by the Army, or even by the infallible Navy? There was this difference, however, that in the Navy there were centuries of experience and precedent to draw upon. Sir Hugh Trenchard was faced with the enormous difficulty of having to *create*, where the wiseacres at the Admiralty had merely to see what their predecessors did in the past under similar circumstances and carry on for another few decades as before. As we have said already, mistakes may have been made in the initial stages of R.A.F. organisation, but taking it as a whole we think there has not been much with which to be dissatisfied. Upon occasion, we have in a friendly spirit crossed swords with Sir Hugh Trenchard, and shall no doubt do so again when necessity arises, but the indiscriminate allegations in the *Pall Mall Gazette* are upon a totally different plane, are an outrageous travesty of the facts and not worthy the reputation of a newspaper with so great a past.

Major Blake, in his communication against the attack, makes several excellent points, such as, for instance, with regard to the allegation that the *esprit de corps* of the R.A.F. has almost disappeared. He says: "A 'Distinguished Officer' who deplores the lack of *esprit de corps* and then attacks the service to which he belongs is certainly not competent to criticise."

Some of the statements made are merely ludicrous. For instance, "At all times the influence of inefficient officers is bad." Precisely. This has upon occasion been found to be so, even in the Navy. And it was realised by the R.A.F. when the time came for reductions. Hence they were allowed to leave the R.A.F. and to become "distinguished officers" lamenting the lack of *esprit de corps*, and the lack of appreciation in a chief who simply would not see what excellent fellows they were. "Many accidents have been due to ignorance." There is a volume of deep thought behind that statement. When the bows of a destroyer cave in because the ship is too hard pressed, it is not due to the ignorance of the designer in failing to get his stresses right. Surely not. It cannot be ignorance, because the designer was an Admiralty man, and therefore omniscient. And so the supposed "chaos" meanders on until it arouses doubt even in the uninformed by its very absurdities.

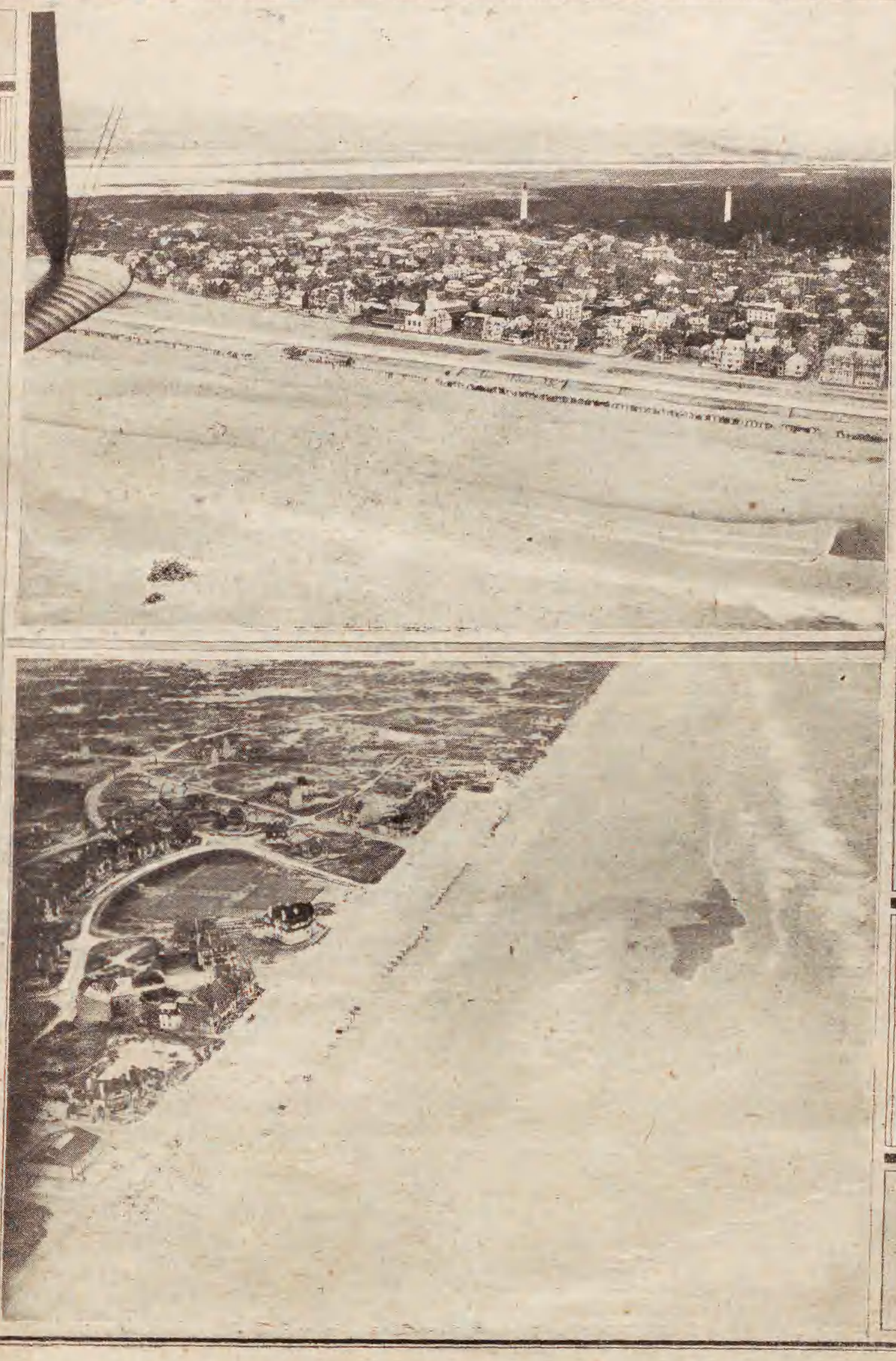
In the same issue of the *P.M.G.*, Rear-Admiral Sir W. R. Hall makes a plea for single control of the Navy and its air arm. On the whole, the claims of the gallant Admiral are moderately stated, and at any rate they are straightforward and honest. That they come from a retired officer of a service which promises to become in time obsolete amply explains the views expressed. One may take it that the gallant Admiral has not had the opportunity of obtaining a very intimate knowledge of the "air arm," and hence he cannot be expected to see the matter other than from the restricted and purely Naval point of view. His statement that "the present scheme does not work" (with the Navy) is already answered by the fact that its alleged failure to work is entirely due to the hostility of the Admiralty and its refusal to give it a chance to prove that it will work. He contends that it will be a long time before aircraft will be in a position to keep the seas without the assistance of the Navy. Perhaps, and perhaps not. But on the other hand it will certainly not be long, if not already here, before the Navy will be totally unable to keep the seas without the assistance of the "Air Arm."

* * *

An R.A.F. Rejoinder

The article in the *P.M.G.* has drawn from Sir Cecil Lambert, Director of Personnel, R.A.F., an extremely able defence, during which Sir Cecil refers to a few only of the things accomplished by the R.A.F. since the Armistice. Sir Cecil, it will be remembered, was Fourth Sea Lord in 1913, and as such was responsible for drawing up the organisation which was adopted for the R.N.A.S. As he says, "the Navy as a whole did not take kindly to the Air Force at its inception, and even after war broke out rather despised than encouraged it. Finally, in 1917, the then Board of Admiralty threw the whole thing overboard, and in the spring of the following year the separate Air Force came into being, and *supremacy in the air was at last attained*." The italics are ours, and comment is, we think, superfluous. There we have, in a nutshell, the whole story of the Navy's attitude from the commencement, and incidentally proof of the fallacy of letting the Navy again run its own air service.

Sir Cecil says, with regard to the alleged failure of the "Naval partnership" or co-operation between the Navy and the R.A.F.: "There are practically no Naval officers with any knowledge of airmanship, but this is in no way the fault of the Air Ministry. The Admiralty were asked to lend or have a quota of officers seconded each year for four years' training in aviation. The offer was refused on the inadequate ground that naval officers could not be spared so long away from the sea; on the other hand, arrangements have been made for ensuring that Air Force



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LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE:

No. 22.—*Top:* Le Touquet; *Below:* The French Coast near Etaples.

personnel shall remain with the units employed in co-operation with the Navy for a period of four years, and thus efficiency is secured." At whose door must the failure of the partnership be laid? Certainly not at that of the Air Ministry.

◆ ◆ ◆

And Second Thoughts

After its first violent attack on the organisation of the R.A.F., the *Pall Mall Gazette* effects a complete, and not very graceful, *volte-face*. It proceeds to complain of the neglect of the flying services, refers to them as "our first line of defence," and sounds, in an article by Lieut.-Col. C. R. Finch-Noyes, D.S.O., late R.A.F., a warning note on the danger of neglecting the R.A.F. While we are spending approximately £2 per head per annum of the total population on the Army and £2 on the Navy, we are spending 8*s*. 5*d*. only on the Air Force. It is refreshing to find Col. Noyes filling the breach to enable the *P.M.G.* to set itself right again, but certainly nobody could adduce, from the first article, that this was what the *P.M.G.* was driving at. If we have misread the original article, then it is evident the methods adopted by the *P.M.G.* to plead for the future of the Air Force were most chaotically conceived. There was a great chance to help a great national cause which, by bad handling, ignominiously failed. The sincerity of its later-day apologies is not very satisfying.

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Aircraft Carriers at Washington

It is a matter for the greatest satisfaction to be able to record that the agreement reached at Washington in the matter of aggregate tonnage allowances for aircraft carriers is materially different from Mr. Hughes' original proposals. These were, it may be remembered, that the United States and this country should each be allowed aircraft carriers aggregating 80,000 tons, while Japan was to be allowed 48,000 tons. The clause about replacements, however, placed this country in a very unfavourable position, as we already have approximately the prescribed tonnage, while the U.S. and Japan have nowhere near that to which the proposal would entitle them. Consequently, while the U.S. and Japan would have been free to construct up to the limit of their allowance, we should have had to stand by and watch them benefitting from our past experience, while we were unable to make progress under the hampering clause. As actually reached, the agreement is not only much fairer to us, but the aggregate tonnage has, for all three countries, been nearly doubled. This is all to the good, since the problems relating to aircraft carriers are so novel that to limit the tonnage to 80,000 tons would mean seriously hampering development.

Under the new agreement, however, Great Britain and the United States are each to be allowed an aggregate tonnage of 135,000 tons, and Japan 81,000 tons. Also, the aircraft carriers have been exempted from the restriction of the ten years' holiday and replacement conditions applying to other types of ships. It therefore seems as if each of the Powers is practically free to construct modern aircraft carriers up to the limit of their allowances. The only point on which it appears that any controversy can arise is the interpretation of the term "obsolete experimental tonnage," which, according to the agreement, may be replaced. The development is so rapid that an aircraft carrier is really always experimental, and it is almost obsolete before it is completed. In this country all the aircraft carriers, with the exception of the "Hermes," which is still building, have been converted into aircraft carriers from cruisers, liners, and battleships. Apart from the "Hermes," which is quite a small ship (11,000 tons), and well below the maximum of 27,000 tons for individual carriers, the majority of the others are certainly to be considered as obsolete experimental, with possibly one or two exceptions. The amount of new tonnage to which this country would be entitled will therefore be considerable, while the other countries, starting practically from rock bottom, will have available for new construction almost their whole allowed tonnage.

From the point of view of national policy, this is highly satisfactory, showing as it does that an increasing importance is being attached to the use of aircraft in co-operation with the Navy, while as regards the aircraft industry, with which we are directly concerned, the building of aircraft carriers necessarily means also the building of aircraft, and hence one more step towards that aerial preparedness which will in the future be our best guarantee of peace.

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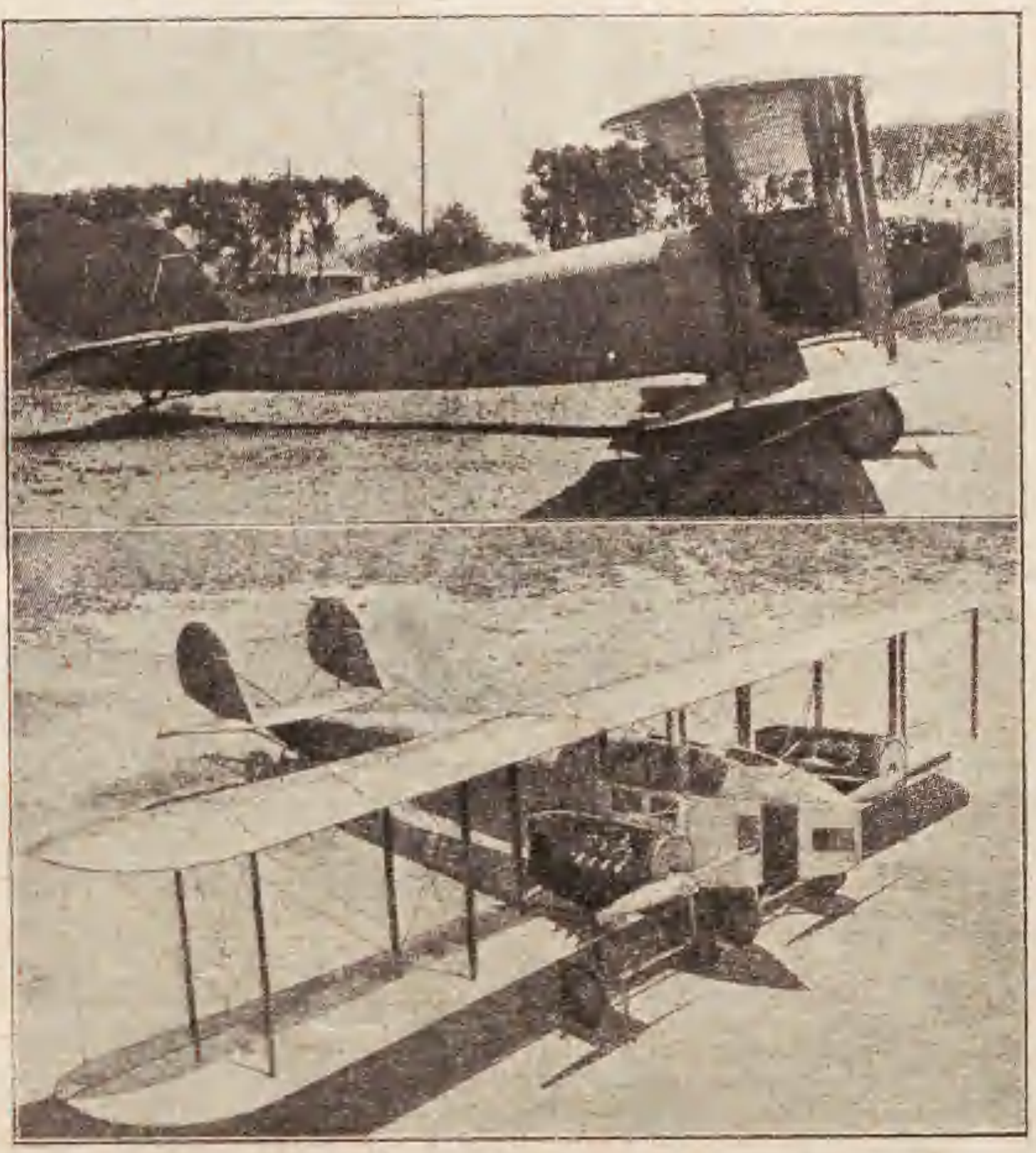
Mapping from the Air

Apropos recent discussions relating to surveying from the air, Professor Melvill Jones has a long letter in *The Times* detailing certain difficulties which have been encountered in securing accurate data from aerial photographs. In particular, he draws attention to the inaccuracies consequent upon different angular positions of the camera when the photographs are taken. Experience has shown, he says, that the required order of accuracy is not generally attainable when the aeroplanes are flown by pilots who have not been specially selected or trained for the work. It is true that even when large unknown tilts occur it is possible to calculate these tilts accurately by a method known as resection—that is, to calculate the tilts from the position of the plates of known ground marks that have been accurately surveyed independently. This method is being developed, but it is thought that it will involve the fixing of too many points by independent ground surveying, and that it requires too much office work to be commercially successful except in special cases.

All of which sounds not especially hopeful for the future of surveying from the air. Commander Boothby, however, scores a distinct point in another letter to *The Times*, in which he says that if Professor Jones could persuade the Air Ministry to allow him to repeat his experiments, using an airship, his difficulties would be easily overcome. An airship, he points out, can place herself vertically over any desired position and stay there. The work of the observer with the camera is thus rendered more simple than when he is hurtled over the spot at 80 miles an hour in an aeroplane, even when in charge of a specially selected pilot. Commander Boothby concludes: "Thanks to the Air Ministry policy, all our airships are now rotting in their sheds, but I have no doubt that the Germans will be pleased to assist Professor Melvill Jones in the very near future, if no British airship can be provided." Bitter, but nevertheless too true.

THE BARNHART TWIN 15 "WAMPUS-KAT"

EVEN if the aviation industry is in a bad way out in the "States," as their reports have it to be, they have one advantage over our own state of affairs, and that is, there appear to be plenty of firms in a position to turn out new and experimental machines of various types, both for Government and commercial purposes. Within the past few months we have seen particulars of or references to about a dozen different new American machines of more or less original design.

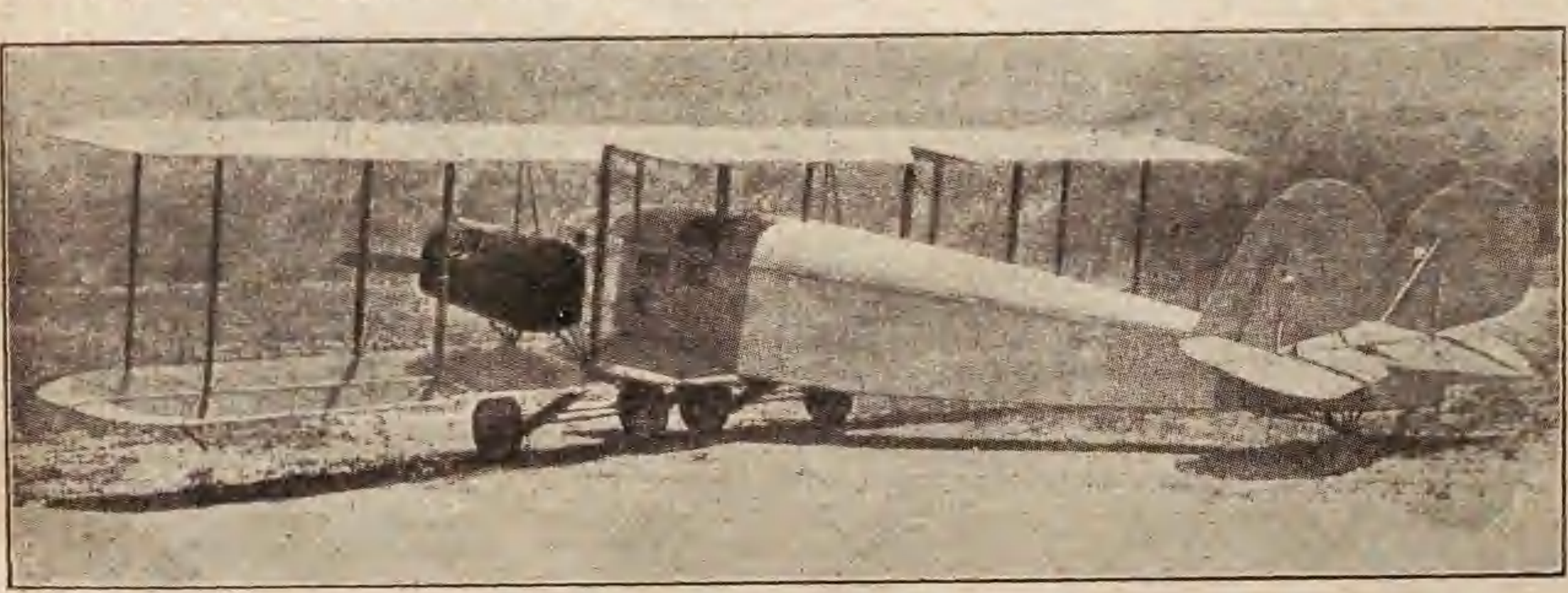


THE BARNHART TWIN 15 "WAMPUS-KAT." Side view (top) and three-quarter front view from above.

One of the latest of these is the Barnhart Twin 15, "Wampus-Kat," a medium-sized, moderate-powered twin-engined commercial biplane, a product of the C. R. Little Aircraft Works, of Pasadena, California. The design of the "Wampus-Kat" is the result of some months' study and planning on the part of G. E. Barnhart, with the financial assistance of C. R. Little, a retired business-man and aviation enthusiast. The main planes are of equal span and chord, without stagger or sweepback, and are of the folding type. The folding operation takes very little time, and is accomplished by releasing four lock pins and four master pins. Dummy or auxiliary struts are provided which properly space the upper and lower planes in relation to their fittings. There are also provided spacer bars, which tie the wings, when folded, to the *fuselage* at the rear outer struts.

During the tests the machine, with the wings folded, was towed over very rough ground at 30 m.p.h., and there was no shake to the wings, nor was any alignment or tightening of wires required. It was also towed through streets and traffic with the wings folded back, and after arriving at the flying field, the machine only required a matter of minutes to make ready for flight. The hinge on which the wings turn is a universal joint, so that there is little likelihood of it being overloaded due to any angularity of the wings or deflection of the spars. With the wings folded the engines are exceptionally accessible.

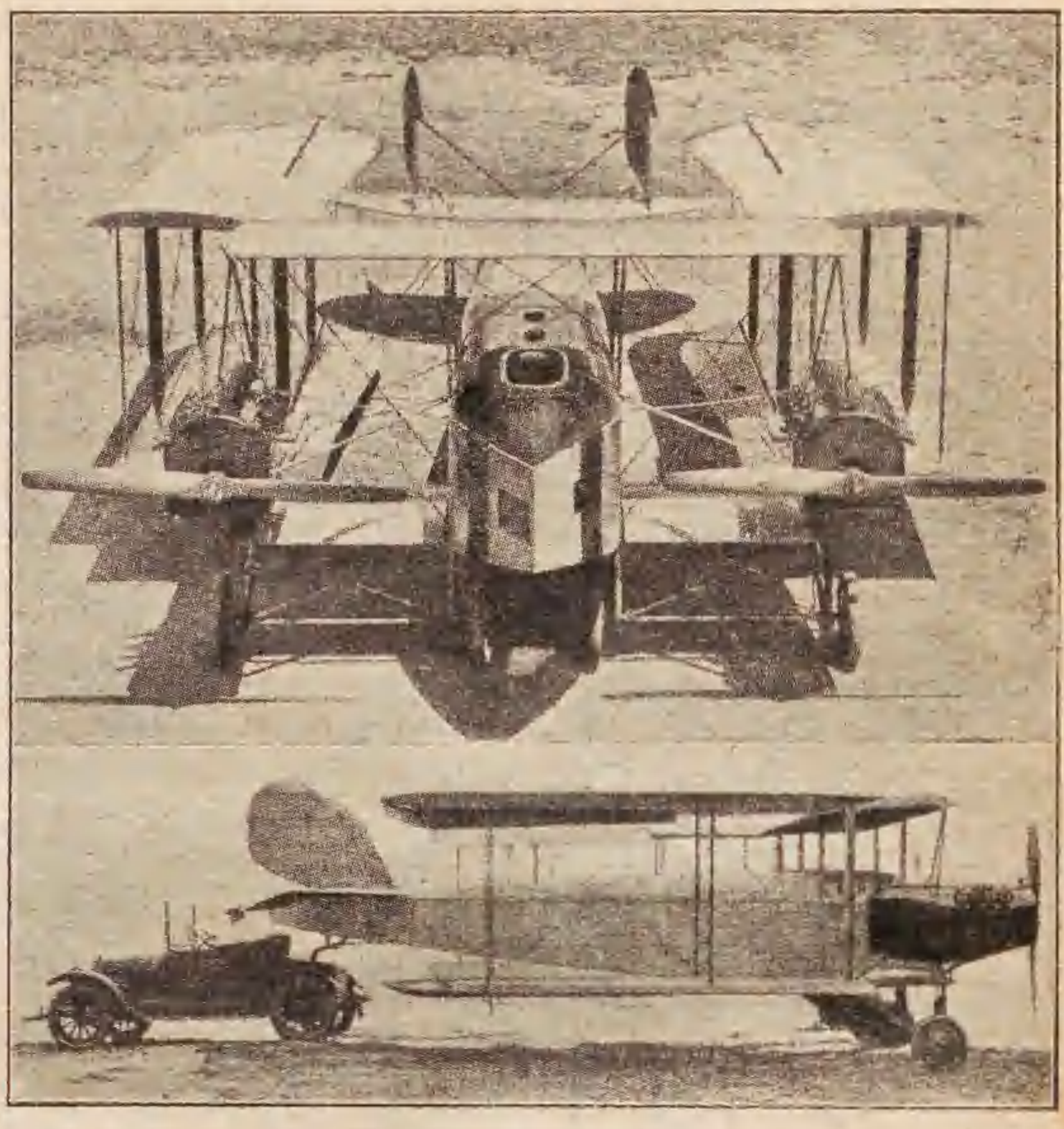
There are seven wing panels; a top centre section extending from port to starboard engine mountings; two lower centre sections running from *fuselage* to engine mountings; and the four upper and lower outer panels, which are of the same shape and size. The wing section employed is R.A.F. 6A. The struts form a three-bay system with lift wires double and landing wires single; between the *fuselage* and engines all wires are duplicated. The main spars are of hollow box girder construction, with block external and internal strut points. These blocks are all properly tapered so as to allow the bending stress being brought in gradually to the strut points. The ribs have spruce webs with lightening holes and reinforcement for horizontal shear. The attachment to the spar is by U shear blocks, which relieve the cap strips of vertical shear load. Cap strips are of spruce with a groove for the ribs. All internal and external fittings are mild steel, of clean cut simple design for ease of production. The wings are internally braced with double steel wires and adjustable turnbuckles. All external strut fitting bolts straddle the spar, and are prevented from sliding by special blocks and bolts through the neutral axis of the spar, which gives the fittings a permanent tie. Where the wings join the *fuselage*,



THE BARNHART TWIN 15 "WAMPUS-KAT." Three-quarter rear view.

or each other, there are pin joints parallel to the neutral axis of the spars. The covering is grade A linen, sewn on to the ribs, and given six coats of dope and three coats of Cosmolac varnish. *Ailerons* are hinged to both upper and lower planes.

The *fuselage* is of rectangular section, and is well stream-lined. In its design an effort has been made to maintain consistent and uniform strength throughout, and special attention has been paid to the ease and quickness of effecting repairs. It is built up of four ash *longerons*, with spruce struts for transverse and vertical members, the whole structure being trussed with steel wire and adjustable turnbuckles. The floor and dome of the pilot's and passengers' cabin is of mahogany three-ply wood with natural finish. Accommodation for four persons is provided for in the passengers' cabin, the seats being readily removable, which enables the number of passengers or goods to be carried to be arranged as desired. Ventilation doors are provided in the dome of the cabin in addition to a large emergency door. Two side windows are provided for each passenger, and in the floor ahead of the passengers is a large negative observation lens through which all the passengers may view the ground. Ample room is provided as the floor space is 6 ft. by 3 ft. 8 ins., and at the rear of the seats is a space for luggage. The pilot's cabin is in the nose, forward of the passengers. For vision the pilot has three side windows, and one in the floor, whilst, in addition, he can see above him through the opening in the dome. Entrance to the cabins is through the floor in the nose of the *fuselage*. All control wires and attachments are protected against the catching of clothing or jambing by passengers or goods. The outside of the entire *fuselage* except the cabin dome is fabric covered; the fabric is laced on to the *longerons* and struts on three sides of the *fuselage*, bottom and sides, the top being a detachable turtle deck. The *fuselage* is large enough for a man to work inside making any adjustment, and with the laced fabric and breaker strips he can open any portion that might require repairs.



THE BARNHART TWIN 15 "WAMPUS-KAT." Two views of the machine with the wings folded for transport.

Special "Dep." control is employed for elevators, *ailerons* and rudders, and the engine controls—duplex throttle spark retard, and switches—are within easy reach of the pilot. All instruments—one for each engine of the following: tachometer, oil pressure gauge and thermometer—are mounted in full view of the pilot.

The landing gear is of the four-wheel type, and is exceptionally strong. Two wheels are mounted below the *fuselage*, and one under each of the engines, the inner and outer wheels being connected by a tubular steel axle. The construction is of wood and steel. Each wheel is carried by a U of nine lamination ash, 2½ by 2 ins., streamlined with a hollow spruce fairing. The entire strut assembly is wrapped with linen treated with dope and natural varnished surface. Steel spools with side thrust and ground friction arms are used on which to wrap the rubber absorber cord, and guard or check cables allow the latter to absorb up to six times the weight of the machine. Any additional load in landing is transmitted direct to the struts through the cables. The front members of the inner and outer U's are connected by tubular steel tie-rods, and braced by double steel cable, the rear members being braced with single cables.

The engines—which are, we believe, 90 h.p. Curtiss eight-cylinder V-type—are mounted on steel tubing beds with wood vibration breakers and with V-type bracing having all ends pin jointed. By removing six main pins, the cowling, radiator and engine may be withdrawn as a complete unit—an important feature in connection with commercial air services. The main engine bolts do not pierce the tubing bed, being rings with studs. The radiator is supported by a felt pad, and is tied from the top to prevent fore and aft movement. As a safeguard against fire all structural members are of steel with the exception of the wood vibration strip. The entire cowling is of aluminium, and is in five detachable sections. It is possible to work around any particular part of the engine with ease, and without removing any but the one section of the cowling. These sections have the hinge joint type connections, which will take up all wear and not allow the cowl to become loosened.

In order to minimise the danger arising from fire, the main petrol tank is carried below the *fuselage*. From the main tank the petrol is delivered to two centrifugal pumps, which force it under pressure to a main control box in the *fuselage*, thence to the desired engine gravity tank. By means of this control box petrol may be delivered at any pressure or by gravity. The petrol system for each engine is entirely separate. For long distance flights extra petrol can be stored in the *fuselage* in 5-gallon cans, and poured into the main tank through the filler whilst in the air; in ordinary filling, petrol is poured into the tank from outside the *fuselage*. All pipe-line connections are of the olive and special fabric-lined moulded rubber hose.

After the trials of the "Wampus-Kat," G. G. Budwig, the test pilot, gave the following report on its general performance. The machine is very easy to fly, take off and land. It flies naturally, and is very stable. But little control is necessary at any time, even in rough air, and it makes natural turns to either right or left, and makes them equally well flying level or in a climb. When stalled the ship recovers quickly, and settles slowly with no tendency to spin or fall violently. The horizontal balance is the same whether loaded or empty, flying level or gliding; the addition of load does not apparently change her climb to any great extent. The glide is good, and she keeps her speed at a small angle. The general controllability under all conditions is excellent. When one motor stops or is shut off abruptly, the machine turns toward the dead motor very slowly, and there is ample time to stop all turn with the rudder.

It flies level on one motor at 2,400 ft. with 90 gals. of fuel and one passenger, at 1,500 ft. with same fuel load and two passengers. (This with the engine revs. at 1,300, about 100 under normal, due apparently to unsuitable airscrews.)

The principal characteristics of the "Wampus-Kat" are:—

Span	50 ft.
Span with wings folded	22 ft.
Chord	5 ft. 5 ins.
Gap	6 ft. 8 ins.
Overall length	30 ft. 10 ins.
Overall height	11 ft.
Dihedral angle	1°

Wing section	R.A.F. Mod. A.
Total area wings (including *ailerons*)	484.9 sq. ft.
Area of *ailerons* (4)	41.25 sq. ft.
Area of tail plane	36 sq. ft.
Area of elevators (2)	23 sq. ft.
Area of fins (2)	10.30 sq. ft.
Area of rudders (2)	19 sq. ft.
Total h.p.	180
Weight of machine empty	2,611 lb.

Weight of machine fully loaded	4,015 lb.
Weight of fuel and oil (4½ hrs.)	540 lb.
Weight of pilot and four passengers	800 lb.
Weight/sq. ft.	8.23 lb.
Weight/h.p.	22.3 lb.
Speed range (sea level)	45-90 m.p.h.
Climb in 10 mins. (full load)	3,500 ft.
Ceiling	11,600 ft.

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THE WIBAULT NIGHT BOMBER

An Interesting French All-Metal Aeroplane

AMONG the examples of metal construction found at the recent Paris Aero Show, there are few which could be said to show real merit. Either they were too costly in manufacture, unsatisfactory in design, or of very inferior workmanship. Exceptions there were, of course; and first and foremost among these was the Wibault all-metal night bomber, "B.N.2." Unfortunately, this machine was not exhibited complete, but from a specimen wing shown on the Duralumin stand, it was possible to form a very good idea of at least the wing construction. In view of the good workmanship, it was not surprising to find that the wing—and indeed the whole machine, which was at the time of the Show undergoing its acceptance tests—was built by Pierre Levasseur, whose workmanship is always a joy to behold.

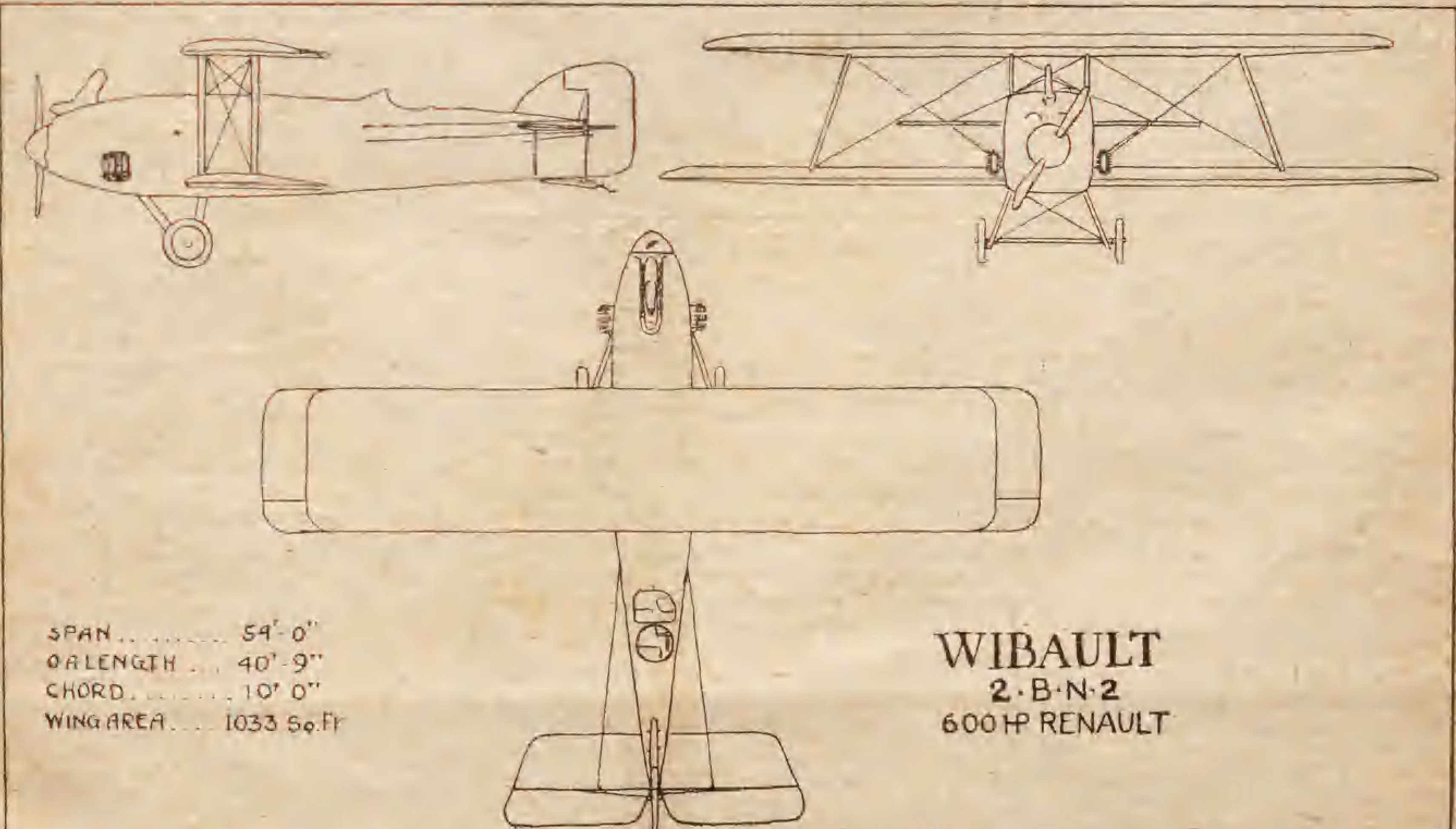
A set of excellent photographs on the Pierre Levasseur stand showed the general lines of the Wibault "2 B.N.2." Unfortunately, we have not been able to obtain good photos. of the machine, but the accompanying general arrangement drawings should indicate the general lines.

As the letters "B.N." indicate, the machine is intended for night-bombing, although it is claimed that it could be modified for commercial work, if desired. As a result, it is claimed, of the metal construction, it has been possible to effect a great saving in the structure weight of the machine, which forms a relatively small percentage of the total weight. The engine fitted is a 600 h.p. Renault, which naturally weighs a good deal. Nevertheless, the weight of the machine empty, but with cooling water, is only 4,620 lbs., while the total loaded weight is 9,450 lbs. The useful load, which in this case does not include tanks and fuel, is 3,100 lbs. Sufficient fuel is carried for a four hours' flight at full throttle.

Apart from this feature of small structure weight, the "Wib. 2, B.N.2" is chiefly remarkable for the fact that its wings are placed very far aft on the *fuselage*, and that, in spite of its comparatively large size, only one pair of struts is employed on each side. Another remarkable feature is that the upper plane is of shorter span than the lower.

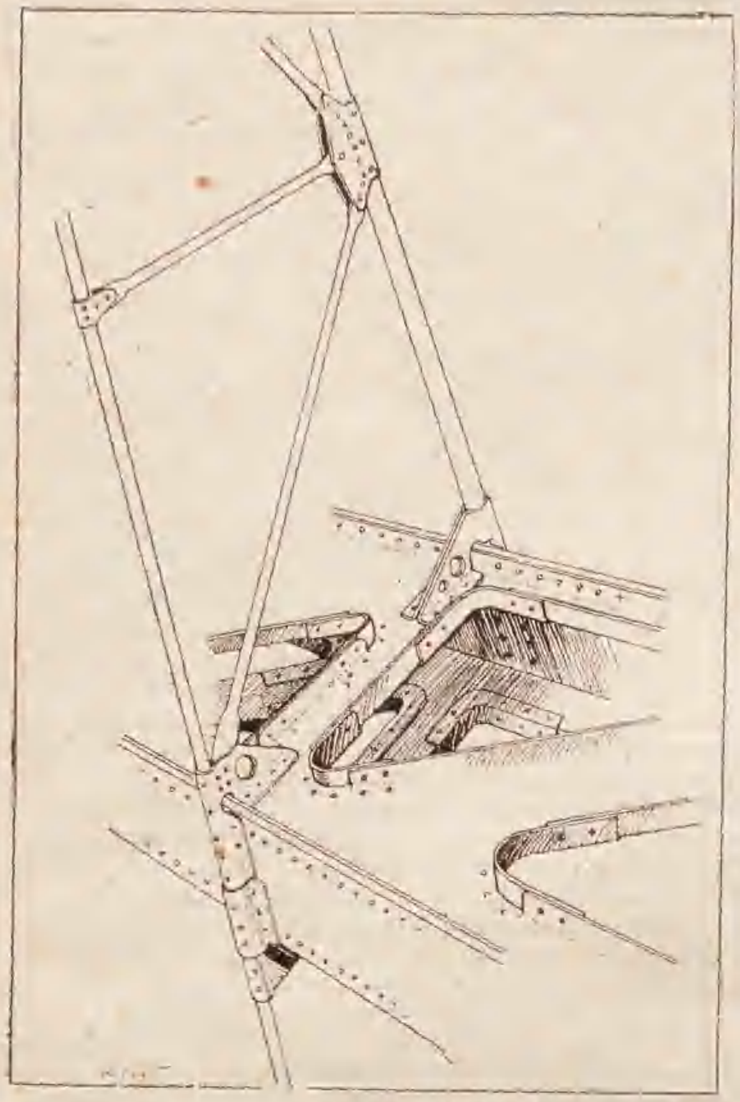
To deal with the various features in the order enumerated, the placing of the wings has probably been decided upon as a result of the necessity of centralising as much as possible a heavy load of varying weight. With such a long cargo space, there is a possibility of so arranging the load—in this case bombs—that by dropping the central ones first and then, working towards front and rear simultaneously, the others in sets from front and rear, the trim is not seriously upset. Large space is required, and in the Wibault this has been attained by spreading the bomb chamber in a fore-and-aft rather than in a lateral direction. Also, for night-flying, it is possibly an advantage to have the crew placed far aft in the *fuselage*, where the view downward is but little obstructed. For use as a commercial aeroplane, which the designer may have had in mind, the central placing of a large cabin or cargo space is also advantageous. It is claimed that as a commercial machine, the "Wib. 2," would carry a pilot and 13 passengers. Allowing 180 lbs. for each occupant, and about 30 lbs. for the luggage of each, this should be possible, while still carrying wireless outfit and other paraphernalia. In that case, the power expenditure per passenger would be about 46 h.p., which is very reasonable, especially as the speed at 6,500 ft. is stated to be 125 m.p.h.

As regards space in the cabin, we understand that when stripped of its bomb cradles, etc., the cabin space available is 14 ft. 9 ins. long, by 5 ft. 2 ins. wide, by 5 ft. 11 ins. high, or approximately 450 cubic ft.



THE WIBAULT NIGHT BOMBER: General arrangement drawings.

The *fuselage* is also, we understand, built of metal throughout, with the exception of the covering, but as it was not exhibited we have not had an opportunity of examining its constructional details.



One of the best examples of Duralumin construction at the Paris Show: Details of the Wibault wing.

The employment of only a single pair of struts on each side has been made possible by using wing sections of great depth. For the section used, it is claimed that this, which is the result of experiments made by M. Wibault personally, is more efficient than ordinary thin sections, although of the deep, high-lift type. The small amount of external bracing results in a low wing resistance, and the inward slope of the interplane struts in conjunction with the short top plane has the effect of giving equal loading in upper and lower spars, which is not the case where upper and lower bays are equal.

As regards the wing construction, this is indicated in the accompanying sketch. The somewhat unusual view is the result of the fact that the wing from which the sketch was made was standing on its leading edge. The wing spars are built up of Duralumin sheet, flanged over as shown. It will be noticed that the flanges of the lightening holes are produced by simply bending at right angles along straight lines, and that where a radius occurs the flange is made up of a separate piece. This form of construction has the advantage that the flanges can be made without incurring the expense of costly dies for stamping out the flanges. The spar flanges themselves are flat strips of Duralumin riveted to the flanged-over edges of the webs. The number of rivets required is not excessive, and altogether this spar construction is much more of a commercial proposition than the majority of those exhibited. For greater compressive strength, it would probably have been an advantage to have the spar flanges rolled to form a corrugation along their ridge, but even with the flat flanges the spars have withstood a sand load equal, we are informed, to a factor of safety of 7·5, without showing any permanent deflection.

The ribs are entirely tubular, the flanges consisting of tubes, bent to the desired curvature, and the webs formed by a series of N-trusses, attached to the flanges by clips and rivets in the manner shown.

The main characteristics of the "Wib. 2, B.N.2," are as follows: Length o.a., 41 ft. 10 ins.; span, 55 ft. 6 ins.; height, 16 ft. 5 ins.; wing area, 1,035 sq. ft.; engine, 600 h.p. Renault; weight empty, but with cooling water, 4,620 lbs.; useful load, 3,100 lbs.; fuel for 4 hours at 6,500 ft.; total loaded weight, 9,450 lbs.; speed at 6,500 ft., 125 m.p.h.; wing loading, 9.13 lbs./sq. ft.; power loading, 15.8 lbs./h.p.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JANUARY 1 AND JANUARY 7, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon-Paris	7	9	3	7	7	2 6	Breguet F-ADAV (1h. 50m.)	B. (1), D.H. 4 (1), D.H. 18 (1), H.P. (1), Sp. (1), V. (1).
Paris-Croydon	11	24	3	11	3	4 0	D.H. 18 G-EAWO (3h. 15m.)	B. (1), D.H. 4 (1), D.H. 18 (1), G. (2), H.P. (2), Sp. (2), V. (1).
Totals for week ...	18	33	6	18	10			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

Air Mail Stamp Issues

HITHERTO the stamps issued by the French Government for use in connection with air mail services in certain of their colonies have been "provisionals." Commencing with the new year, however, it is stated that a special set of three stamps—75 c. blue, 1 fr. red and 2 fr. violet—is to be issued for use in French air mail service in Morocco. They will have an appropriate design, showing an aeroplane flying over Casablanca.

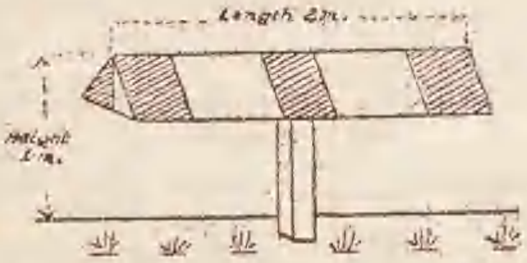
Another air mail stamp has just been issued by the Newfoundland Post Office, two previous issues having made their appearance on the occasion of the Hawker and Alcock Transatlantic flights in 1919. This new stamp has been brought into use in connection with the experimental service between St. John's and Halifax, N.S., and consists of the 35 c. Cabot (1897), which has been overprinted "Air Mail to Halifax, N.S., 1921" in three lines. Some 14,000 of these stamps have been issued, and it is said that about 5,000 have been actually used on the service. In connection with the above service it may be of interest to note that the pilot is, we believe, F. S. Cotton, who flew a D.H.14 in the 1920 Aerial Derby.

NOTICES TO AIRMEN

France : Civil Landing Grounds, etc.

PREVIOUS Notices to Airmen relating to France are amplified and amended as follows :—

1. *Le Bourget Aerodrome.—Ground Markings.*—A system of ground markings designed to clearly define the bad landing area of the Le Bourget aerodrome in the vicinity of the Morée brook—the north boundary—has been brought into force, as an experimental measure, as from December 12, 1921. These markings are wooden structures, as illustrated in the sketch below, and are placed at intervals of 60 metres. Aircraft approaching from north should clear the markings before landing, and will then be certain of alighting on suitable ground.



2. *Civil Landing Grounds.*—The following grounds are now available :—(i) *Poix.*—Emergency Landing Gound. *Position.*—Lat. 49°49′N., Long. 1°58′E. Situated 4½ kms. N.N.W. of Poix on the east side of the road to Abbeville. *Dimensions.*—660 by 600 yards (approx.). No further details are at present available. (ii) *St. Quentin.*—Emergency Landing Ground. *Position.*—Lat. 49°50′N., Long. 3°12′E. Situated 7 kms. to the S.W. of St. Quentin. *Dimensions.*—700 to 550 yards, but only the northern half of the ground is at present suitable for use by aircraft. No further details are available at present.

3. *Valenciennes.—Telephone.*—A telephone has been installed at this landing ground. Number—Valenciennes 30.

4. *Previous Notices.*—Para. 2 (1) c of Notice to Airmen No. 36 of 1921 is amplified by para. 3 of this Notice.

(No. 110 of 1921.)

Aerodromes for Civil Use ; Consolidated List

IN new lists (A to D) now ready (No. 1 of 1922), aerodromes, seaplane stations and landing grounds, open to civil aviation in the United Kingdom, and Service and Civil stations, available to civil aircraft in case of emergency only, are shown as corrected to 1st January, 1922.

The lists are classified as before and in alphabetical order.

Notices to Airmen Nos. 81, 96, 104 and 108 of the year 1921 are at the same time cancelled. (No. 1 of 1922.)

Gosport Aerodrome ; Obstructions

THE southern portion of Gosport aerodrome is being used as a sports ground, and goal posts have been erected on the ground.

Pilots having to land on this aerodrome should use the northern portion. (No. 2 of 1922.)

Transmission of Calibrated Waves from Air Ministry Wireless Station

IT is notified that the Air Ministry Wireless Station, London, will, from the 10th of January, 1922, transmit a series of calibrated waves daily at the times shown in notice No. 3 of 1922.

Lympne Aerodrome ; Erection of an Anemometer Mast

PILOTS of aircraft are warned that an anemometer mast is in course of erection at Lympne aerodrome. The mast will be erected in the S.W. corner of the aerodrome near the meteorological office, and will be marked by a black and white danger flag by day and a red obstruction light at night. The top of the mast will be 78 ft. above the ground.

(No. 4 of 1922.)

Visual Signals for Aircraft ; Addition

THE following signal is added to the *Standard Table of Visual Signals for use of Aircraft* issued in Notice to Airmen No. 2 of 1920.

Signal.	Ground or sea to aircraft ; signification.	Aircraft to sea or ground ; signification.
A white flare from which, at intervals of about 3 secs., a white light is ejected into the air.	Aircraft on the water in distress and requiring immediate assistance.	Aircraft on the water in distress and requiring immediate assistance.

(No. 5 of 1922.)

NOTICE TO GROUND ENGINEERS

Maintenance of A.V. 8 and A.V. 12 Type Magnetos

THE following precautions should be observed with A.V. 8 and A.V. 12 type magnetos :—

1. *Lubrication.*—Before starting up an engine fitted with a magneto which has been drawn from store or has not been run for some time, care must be taken to ensure that the oil well of the distributor bearing, which is of the plain phosphor-bronze type with wick lubrication, is filled, by passing approximately a teaspoonful of oil down the left-hand hole in the oil cup at the distributor end of the magneto (facing the distributor). Six drops of oil should also be injected into each main bearing through its respective oil cup ; one or two drops to the contact breaker cam lubricating pad, and one to the contact breaker pivot pin. To effect the last, it is only necessary to move the retaining spring to one side.

This provision of oil should nornally be sufficient for twelve hours' running. Thereafter, at similar intervals, twelve drops of oil should be given to the distributor gear wheel bearing, with treatment of the other bearing as stated above.

2. *Contact Breaker.*—The gap between the contact breaker points should be maintained within ·013 in. and ·011 in. A gap of ·012 in. may be regarded as normal.

The contact breaker points, which are slightly convex, should be cleaned, if necessary, with very fine emery cloth, care being taken to ensure that no emery dust is left on the contact breaker. A file should *not* be used for this purpose. A soft brush is convenient for cleaning the contact breaker.

3. *Distributors.*—In changing the magnetos on an engine, it is essential that the original distributor block should be removed, and the new magneto attached complete with its own distributor. The changing of a distributor block from one magneto to another is most undesirable, owing to the possibility of the rotor brush fouling the distributor segments, due to the small gap between these parts and to the working tolerances necessary on distributor, end plate, gear centres, etc.

The setting of the spark gap between the rotor main electrode and the distributor segments must be correctly maintained within the limits of ·010 in. and ·015 in. Normally it should be unnecessary to interfere with this gap, which is correctly set for each individual magneto before its despatch from the maker's works.

The gap between the rotor starting electrode and the distributor segments should be between ·020 in. and ·030 in.

4. *Hand Starter Terminal.*—Care must be taken, when fitting the starter lead to the distributor, that the terminal screw is properly locked by the spring strip provided for the purpose. The screw should be tightened by a box spanner which at the same time will press down the spring clear of the hexagon ; on release, the spring should lock the screw, the latter being turned slightly, if necessary, to ensure this. No part of the screw or the locking spring must project beyond the face of the distributor.

(No. 1 of 1922.)

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"Under the Searchlight"

ONE of the most important books, "Under the Searchlight," by the Hon. Violet Douglas Pennant, to be published shortly, by Messrs. Allen and Unwin, should be of very considerable interest. In this, Miss Pennant proposes to deal with the inner history, from first to last, of what was generally referred to, at the time, as "the great W.R.A.F. scandal." We understand that, with the exception of the mysterious "secret statement," furnished by Miss Philippa Strachey to Lady Rhondda, and by Lady Rhondda to Lord Weir (the nature of which was never divulged, and of which Miss Douglas Pennant, herself, is still entirely ignorant), the book will reveal to the public the fullest details concerning this complex case.

The Next Aero Club de France President

FOLLOWING the death of M. Michelin, several names are rumoured to fill the vacant chair of honour. M. Flandin, one-time Secretary of State for Aeronautics, is a first favourite, with several runners-up, but there are those who would like to see M. Bazil Zaharoff take up the work. There is one thing certain ; the more money that attaches to those backing-up official French aviation, the better are the prospects incidentally for the progress of the great science and industry, internationally and otherwise.

THE DETERMINATION OF DOWNWASH*

By **Lieut. WALTER S. DIEHL, Bureau of Construction and Repair, U.S.N.**

Introduction.—It is obvious that, in accordance with Newton's second law, the lift on an aerofoil must be equal to the vertical momentum communicated per second to the air mass affected. Consequently, a lifting aerofoil in flight is trailed by a wash which has a definite inclination corresponding to the factors producing the lift. It is thought that sufficient data, theoretical and experimental, are now available for a complete determination of this wash with respect to the variation of its angle of inclination to the originating aerofoil and with respect to the law which governs its decay in space.

Munk's Formula for Downwash.—Although it has long been known that the angle of downwash ϵ, as observed at a given point behind the aerofoil, is directly proportional to the lift of the aerofoil (British *A.C.A.*, R. and M. No. 196) and inversely proportional to the aspect ratio (Lanchester, *Aerial Flight*, Vol. 1, Chapter VIII, British *A.C.A.*, R. and M. No. 161). Munk (*Technische Berichte* III-1) seems to have been the first to propose a quantitative solution. He asserts that ϵ must be represented as the product of some constant and the angle of attack as expressed by the formula (Betz, T.B. 1-4),

$$a = \frac{57 \cdot 3}{\pi} \cdot 2\,L_c \left(\frac{S}{b^2}\right)$$

where b is the span, L_c is the lift coefficient and S is the area of the aerofoil. The formula for downwash then becomes

$$\epsilon = c \cdot a = \frac{57 \cdot 3}{\pi} \cdot 2L_c \left(\frac{S}{b^2}\right)$$

the value of the constant c being determined by experiment. The formula as given applies to monoplanes, but may be applied to multiplanes, according to Munk, by the introduction of another constant k which reduces the span b to the span of the equivalent monoplane.

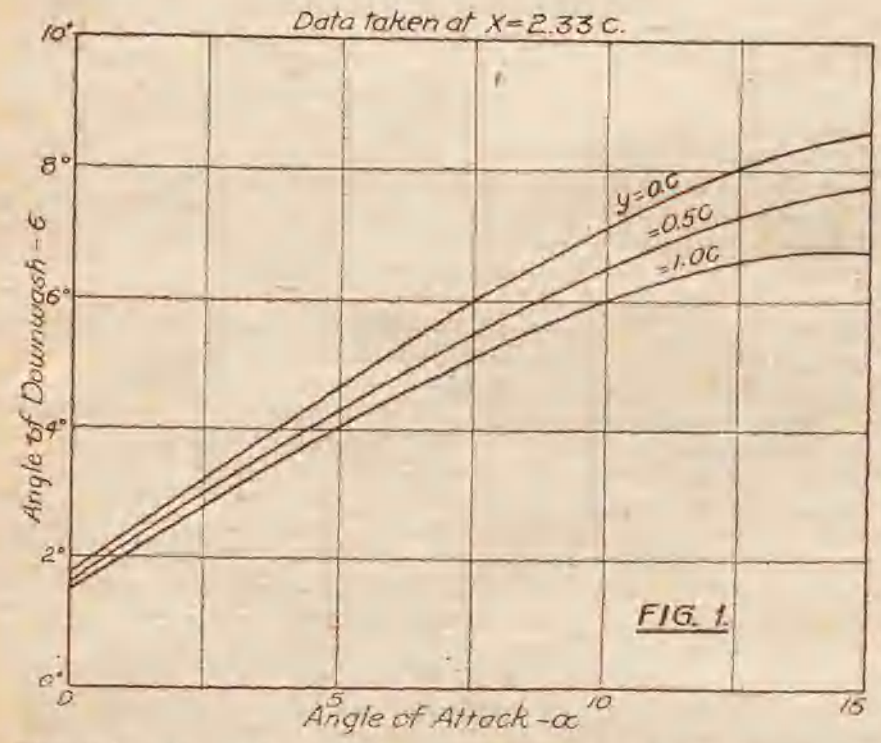

FIG. 1.

Variation of angle of downwash with depth Y below upper wing. From R. and M., No. 426, Fig. 7.

The values of c were determined for several models by photographing a series of streamers. Owing to the lack of certain vital data, the results have not been included in this study, but the conclusions are given instead. It appears that the equation, as given above, is not general. The values of c vary somewhat more than is allowable for a "constant." No attempt was made to determine the variation of c with aspect ratio, nor was any allowance made for the inevitable dying out of the wash effect in space. It appears, however, that the angle of downwash is substantially constant over about eight-tenths of the span, with sudden changes near the tips.

N.P.L. Formula.—The most comprehensive series of tests on downwash, which have been published, are those by Sandison, Glanert, and Jones (British *A.C.A.*, R. and M. No. 426). In this investigation the variation of downwash was determined in space for a number of points behind, above, and below the trailing edge of the aerofoil. It was found that, in accordance with hydrodynamic theory,† the angle of downwash decreases exponentially with the distance from the aerofoil (a biplane in this case), and might be expressed by the empirical formula

$$\epsilon = \epsilon_0 \, 10^{-0.05\,\xi - 0.08\,\zeta}$$

where

ξ is the distance behind the wing in chord lengths,

ζ is the distance below the chord of the upper wing in terms of the gap,

and ϵ_0 is a constant for any given arrangement.

This appears to have been the first attempt to express the variation of ϵ_0 from point to point. With a satisfactory law for the variation of ϵ_0 it would have been complete.

Derivation of a Comprehensive Downwash Formula

It is now possible to derive a comprehensive downwash formula based on the Göttingen theoretical and the N.P.L. empirical formulæ. It is known definitely that downwash varies exponentially with distance from the trailing edge. The plotted results of N.P.L. investigations, which show this variation vertically and horizontally, are given in Figs. 1 and 2, respectively. The data in Fig. 1 have been replotted on a logarithmic scale in Fig. 3, with the vertical distance from the trailing edge expressed in chord lengths plus one chord length‡ as abscissa and angles of downwash as ordinates. It is found that for a given angle of attack, the angles of downwash at various vertical distances from the trailing edge lie on a straight line. The lines corresponding to the various angles of attack are all parallel and have a slope of $-13° \pm 0 \cdot 5°$. This indicates that the variation of angle of downwash with vertical distance from the trailing edge can be represented by an equation of the form:

$$\epsilon = c_1 \, (y + 1)^n,$$

where c_1 = a constant,

y = the vertical distance, of the point under consideration, in chord lengths, from the trailing edge,

and $n = \tan(-13° \pm 0 \cdot 5°)$

$= -0 \cdot 23 \pm 0 \cdot 01.$

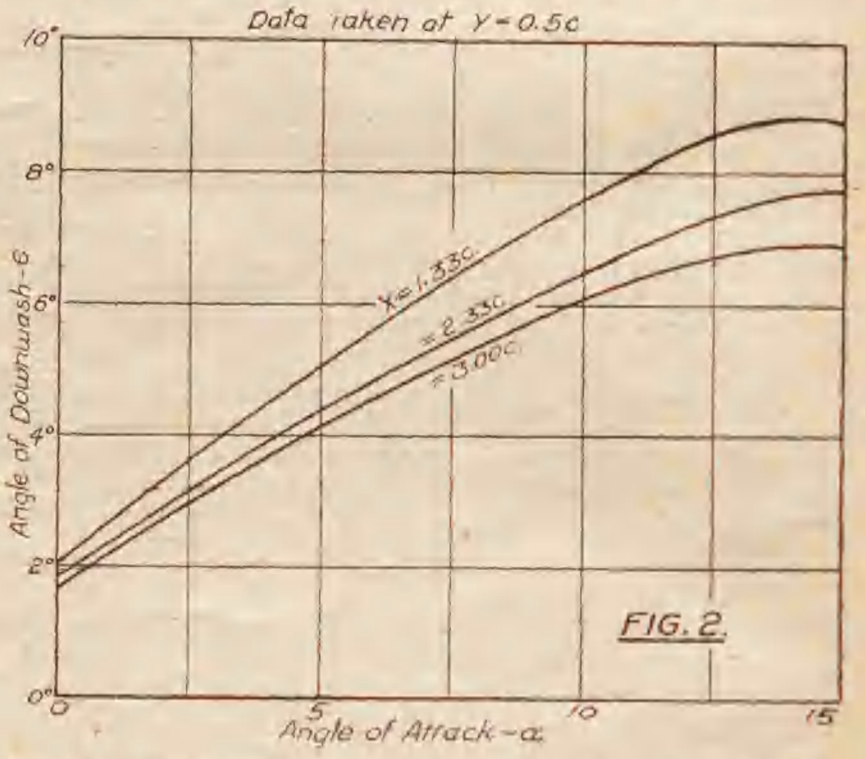

FIG. 2.

Variation of angle of downwash with distance X behind wings. From R. and M., No. 426, Fig. 7.

In a similar manner the data from Fig. 2 have been plotted in Fig. 4. The points again fall near parallel straight lines, but their slope, $-21° \pm 0 \cdot 5°$, is steeper than that in Fig. 3. The indicated variation of the angle of downwash with variation of horizontal distance from the trailing edge is of the form

$$\epsilon = c_2 \cdot (x + 1)^n$$

where c_2 = a constant,

x = the horizontal distance, of the point under consideration in chord lengths, from the trailing edge,

and $n = \tan(-21° \pm 0.5°).$

$= -0 \cdot 38 \pm 0 \cdot 01.$

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* Technical Note No. 42 of the American National Advisory Committee for Aeronautics.

† See Lanchester. *Aerial Flight*, Vol. 1, Chap. III.

‡ This is necessary so as to provide a finite value at the trailing edge.

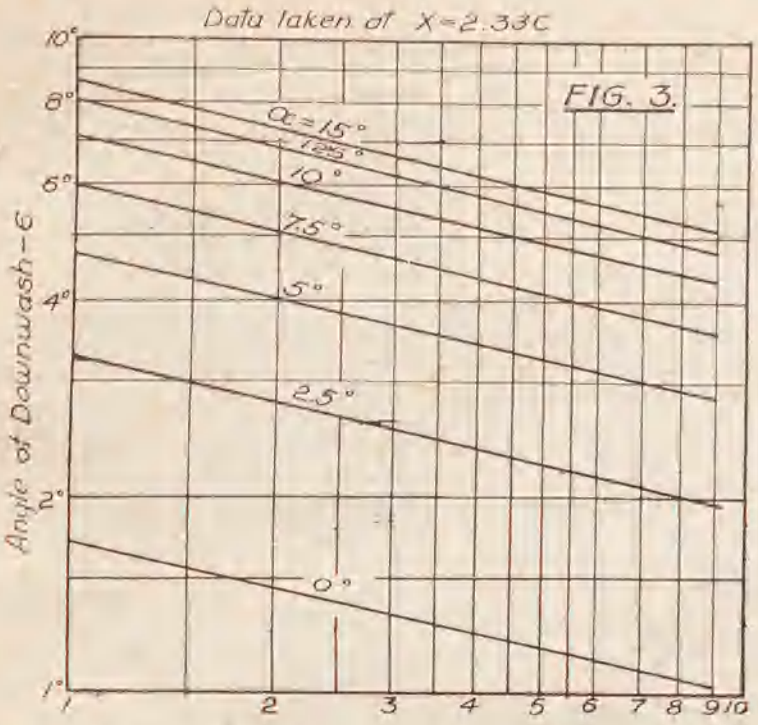

FIG. 3.

Variation of angle of downwash with depth Y below wing. Y = vertical distance from trailing edge in chord lengths (plus one chord length).

TABLE I.—*Determination of K in the Equation*

$$\epsilon = \frac{K}{n} \cdot Fx \cdot Fy \cdot L_c$$

Source of Data	Aspect Ratio (n)	$\frac{\Delta\epsilon}{\Delta L_c}$	x	y	Fx	Fy	$\frac{\Delta\epsilon}{\Delta L_c}\left(\frac{1}{Fx \cdot Fy}\right)$	$K = \frac{\Delta\epsilon}{\Delta L}\left(\frac{1}{Fx \cdot Fy}\right) \cdot n$
N C—1 Curtiss tests	9·5	11·20	2·5	0	·625	1·00	17·9	170
R. & M. No. 196	6	15·20	2·3	0·55	·64	·90	26·4	158
R. & M. No. 426	6	14·70	3·0	0·61	·595	·89	27·8	167
R. & M. No. 426	6	16·00	3·0	0·43	·595	·915	29·3	176
R. & M. No. 515	7·73	11·8	2·6	0·6	·62	·895	21·3	164

NOTE.—There will be a slight decrease in the value of $\Delta\epsilon/\Delta L_c$ with increase in lift coefficient if the reference point is not fixed in space. This is caused by the change in the co-ordinates of the point with change in angle, and the effect may easily be accounted for.

Let D = distance from trailing edge, T, to reference point P

θ = Inclination to horizontal of line TP

then $x = D \cdot \cos\theta$

$y = D \cdot \sin\theta$

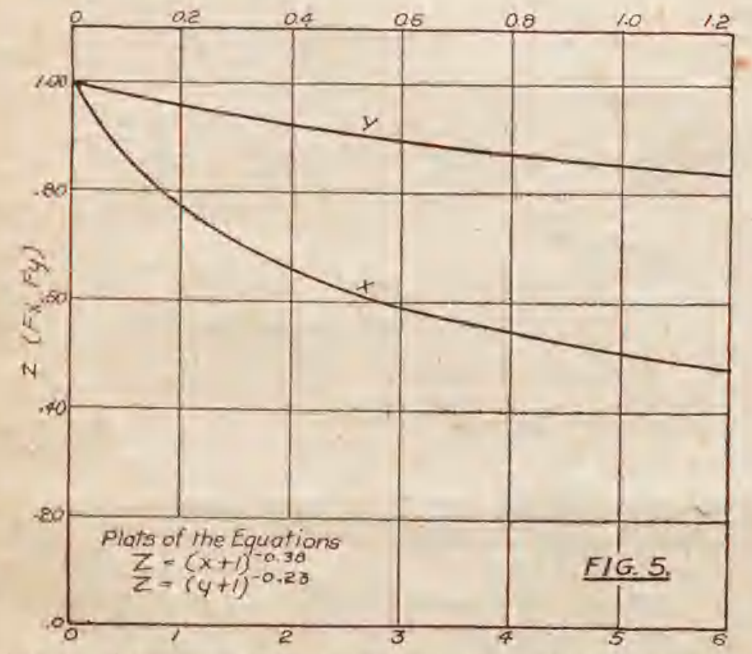

FIG. 5.

Distance from trailing edge, chord lengths. Y = vertical distance. X = horizontal distance.

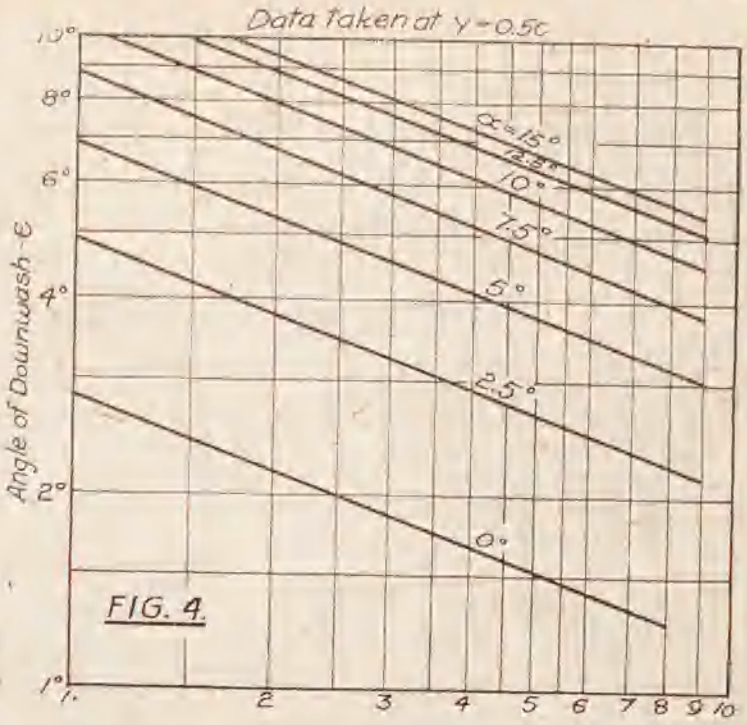

FIG. 4.

Variation of angle of downwash with distance X behind wing. X = horizontal distance from trailing edge in chord lengths (plus one chord length).

In order to eliminate the calculations involving fractional exponents the functions,

$$Z = (y + 1)^{-0.23}$$

and

$$Z = (x + 1)^{-0.38}$$

have been evaluated and plotted in Fig. 5.

Data from five series of downwash determinations have been plotted in Fig. 6, with angles of downwash as ordinates and lift coefficients as abscissæ. The slope of the straight line, which passes through the points representing a series of tests, determines the value of $\Delta\epsilon/\Delta L_c$ for that particular arrangement and the point in space at which the observations were taken. The aspect ratio, the value of $\Delta\epsilon/\Delta L_c$, and the co-ordinates of the observation point are given, for each series of tests, in Table **I.**

It is evident from inspection of Fig. 6 that ϵ varies directly with lift coefficient. It has also been shown by data from the tests of Sandison, Glauert, and Jones (British *A.C.A.*, R. and M. No. 426) how ϵ varies in space. Munk's equation indicates that ϵ varies inversely as the aspect ratio, n. Therefore the angle of downwash should be given by

$$\epsilon = \frac{K}{N} \cdot (x + 1)^{-0.38} \cdot (y + 1)^{-0.23} \cdot L_c$$

where K is a constant, numerically equal to $\Delta\epsilon/\Delta L_c$ at the trailing edge of a wing of aspect ratio unity.

The value of K is determined for each of the five series of tests which are plotted in Fig. 6, by substituting the proper values for the functions of x and y and for the aspect ratio n. The procedure is indicated by the headings of columns in Table I.

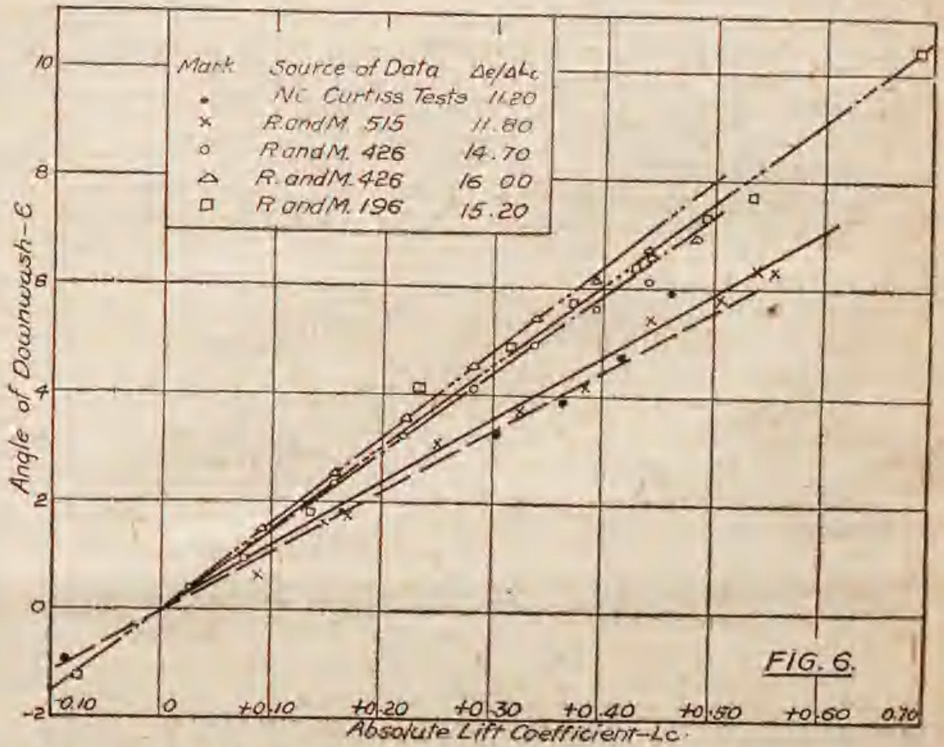

FIG. 6.

Variation of the angle of downwash with lift coefficient. Test data.

It is found that K is substantially constant, varying from 164 to 176; a single exception of 158 corresponds to a series of tests on a biplane arrangement, the wings of which were equipped with flaps and represent abnormal conditions. It therefore appears that the angle of downwash can be represented to a good approximation by

$$\epsilon = \frac{170}{n} \cdot (x + 1)^{-0.38} \cdot (y + 1)^{-0.23}\,L_c$$

$$\epsilon = \frac{170}{n} \cdot Fx \cdot Fy \cdot L_c$$

Fx and Fy being the values of the functions of x and y which are given in Fig. 5.

The validity of this formula is obviously confined to that range of angle of attack or lift coefficient in which the airflow about the aerofoil is not abnormally turbulent.

Application of the Downwash Formula.—The chief use of a downwash formula is the calculation of the aerodynamic angle of attack of the horizontal tail surfaces. For this purpose a reference point is taken on the leading edge of the horizontal tail surfaces and the values of ϵ obtained from the formula. The aerodynamic angle of attack of the tail surfaces will then be

$$\alpha_t = \alpha - \beta - \epsilon$$

where α is the angle of attack of the wing and β is the acute angle between the chord lines of the wings and horizontal tail surfaces; considered positive (in the equation) if the tail is set at a less apparent angle than the wings.

The data from tests seem to indicate that in case of a biplane the maximum angle of downwash occurs in the horizontal plane midway between the two wings. The effect is so slight, however, that the above method may be used, referring the co-ordinates of the reference point to the nearest wing (preferably to the no lift line), with the assurance that the results so obtained will be as precise as it is practicable to calculate them with the data now available.

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LONDON TERMINAL AERODROME

Monday Evening, *January* 9, 1922

THE weather has played some curious pranks with the London-Paris aeroplane service during the week. There has been little flying to schedule, and the machines which have completed their journeys have done so with difficulty.

On Tuesday, for instance, when there was a strong northerly wind, a Handley Page "0-400" was five hours on the journey from Paris to Croydon, and, though her tanks had been filled with 240 gals. of fuel before she left Paris, there was only sufficient for about ten minutes' flying left by the time Croydon was reached.

On Wednesday, when the wind was again blowing strongly from the north, a Messageries Aérienne five-seater Spad flew from Poix to Croydon, but had to descend at Lympne for petrol before finishing the journey to Croydon.

There was an amusing scene on the aerodrome on Monday, and one which illustrates the risks of premature publicity, so far as aviation is concerned. A consignment of live pigs was to be dispatched by a special "Goliath" to Paris, and, the fact having been well "advertised" in the daily papers beforehand, the result was that a number of Press photographers, including at least one moving-picture expert, swarmed round the aeroplane, firing off plates and films at top speed. The weather, however, was far from good, and though one of the Instone Air Line "D.H.18's," with Mr. Powell in charge, got away, other firms decided against flying, and the pigs' departure was, therefore, postponed.

The Engines of the "Air Express"

I AM able to give details, which should, I think, prove interesting, as to the running of the 450 h.p. Napier "Lion" motors on the continental air service. One of these engines, which was running in Aircraft Transport and Travel days, in an "Airco" 16, has now put in 407 hours flying. Another "Lion" went for 160 hours without overhaul, and was only dismantled then, owing to regulations and as a matter of policy. The engine at present in the "D.H.18 G-EARO" has been running for over 130 hours since its last overhaul, and seems good for another 130 hours. Actual fuel measurements, taken over long periods of commercial work, show that the consumption of petrol with the "Lion" is 24 gals. an hour, while the amount of oil used is about 7 pints an hour.

Mr. Butler, who is the private owner of a Bristol "tourer," was down at the aerodrome on Sunday, and gave a few friends joy-rides in his machine. He afterwards flew over to Stag Lane aerodrome, and left the Bristol there. It is understood that he intends to purchase a "D.H.9." He is shortly leaving for Newfoundland, and will take the "9" with him, but details as to what he intends to do with the machine there are, at the moment, lacking.

The Surrey Flying Services have now almost completed the Avro for the Marconi Co. It has been altered to take a Renault engine, and has been allotted the registration number "G-EBAJ"—which, incidentally, is worthy of note, showing as it does that civil aircraft now registered have, apparently, run through the combinations of the last two letters, and have started on the last three.

Another Avro is being built-up for a private owner, and Mr. Grant is having quite a busy time.

Captain Muir is at present in Liverpool, where he is testing a Parnall "Puffin" for the Disposal Co. Demonstrations of this machine are to be given in the presence of representatives of various foreign Governments, and are to include all the "stunts" a deck-amphibian is capable of.

Mr. Leysmith was at the aerodrome during the week, collecting a few odds-and-ends he required for the searchlights and other lighting equipment at Lympne. Judging by the time he has been away from Croydon, the lighting arrangements at Lympne must be on a very comprehensive scale.

The lighthouse at Croydon has not, as yet, been moved to Titsey Hill. Apparently the erection of the tower there to accommodate it is occupying rather more time than was anticipated at first.

Telephoning to Machines in Flight

AN "extension" from the wireless cabin has now been carried to the control-tower, and the wireless operators can, when required, "plug" the control-tower through to any aeroplane in flight. This arrangement has been adopted in connection with the "sectionalising" of the aerodrome for an improved method of direction-finding when an aeroplane is near the 'drome, but is unable to see it in mist or fog. Each pilot will have a map, showing the sections of the aerodrome, and the man in the control-tower will be able to tell him which section he is over, without any such short-time lag as may be reckoned with in the normal direction-finding method.

A small army of painters have invaded the aerodrome, and are busy on the Instone offices. The new Instone goods-office is approaching completion. It is interesting to note that the recent reductions in freight rates, announced by Instones', have been followed by other firms, who have brought their charges into line.

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Aerial Advertising

OUR Editorial remarks on this subject in last week's issue called forth a visit from the inventor of this new form of smoke signs. While he does not yet wish to have details of his invention published, he placed at our disposal sufficient material to enable us to form the opinion that, not only are the prospects of a general application of the invention far less annoying than appeared at first sight, but that actually, apart from any question of aerial advertising, the invention has its numerous scientific uses, some of which are undoubtedly of very great value indeed. Without going into details, it may be intimated that the invention will probably enable experiments to be made on full scale machines on problems connected with such complicated subjects as the accurate determination of downwash and of the air velocity at various points in the neighbourhood of the *fuselage*, wings and tail of an aeroplane. Even the smoke signs themselves, we are given to understand, so far from being a blot on nature, are most fascinating things to watch, although the advertisement side is merely an incidental. We are awaiting a demonstration at an early date.

A Fairey Weight-Lifter.

HITHERTO it has been the fashion, at any rate where seaplanes are concerned, to employ twin-engined machines when great loads had to be carried. This precedent now appears to have been destroyed by a Fairey single-engined seaplane, which has carried a useful load of 3,100 lbs. The machine is a tractor seaplane, with Rolls-Royce "Eagle" engine, and as the total weight lifted was 7,250 lbs., the power loading was about 20 lbs./h.p. Incidentally this performance probably constitutes a record for weight lifted by a single-engined machine of this power.

SPECIALISED AIRCRAFT

This was the title of a Paper read by Wing-Commander W. D. Beatty, C.B.E., A.F.C., before the Royal Aeronautical Society on January 5, 1922. It proved to be a very interesting paper indeed, although scarcely in the way one would have expected from its title. The first part of the paper was mainly historical, and gave a review of the development of military machines from the time of the Military Trials on Salisbury Plain in 1912 up to the end of the War. The lecturer gave in table form particulars of the devlopment of specialised types, under the headings of Training Machines, Fighters, Reconnaissance and Day-Bombing Machines, Night Bombers, Ship Aeroplanes, Torpedo Aeroplanes, Seaplanes, and Flying Boats. On the subject of commercial aircraft, the lecturer mentioned that the first organised services were operated with machines of war type, variously modified to meet civil requirements, and that the need of special designs soon made itself felt. In his opinion, Commander Beatty said, we were now at a stage, as regards commercial design, about equivalent to that of military design at that period of the War when slow two-seaters armed with a rifle or a stripped Lewis gun carried on the general air work of the Army. The real commercial aeroplane has not yet, he said, been developed. Progress has, however, been made in the right direction, as shown by a table of early types of commercial aeroplanes showing the development in useful load and performance, from the Avro with 60 h.p. Green engine (the machine on which the late Lieut. Parke did his famous "dive" at Salisbury Plain) through the Vickers-Vimy Commercial, Handley Page W. 8, and D.H. 18, to modern times.

In order to arrive at the user's view of his machines, the lecturer studied them from the point of view of the profit and loss account of the operating firm. In order to reduce expenditure the following qualities are required: Low first cost, economical maintenance, and economical running. By careful design, the lecturer said, manufacture can be simplified and expensive fittings eliminated. Moving parts and friction between them should be reduced to a minimum. Parts which require attention should be easily accessible, and engines must be readily removable. In regard to the latter Commander Beatty said he would very much like to see comparative tests carried out on engines removable complete by themselves and removable complete with their mounting. The latter method, he stated, is probably the quicker in operation, but will have to bear the charges due to the additional capital outlay on spare mountings. The engine should be capable of running for 300 to 500 hours without overhaul. At present he thought we were getting close to a standard period of 100 hours between overhauls.

Turning to the receipts side of the account Commander Beatty pointed out that one must have a large load-carrying capacity, but that this is of no avail if the traffic sufficient to fill it cannot be attracted. He then proceeded to deal with the requirements from the point of view of the passengers, and as this part of the paper was extremely interesting we publish it practically verbatim—with only a paragraph deleted here and there where it has been possible to do so without detracting greatly from the value of the paper:—

"*Passengers' Needs.*—Far more attention is necessary to the comfort of passengers, and this embraces a wide variety of detail. I cannot but think that considerable advance might be made in forthcoming commercial types were designers to travel to and from Paris in each of the various types of aircraft actually in use on the cross-Channel services. This is the slack time of the year for passenger traffic; why should not the transport companies grant a certain number of free return tickets to *bona fide* designers, thus affording them opportunities to ascertain in their own vile bodies the various existing causes of discomfort and learn what to avoid? Passengers are the most important source of revenue for air transport firms at the present time, and each that considers that he has had a really comfortable journey is a walking advertisement for the air line, while each dissatisfied passenger will result in a lowering of possible receipts.

"*Silence.*—First and foremost amongst the important items affecting comfort I would place silence. A "desirable attribute" in 1912, it has never yet been attained in normal practice, and the air line passenger still suffers acute discomfort from the noise to which he is subjected.

"It is true that the noise in a machine comes from a variety of sources, but it is urgent that some at least should be eliminated. Promising exhaust silencers have appeared experimentally; it is for designers to incorporate them in their designs. Never should an open exhaust point in the direction of the cabin. Get rid of the barking roar of the exhaust, and it becomes possible to identify and so to eliminate the other noises. Probably modifications in the design of propellers may be desirable, and with a silent exhaust it becomes an easier matter to compare the noise effect of two different propellers. Fabric covered *fuselages* must also, I think, be relegated to the past; a stiff wooden covering does not transmit to the interior of the cabin the blows from the slipstream in the same way that fabric does. Vibration and resonance are closely allied to noise in effect on passengers, and should be eliminated. It may be necessary on these grounds to ensure that the two engines of a twin-engined machine never synchronise. I believe Colonel Bristow is trying experiments on these lines. Engine designers will need to utilise motor-car experience, and get rid of that variety of noises from gears and other moving parts which at present are so obvious in an aero-engine when its exhaust does happen to be silenced."

Ventilation and Heating.—"The next important detail which designers should carefully study is that of ventilation, to which very little attention has hitherto been given. Adequate ventilation of the cabins of commercial aircraft is a problem that presents considerable difficulty. The cubic space available is very limited, so that the air inside the cabin tends to become vitiated rapidly, while the speed of the machine is such that the velocity of in-coming air is often so high that the passenger feels a draught. In rough weather, therefore, the unfortunate passenger tends to suffer from depression, headache, cold and illness."

"For many years the efficiency of ventilation has been determined by the quantity of carbon dioxide present in the atmosphere. The supply of air generally recognised as necessary to remove all sensible impurities amounts to 3,000 cubic ft. per hour per person. In a present-day cabin of 300 cubic ft.—seating ten passengers—the air must be changed 100 times an hour if the standard allowance is to be provided. In practice, such a rate of change is unobtainable, except in unbearably draughty conditions. It is clear then that the measurement of the CO_2 content is likely to continue to be unsatisfactory."

"Professor Leonard Hill, however, has pointed out that the 3,000 cubic ft. figure can be much reduced if the cooling, drying and radiant energy conditions are satisfactory. To afford a means of determining these conditions he invented the 'Kata' thermometer. Experiments have shown that the information given by this instrument is an accurate guide to the adequacy of the ventilation so tested, and if its readings average between six and eight the conditions may be considered satisfactory. Now the cooling and drying effects of air depend largely upon its rate of movement, and it may be taken that if the temperature of the air is 55° to 60°, its velocity at the inlet to the cabin should not exceed 4½ ft. per second, if the inlet is 18 ins. or more from the passenger, or 3 ft. per second if it is less than 18 ins. from the passenger."

"With inadequate warming arrangements, a change of air more frequently then three to five times an hour is likely to be uncomfortable in the normal cabin, and under such conditions it may be found necessary to keep the velocity of in-coming air down to 1½ to 2 ft. per second. The velocity of out-going air may be as much as 10 ft. per sec. at the orifice, particularly if that is at least 18 ins. from the passenger. Designers should, I think, aim at providing for some twenty changes per hour, taking care to avoid draughts and make satisfactory heating arrangements. If it is found that the air is being changed too rapidly for comfort, it is a very simple matter to close up some of the openings. It is far more difficult for the user of the aircraft so to alter it as to increase the regular supply of air if the original arrangements have proved inadequate."

"Now, how is the air to be changed? Experiments in America on sleeping cars showed that, provided the foul air was expelled, an ample supply of fresh air found its way through cracks and crevices in a swiftly moving vehicle. Personally, I think it better to arrange for the removal of the foul air than to trust to luck to its finding its way out. It should be practicable to design suitable aspirators to draw the air from the cabin of an aeroplane—slightly above the floor level, for, though hot air rises, vitiated air tends to descend. It is probable that air entering through cracks and crevices will do so at such a velocity as to be a source of discomfort to passengers, particularly as its temperature is likely to be low. Air inlets should, therefore, be arranged at the front of the cabin, somewhat below the roof; the velocity of air entering here can readily be governed by the insertion of right angle bends in the trunks leading to the inlets: each such right angle bend reducing the total flow by 50 per cent."

"It must be remembered that it is essential that the incoming air should be free from impurities, due to exhaust gases, petrol fumes, stale oil, and so on. Special arrangements for the aspiration of the air from the engine compartment—which should in any case be bulkheaded off from the passenger cabin—may be of value in preventing leaks of impure air into the cabin.

"Heating is closely bound up with ventilation, and at the temperature likely to be met with in ordinary flying, it is essential that arrangements should be made for warming the cabin. It is possible to arrange for a supply of air heated by the exhaust pipes, but it should be remembered that air that has been in contact with metal heated to some 200° C., is definitely unsuitable for breathing. If a muff on the exhaust is used, it should therefore be stepped up, the in-coming air for the cabin being taken from the outer step."

"Some of you, however, may remember the footwarmers which Cody fitted to his machine, heated from a bye-pass off the engine cooling system. While there are objections to the introduction of such complications in a matter so important as the running of the engine, no serious difficulty should be experienced in fitting a hot water or steam heating system which draws its heat from the exhaust. Such a system, once developed experimentally, should prove very satisfactory and require little or no attention, while its weight ought not to be excessive."

"A suitable arrangement for ventilation and heating might be as follows:—At the forward end of the cabin fresh air enters at a rate of 3 ft. per sec., through an inlet about 12 ins. by 12 ins. in size, slightly below the roof. Aspirators, arranged below the seat level at the back of the cabin, suck out the vitiated air. An exhaust heated tubular boiler supplies steam or hot water to a radiator fitted two or three inches in front of the fresh air inlet, and the same heating system includes footwarmers in the cabin floor. Such an arrangement should imply fresh air, warmth and comfort for the passengers. I am indebted to Colonel Heald for much of the information upon which the foregoing is based."

"The form of construction of the cabin directly affects its warmth, and from this point of view the fabric-covered cabin is very bad. With this material radiation to the outer air is so rapid that adequate warming in cold weather is almost out of the question."

Seats.—"However, I must return to the subject of passengers' comfort, and I wish to say a word or two about seating accommodation. It always seems to me that chair designers work entirely by tradition, and that if any scientific study of the subject has been made, no attention has been given to the conclusions reached. If the tyres on the wheels of a motor-car are too small, the vehicle is uncomfortable to ride in, and the tyres wear out rapidly. Similarly, if the weight of one's body is carried by a small portion of it, that part quickly gets fatigued and the whole body feels uncomfortable. Only too often seats are designed so that an unnecessarily small portion of one's anatomy bears the majority of the weight. Why should not designers study the problem carefully in conjunction with anatomists and produce a light chair properly designed to suit the human form and to keep the loading per sq. in. of flesh at a low figure."

Number of Engines.—"There is room for much diversity of opinion in regard to single engine *versus* twin engine, or multi-engine machines. While traffic is small the lower first cost and running cost of a single engine machine has an important bearing on the matter. If a twin engine machine will carry nearly double the load of a single engine machine, it immediately becomes a serious competitor economically if the available traffic is sufficient to fill it. Here arises the problem of how large can a *fuselage* be built practically for a single engine machine. In military aircraft great weight can be carried in a small compass, as the load is in a very condensed form. But in commercial types there will be a continual demand for more cubic space per passenger. Will *fuselages* be necessarily so large that high-powered engines will be economically unsound? In the De H.18, eight passengers are carried at 56 h.p. each; in the De H.32, eight at 45 h.p. each."

"Let us assume that we are considering the use in a single engine passenger aircraft of a 1,000 h.p. engine. For that power we must accommodate at least 22 passengers, and we should endeavour to allow at least 40 cubic ft. of space per head. Is such a *fuselage* practicable for a single-engined machine? What is the limiting size? How is propeller efficiency likely to be affected? These questions, which also concern the practicable size of twin-engine aircraft, are matters on which I feel sure that engine designers would like the considered views of aircraft designers, otherwise they may be devoting their attention to engines of a size likely to be unsuitable for commercial work."

"The twin-engined machine has some advantages over the single-engined, particularly if it will fly on one engine. Greater reliability is thereby secured, and to the psychological desire of many passengers for a machine with more than one engine is added the greater favour with which insurance companies may regard it."

Salvage.—"From the insurance point of view, emergency exits for passengers should be provided, and the question of salvage is of some importance. Attention to details which facilitate quick repairs in the event of trouble, and easy transport of spare parts, may assist a constructor in obtaining the favour of those august underwriters whose opinions are reflected with much emphasis in the balance sheet of the transport firm."

The Discussion

THE discussion which folllwed the reading of the paper was opened by Sir Samuel Instone, Director of the well-known Instone Air Line, who stated that he was not a technical man, and had never claimed to be one, representing the commercial side solely. He stated that he would like to emphasise how essential it is that the Government should help financially. Commerce, he said, has been bled white by taxation, and it was no good expecting financiers in the City to find the means for commercial air development. In the old days, there was plenty of money in the City, and financiers were able to find the money for the development of the Mercantile Marine. As things are at present, this could not be repeated on behalf of Civil Aviation, and the Government simply *must* assist. The percentage set aside for subsidies was totally inadequate—£200,000, out of a total vote of £16,000,000. And even that small percentage, he stated, appeared to be grudged. To him it seemed that the spirit at the Air Ministry was not how best to spend that £200,000, but "How much can we save out of the £200,000?" Sir Samuel expressed satisfaction at hearing the lecturer say that there was an advantage in two-engined machines, as his firm had always found that the public were more confident in a twin-engined than in a single-engined machine. As regards the question of giving free return tickets to designers, as suggested by the lecturer, his firm had always done so on demand, and would always be pleased to do so whenever possible.

Mr. F. Handley Page said that, in his opinion, commercial aircraft would become more and more specialised as time went on, and he thought that the development would be towards the smallest possible head resistance, so as to waste no single horse-power that could be saved. Once in the air, one would throttle down, and thus spare the engine as much as possible. The question of the passengers' comfort was a very important one, and especially that of ventilation. With reference to the suggestion of giving free tickets to designers, Mr. Handley Page caused much amusement by saying, jokingly, that perhaps his machines had not so many seats to spare as those of Sir Samuel, but that nevertheless he would promise to do what he could. He was pleased to hear twin-engined machines spoken so well of, the more so as a distinguished member of the Royal Aero Club had, that very afternoon, slated him for saddling commercial aviation with some of the most damnable creations in the way of out-of-date twin-engined machines. He was glad to hear other people confirm the faith of the public in twin-engined 'buses.

Major C. C. Turner disagreed with the lecturer in considering Great Britain too small for air lines, mentioning several distances which exceeded that of the London-Paris services. He thought that the public faith in twin-engined machines was largely caused by lack of information, and did not think that a well-designed single-engined machine was any less safe than a twin-engined one.

Major Kennedy was somewhat disappointed with the small attention given in the paper to specialised aircraft. From the title of the paper, he had expected to hear something about special types for mails, parcels, etc., as well as about passenger machines. He also would like to emphasise the necessity for strong Government support.

In his reply, Commander Beatty said he agreed that he had said nothing about specialised machines for mails and parcels, chiefly (amid merriment), he said, because he regarded the present machines as mail and parcels machines, and not really fit for passenger carrying.

Finally, Sir Samuel Instone stated that it might interest those present to hear that his firm had ordered three machines specially designed for carrying goods and parcels.

THE ROYAL AIR FORCE

London Gazette, January 3, 1922

Memoranda

Lieut.-Col. (actg. Col.) I. Curtis, M.A., A.M.I.M.E., relinquishes his temp. commn. and retains rank of Col.; Oct. 1, 1920 (substituted for *Gazette*, Dec. 7, 1920). Lieut. R. C. Macpherson (Lieut., Black W.) relinquishes his temp. R.A.F. commn. on return to Army duty; March 28, 1919.

The follg. are deprived of permission to retain their ranks on conviction by the Civil Power.—Sec. Lieut. H. La Touche Templeton; Nov. 8, 1921. Lieut. W. A. C. Dicketts; Oct. 18, 1921.

Two cadets are granted hon. commns. as Sec. Lieuts., with effect from dates of their demobilisation.

London Gazette, January 6, 1922

General Duties Branch

G. A. F. Bucknall is granted a perm. commn. as a Pilot Offr., with effect from Dec. 30, 1921, and with seny. Dec. 30, 1920. Pilot Offr. on probn. H. J. Toye is confirmed in rank; Nov. 9, 1921.

Memorandum

Hon. Sec. Lieut. F. J. Gichard relinquishes his hon. commn. on appt. to T.F. Dec. 22, 1921.

ROYAL AIR FORCE INTELLIGENCE

IT is notified that Air-Commodore F. C. Halahan, C.M.G., D.S.O., M.W.O., assumed duty as Director of Aeronautical Inspection on January 3, 1922. This post was formerly held by Brig.-Gen. R. K. Bagnall-Wild, C.M.G., C.B.E., who recently succeeded Air-Commodore H. R. M. Brooke-Popham, C.B., C.M.G., D.S.O., A.F.C., as Director of Research on the appointment of the latter as Commandant of the Royal Air Force Staff College, on formation.

The following other appointments in the Royal Air Force are notified:—*Wing-Commanders* C. E. C. Stanford, D.S.O., M.B., B.Sc., from Headquarters, Inland Area, to Inspectorate of Recruiting (Coastal Area) as Medical Inspector of Recruiting. 19.12.21. M. G. Christie, C.M.G., D.S.O., M.C., from Air Ministry (Controller-General of Civil Aviation) to R.A.F. Depôt (Inland Area). (Supernumerary.) 1.1.22. A. V. Bettington, C.M.G., from Headquarters No. 11 (Irish) Wing to School of Military Administration. Attached for Senior Officers' Course of Instruction. 13.1.22. H. R. Nicholl, O.B.E., from Headquarters, Inland Area, to School of Military Administration. Attached for Senior Officers' Course of Instruction. 13.1.22. H. S. Turner, M.B.E., D.T.M., from Headquarters, No. 1 School of Technical Training (Boys) (Halton) to School of Military Administration. Attached for Senior Officers' Course of Instruction. 13.1.22.

Squadron-Leaders W. R. Read, M.C., D.F.C., A.F.C., from No. 216 Squadron (Middle East Area) to R.A.F. Depôt (Inland Area). 28.11.21. N. C. Spratt from School of Naval Co-operation and Aerial Navigation (Coastal Area) to Air Ministry (Directorate of Research). 12.1.22. A. E. Gaskell, D.S.C., from Headquarters, Coastal Area, to No. 29 Group Headquarters (Coastal Area). 25.1.22.

Squadron Leaders E. W. Craig, M.C., M.B., from No. 2 Flying Training School (Inland Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) Attached for temporary duty to Air Ministry (Directorate of Medical Services). 9.1.22. G. S. Marshall, O.B.E., from Research Laboratory and Medical Officers School of Instruction (Inland Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) Whilst on Study Leave. 2.1.22. G. H. Bowman, D.S.O., M.C., D.F.C., from School of Naval Co-operation and Aerial Navigation (Coastal Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) Attached to Central Flying School (Inland Area) for Flying Refresher Course, pending embarkation overseas. 16.1.22. G. W. Robarts, M.C., from Air Ministry (Director-General of Supply and Research) to R.A.F. Depôt (Inland Area), (Supernumerary.) 12.1.22. To join 31.1.22. C. H. Elliott-Smith, A.F.C., from R.A.F. Depôt (Inland Area) to Headquarters (Inland Area). 13.1.22. W. B. Hargrave, O.B.E., from Central Flying School (Inland Area) to Headquarters, R.A.F., India. 31.12.21.

Flight-Lieutenants J. K. Summers, M.C., from No. 2 Flying Training School (Inland Area) to No. 5 Flying Training School (Inland Area), 18.1.22. A. Lees, from R.A.F. Depôt (Inland Area) to Aeroplane Experimental Establishment (Inland Area). 9.1.22. G. E. Godsave, from Air Pilotage School (Cadro) (Inland Area) to Admiralty Compass Observatory. 23.1.22. J. W. Woodhouse, D.S.O., M.C., from Inter-Allied Aeronautical Commission of Control (Hungary) to R.A.F. Depôt (Inland Area). (Supernumerary.) 20.12.21. C. H. Keith, from School of Naval Co-operation and Aerial Navigation (Coastal Area) to No. 230 Squadron (Costal Area). 2.1.22. I. T. Lloyd, from School of Naval Co-operation and Aerial Navigation (Coastal Area) to No. 2 Flying Training School (Inland Area). 2.1.22. H. E. P. Wigglesworth, D.S.C., from Air Ministry (Directorate of Equipment) to R.A.F. Depôt (Inland Area). (Supernumerary). 19.1.22. B. C. Adamson, from Inland Area Aircraft Depôt (Inland Area) to R.A.F. Cadet College (Flying Wing) (Cranwell). 9.1.22. J. W. Harper, M.D., to Research Laboratory and Medical Officers' School of Instruction (Inland Area). On appointment to short service commission. 14.12.21. O. Armer, to R.A.F. Depôt (Inland Area), on attachment to Royal Air Force from Army Dental Corps. 30.11.21. To Electrical and Wireless School (Inland Area). 17.12.21. J. V. Read M.B.E. The recent notification wherein this officer was posted from Inland Area Aircraft Depôt to R.A.F. Cadet College (Flying Wing) is hereby cancelled.

Flight Lieutenants A. W. Fletcher, D.F.C., A.F.C., from R.A.F. Base, Leuchars (No. 3 Squadron) (Coastal Area), attached to H.M.S. "Argus" for flying duties. 7.1.22. L. C. Keeble, from R.A.F. Base, Leuchars (205 Squadron) (Coastal Area). Attached to H.M.S. "Argus," for flying duties. 7.1.22. H. V. German, from R.A.F. Base, Leuchars (Coastal Area) to half-pay list. 27.12.21. E. A. Fawcus, from No. 6 Squadron (Middle East Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) 4.11.21. H. O. Long, D.S.O., from R.A.F. Depôt (Inland Area) to Instrument Design Establishment (Inland Area). 5.1.22. [illegible] W. Wilson, from R.A.F. Depôt (Inland Area) to No. 1 Stores Depôt. 12.1.22. F. G. M. Williams, from British Naval Mission (Greece) to R.A.F. Depôt (Inland Area). (Supernumerary.) 31.12.21. To join 28.1.22. L. H. Slatter, O.B.E., D.S.C., D.F.C., from No. 203 Squadron (Coastal Area) to half-pay list. 11.1.22. P. J. Wiseman, from Air Pilotage School (Cadre) (Inland Area) to Central Pay Office (Inlnd Area). 1.1.22. O. W. de Putron, from Experimental Section, Royal Aircraft Establishment (Inland Area) to School of Army Co-operation (Inland Area) 18.1.22. W. J. King, D.C.M., from Headquarters, R.A.F., Cranwell to No. 1 Stores Depôt. 23.1.22. E. S. Baker, from No. 1 Stores Depôt to No. 4 Stores Depôt. 17.1.22. T. Bell, M.M., from No. 3 Stores Depôt to the Packing Depôt. 17.1.22. H. S. Scroggs, from No. 4 Flying Training School (Middle East Area) to No. 45 Squadron (Middle East Area). 6.12.21. N. H. Bottomley, A.F.C., from Egyptian Group Headquarters (Inland Area) to Headquarters (Middle East Area). 7.11.21. E. M. Cashmore, from Stores Depôt, Egypt (Middle East Area) to Headquarters (Middle East Area). 1.12.21. F. T. Allen, from R.A.F. Depôt (Inland Area) to No. 2 Flying Training School (Inland Area). 4.1.22.

THE ROYAL AIR FORCE MEMORIAL FUND

A MEETING of the Executive Committee of the above Fund was held at No. 7, Iddesleigh House, Caxton Street, S.W. 1, at 3 p.m., on Wednesday, January 4, 1922. The following members of the Committee were present:—Lord Hugh Cecil (Chairman), Dame Helen Gwynne-Vaughan, Mrs. Barrington-Kennett, Air Vice-Marshal A. V. Vyvyan, Messrs. F. E. Rosher and H. E. Perrin.

Letters of regret for non-attendance were received from Lady Leighton, Major-General Sir Sefton Brancker, and Mr Walter Field.

The usual financial statements and the list of grants made since the last meeting, held on December 7, 1921, were submitted and approved. The amount of Grants made was £303 13*s.* 8*d.*, which is a considerable reduction on the average amount of the previous few months. The chief matter on the Agenda was the R.A.F. War Memorial, and much progress was made in this matter, and it was resolved that matters of subordinate importance in connection with the Memorial should be left to the decision of the War Memorial Sub-Committee, and it is hoped that within a very short time the actual execution of the Memorial on the Thames Embankment will be commenced.

The Secretary was instructed to prepare the Annual Report for 1921, on the lines of the one issued for 1920, and it is hoped to have this Report issued by the end of February.

The next meeting of the Committee was fixed for Wednesday, February 15, 1922, at 3 o'clock.

Royal Air Force Sports Board.

THE following fixtures have been arranged for January:—January 7, Rugby (R.A.F. *v.* Northampton, at Northampton); 11, Rugby (R.A.F. *v.* Guy's Hospital, at Honor Oak); 11, Fencing (R.A.F. *v.* Bertrand's Academy, at Hanover Square); 19, Rugby (R.A.F. *v.* Blackheath, at Blackheath); 21 to 28, Association (R.A.F. Memorial Fund Football Week, at Blackheath); 28, Rugby (R.A.F. *v.* Llanelly, at Llanelly).

R.A.F. (Cadet) College

THE following is a list of Cadets, in order of merit, who passed out of the Royal Air Force (Cadet) College in the December examinations:—Mills, G. H. (awarded Fellowes Memorial Prize), Barratt, J. B., Waite, R. N., Akerman, W. J. M., Revington, A. P., Hayter-Hames, N. C. (awarded R. M. Groves Memorial Prize), Mackay, M. B., Whelan, R. D., Shepherd, G. C. (subject to completion of flying training), Mangles, R. A. R., Brown, J. R., Spaight, R. H. S. (subject to completion of flying training), Bernard-Smith, G. C. B., Rowe, F. C. T., Bonham Carter, D. P. F., Mitchell, F. G. S., Brook, W. A. D., Gore, C. W., Stone, R. A. B., Falconer, C. L. (awarded Sword of Honour), Coombe, G., Desmond, D. J., Gay, G. W., Lacey, E. V. S., Springfield, C. M. O. C., Stone, C. J., Pontifex, R. W., German Williams, M. H., Hawtrey, J. G.

The Art of "Press Cutting" Agencies

LIKE most newspapers, FLIGHT, under arrangements, receives newspaper references to matters that specially concern us—to wit, aviatic. At times we are favoured with some weird and wonderful selections accordingly, but the Christmas festivities account for one cutting which brought us up with a jerk: "A night of Flying Chimney-pots." And then there are folk who maintain aviation has made no progress.

Washington and Aircraft

As was expected from the first, the Washington Conference has realised the difficulties of any attempt to limit the construction of aircraft and at the same time avoid handicapping the development of aviation for commercial purposes.

On January 9, the representatives of the Five Powers accordingly arrived at the conclusion that it is impossible at present to limit the development or the use of aircraft, and adopted a resolution recommending the creation of an international Commission to study the question with a view to future limitation.

This is in harmony with the report of the Sub-Committee upon the subject, which was of the opinion that it is impossible to limit the size and use or characteristics of aircraft other than lighter-than-air machines, and that the question of restricting aircraft in war should be left open for a future conference.

French 1922 Air Budget Details

Last week, details of the French Air Budget for 1922 were available, and total, as passed by Parliament, to just under 436 million francs. The main appropriations are: *Minister of War:* For Home Squadrons, 214,287,500 francs; Algeria and Tunis, 9,936,490 francs; Morocco, 22,173,092 francs. Total, 246,397,082 francs. *Under Secretary of State Department for Aeronautics:* 147,219,970 francs, which includes foreign air attachés, 200,000 francs; technical service, 5,400,000 francs; prizes and subsidies for commercial aviation, 45,382,000 francs.

Ministry of Marine: 37,318,543 francs.
Ministry of Colonies: 4,991,000 francs.

Air Traffic at Bourget, the Paris Air Port

Of considerable interest and importance are the figures now available for the past year's growth of flights and passengers and freights carried. For the month of December, the figures are: 148 flights (arrivals and departures), 359 passengers, 7,277 kilogs. of freightage, and 84 kilogs. of mails. For the full 12 months to December 31, 1921, last (compared with 1920) the figures are: Flights, 4,022 (3,359 in 1920); passengers, 13,369 (6,850 in 1920); goods, 150,309 kilogs. (120,745 in 1920); mails, 3,308 (1,474 in 1920).

These figures are for the airways in operation between Paris and London, Paris-Brussells-Amsterdam, Paris-Strasbourg-Prague-Warsaw, Paris-Amsterdam and Paris-Havre.

Rumpler's Figures in Germany for 1921

Over the Berlin-Augsburg air-route, which the Rumpler Co. have been exploiting, the totals for 1921 are given as 1,244 passengers and 3,286 kilogs. of mails carried.

The Use of Light as an Aid to Aerial Navigation

A discussion upon the above important subject will be opened by Lieut.-Col. L. F. Blandy, D.S.O., at the Royal Society of Arts, at 8 p.m., on January 31, under the auspices of the Illuminating Engineering Society. At this joint meeting with the Royal Aeronautical Society, Major-General Sir Frederick Sykes will preside.

Syria and Aviation Development

A new air service has been instituted in Syria between Latakia and Homs. Two journeys each way are, according to the Paris *Temps*, made per week, as on the similar services between Aleppo and Deir-Zor, Aleppo and Aintab, and Aleppo and Alexandretta. Services are also to be opened between Damascus and Palmyra and Damascus and Soweida (Hauran). A number of packages were carried on the Levant services, and in November 31 wounded or sick were evacuated by aeroplane without accident.

The London Aero-Models Association

A general meeting of the above Association was held on Thursday, January 5, at 20, Great Windmill Street, Piccadilly, W. 1, when 29 members had the pleasure of listening to a very interesting lecture by Mr. F. J. Camm on the subject of gears. A general debate followed, many members joining in. Messrs. W. G. Evans and Sons have very kindly presented a prize of £2 2s. to be competed for by the members during the coming flying season. An important general committee meeting will be held on Thursday, January 12. On January 19 all members are specially requested to attend a general meeting, when the election of the officers who will hold office for the ensuing twelve months will take place, and other business will be discussed.

Meetings are held every Thursday, at 20, Great Windmill Street, Piccadilly, W. 1, commencing at 7.30 p.m. prompt. Membership forms can be had from the Hon. Sec., Mr. A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

SIDE-WINDS

From the other side of the Atlantic comes quite an interesting little pamphlet, entitled the "Text Book of Aeronautical Lubrication." It is published by the C. L. Maguire Petroleum Co., of Chicago, one of the "big" lubricating oil, etc., concerns of America, and the makers of "Lakeside Aviation Oil." The first half of this work is devoted to the qualities of the above oil, and to lubrication problems (aviatic) in general, whilst the second half consists of a very comprehensive "chart" of troubles experienced with aero-engines, their causes and remedies. Two interesting diagrams are also included, showing an aero-engine (Hall Scott) with the lubrication of all the important parts graphically set out.

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The second annual Martlesham Heath Reunion Dinner (tickets 17s. 6d. each) will be held on Friday, January 20, at the Café Royal, Regent Street, London, W., at 7 p.m., when the Chair will be taken by Brig.-Gen. R. K. Bagnall-Wild, C.M.G., C.B.E.

Will all former members of the Station, please communicate with Capt. P. G. Robinson, Room A. 139, Air Ministry, London, W.C.2?

* * * *

PUBLICATIONS RECEIVED

Technical Note No. 75. Effects of Varying the Relative Vertical Position of Wing and Fuselage. By L. Prandtl. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 118. The Pressure Distribution over the Horizontal Tail Surfaces of an Airplane. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 76. A Mechanical Device for Illustrating Airplane Stability. By F. E. Norton. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1919

Published January 12, 1922

32,115. Baron R. de T'Serclaes. Rotary explosion engines. (152,663.)

APPLIED FOR IN 1920

Published January 12, 1922

15,521. J. Democratis. Parachutes. (172,670.)
15,964 and 15,965. Dayton-Wright Co. I.C. engines. (146,944 and 143,409.)
19,298. H. Junkers. I.C. engines. (147,219.)

If you require anything pertaining to aviation, study "Flight's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xii).

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued*

(Continued from p. xii.)

LUBRICATING OILS—
Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cheery," Cent. London.

MACHINING—
Arnott & Harrison, Ltd., Hythe Road, Willesden Junction. Willesden 2297.
Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—
British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278: "Asteroidal," Coventry.

METALS (Anti-Friction)
Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1123.

METAL PARTS AND FITTINGS—
Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.
Grahame-White Company, Ltd., Hendon, N.W. 9. Kingsbury 120.
London Office: 12, Regent Street, Pall Mall, S.W. 1. Regent 2084.
Monk Engineering Co., High St., Coventry.
Coventry 807; "Assistance," Coventry.
Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MISCELLANEOUS—
British Oxygen Co., Ltd. (Hydrogen Gas), Elverton St., Westminster, S.W. 1.
Victoria 4706 (2 lines), 6717 (2 lines).

MODELS—
Jones, A. E., Ltd., 52, High St., New Oxford St., W.C. 1.

MOTOR CARS AND MOTOR BICYCLES—
Auto-Carriers (1911) Ltd., 181-182 Hercules Rd., Westminster Bridge Road, London, S.E. 1.

NIGHT LANDING LIGHTS—
Allen-Liversidge, Ltd., amalgamated with Imperial Light, Ltd., 106, Victoria St., S.W. 1.
Victoria 4155; "Aceterator," Sowest, London.

OFFICE FURNITURE AND APPLIANCES—
Edison Swan Electric Co., Ltd., The, Ponders End, Middlesex.

PARACHUTES—
E. R. Calthrop's Aerial Patents, Ltd., Eldon St. House, Eldon St., E.C. 2.
London Wall 3266-67; "Savemalive," Ave, London.

PETROL—
Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.
Shell-Mex Ltd., Victory House, Kingsway, W.C. 2.
Holborn 2303-4; "Shelzine," Westcent, London.

PHOSPHOR BRONZE AND GUNMETAL—
Clifford, Charles, & Son, Ltd., Fazeley Street Mills, Birmingham.
Central 3634 (4 lines); "Clifford," Birmingham.
Keeling, A. D., Ltd., Caroline Street, Birmingham.
Central 440 (3 lines); "Nickel" Birmingham.

PHOTOGRAPHIC APPARATUS—
Kodak, Ltd. (Wratten Div.), Kingsway, W.C. 2.

PROPELLERS—
Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.
Metal Airscrew Co., Ltd., Regent House, Kingsway, W.C. 2.
Gerrard 5122; "Pliantness," Phone, London.

RADIATOR TUBING—
Sansum, S., & Co., Eagle Tube Works, Wolverhampton.

RADIATORS AND RADIATOR REPAIRS—
Serck Radiators, Ltd., Warwick Road, Greet, Birmingham.
Victoria 521 (3 lines); "Nerleak," Birmingham.

SCRAP METALS—
Keeling, A. D., Ltd., Caroline St., Birmingham.
Central 440 (3 lines); "Nickel," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—
Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

SPARKING PLUGS—
Lodge Plugs, Ltd., Rugby.
Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15. Putney 2132, 2133.
"Kaalgee," Phone, London.

SPRAYING PLANT—
Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1.
Holborn 2041; "Aerography," London.
Midland Fan Co., Ltd., 46, Aston Rd., Birmingham.
Central 3463; "Blast," Birmingham.

TAPES AND WEBBING—
MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent. London.

TESTING—
Tait-Cox & James, c/o S. Heckstall Smith, F.R.Ae.S., 4, Golden Square, W. Gerrard 3489.

TIMBER—
Owen, Joseph, & Son, Boro High Street, S.E.
Hop 3811; "Bucheron," London.

TUBES, ALUMINIUM—
British Aluminium Co., Ltd., The, 109, Queen Victoria St., London.
City 2676; "Cryolite," Cent. London.

TYRES AND WHEELS—
Palmer Tyre, Ltd., Shaftesbury Avenue, W.C. 2.
Gerrard 1214; "Tyricord," Westcent, London.

VARNISHES AND COLOURS—
The British Emaillite Co., Ltd., Brentfield Road, Stonebridge Park, N.W. 10.
Willesden 2346 and 2347; "Ridleypren," London.
Naylor Bros., Ltd., Slough, Bucks.
Slough 228; "Naylor," Slough.

WELDINGS, REPAIRS—
Barimar, Ltd., 10, Poland St., London, W. 1.
Gerrard 8173; "Bariquamar," Reg. London.

WIND SHIELDS—
Auster, Limited, 133, Long Acre, W.C. 2.

WIRES AND CABLES (Aeroplanes)—
Bruntons, Musselburgh.
Bullivants, Ltd., 72, Mark Lane, E.C. 3. Works: Millwall, E. 14.
Clifford & Sons, Ltd., Birmingham.

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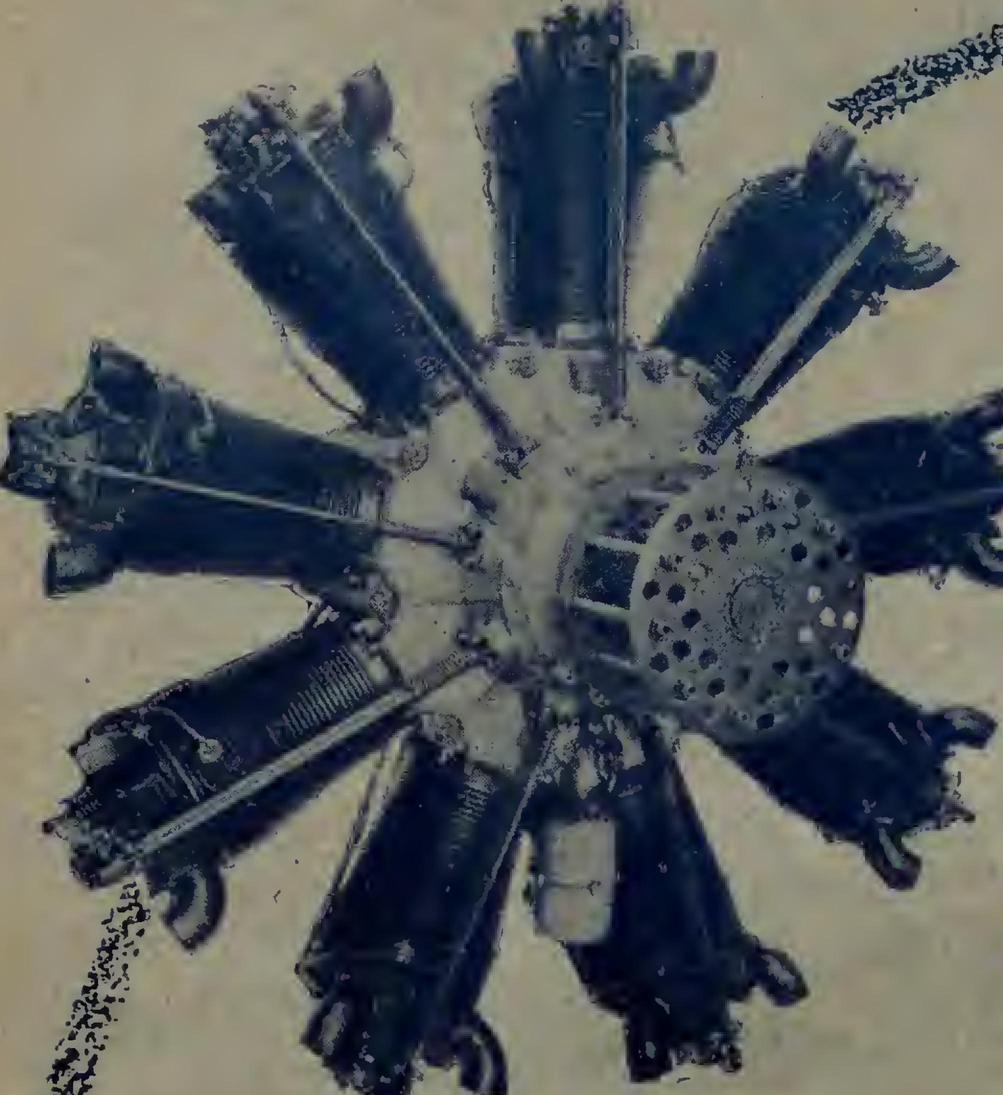

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

1922.	
Jan. 19	**Lecture, "Aeroplane Installation," by Brig.-Gen. R. K. Bagnall-Wild, before R.Ae.S.**
Feb. 2	**Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.**
Feb. 7 & 8	**Second Air Conference at Guildhall**
Feb. 16	**Lecture, "Methods of Instruction in Aeroplane Flying," by Sq.-Leader Portal, before R.Ae.S.**
Mar. 2.	**Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.**
Mar. 26–April 2	**Nice Meeting**
Mar. 30	**Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**

EDITORIAL COMMENT

Admiralty Report on "R. 38."

IN our issue of October 13, 1921, we published the report of the Court of Enquiry appointed to look into the circumstances occasioning the loss of H.M. Airship "R 38," and the Air Council's statement on the report. We also published, in the same issue, a communication from the Secretary of the Admiralty to the effect that the Admiralty were conducting a full investigation into the history of the design of the airship and of the initial stages of its construction up to October, 1919, when the responsibility for the design and construction of airships was transferred to the Air Ministry. The Admiralty report has now been issued, and is published elsewhere in this issue.

The main conclusions to be drawn from the report are that the Admiralty have come to the decision that, although the design was an advance on anything hitherto attempted, it did not incorporate any novel features which would affect the strength and safety of the ship, and that no undue risk was taken in the design. Briefly, the report states that during the period when the design of this airship was in preparation, the Director of Airship Production was responsible for the design and manufacture. His instructions required him to keep in close touch with the Superintendent of Airships, who was responsible for the formulation of general requirements in respect of the equipment and fittings of airships and for the final trial and acceptance of airships from the point of view of utility and fighting efficiency. The general requirements for new airships—*i.e.*, the performances of which they were to be capable—were laid down by the Naval Staff, the Air Division of which acted as liaison with the Air Ministry.

During the summer of 1918 the problem of improved airships received a great deal of attention, and it was found that, to meet the latest requirements (long range, high speed, and a high ceiling) it would be necessary to build a very large ship. (These requirements were, of course, drawn up by the Naval Staff of the Admiralty.) As, however, no constructional sheds were available which were large enough to enable the construction to be carried out, it was decided that the requirements of the Naval Staff should be revised so as to fall within the limitations imposed by existing constructional sheds. The revised requirements were considered at a conference of the Director of Air Division, the Director of Plans, the Superintendent of Airships, and the Director of Airship Production. The design recommended by this conference was approved by the Board of Admiralty, and work was commenced.

From this stage in the report and onwards it is interesting to compare the points brought forward by the Court of Enquiry with the statements contained in the Admiralty report. The former states that "having regard to the great differences in requirements between H.M. Airship 'R 38' and previous British airships, the design should have been examined by an official and competent Committee before actual construction was commenced." The Admiralty report maintains that although the requirements for which "R. 38" was designed were in advance of those affecting previous ships they "did not involve the introduction of any new principle, and on that account the design cannot be considered a novel one." Regarding the suggested discussion by an official and competent committee, the Admiralty report maintains that "there was at the time no body in existence which could have been called in to advise on the structural strength of 'R. 38.' Practically all the expert opinion which could have been of any assistance was already engaged upon the work. Had, therefore, any special committee been formed before the construction of 'R.38' was commenced, it would necessarily have been composed mainly of these Admiralty and Air Force expert officers." The Admiralty report further points out that the Director of Airship Production was a member of the Advisory Committee for Aeronautics, and that the Airship Production Department was in constant touch with the National Physical Laboratory and received much information from the experiments carried out there. This last Admiralty statement is evidently a reply to the suggestion of the Court of Enquiry that "it appears evident that in some cases there was a lack of vital aerodynamic information as to the effect of the modifications on the strength of the structure."

Altogether, the Admiralty report does not seem to carry the matter much farther. It appears to us that neither one side nor the other has advanced any real proof one way or the other. One side says the design was not greatly different from previous ones. The other maintains that the new requirements were far ahead of anything previously demanded of British airships. The sum total appears to be that we are no nearer than we were to knowing who, if anyone, was to blame for the regrettable accident. There can be little doubt that "R. 38" did differ materially in design from previous British airships, and represented an attempt to catch up with the Germans by original design instead of being content with copying. The requirements were certainly exacting, and as the airship was meant for war purposes a certain amount of risk had to be taken. In other words, if the airship was to do its work it had to be lighter—and consequently possibly have a smaller factor of safety—than previous ships. Equally certainly there can be no doubt that those responsible for the design firmly believed that everything had been done to make the ship sufficiently strong. It is just in the interpretation of the word "sufficiently" that there can be an opening for differences of opinion. Airship design is not yet an exact science—far from it—and much has to be done by empirical methods, which may fail to foresee all the factors entering into the equation. The Germans have reached their present high status in airship design and construction through full-scale experiments extending over twenty years or more. When, under the stress of war requirements, we attempted to take a short cut by trusting to calculations to take the place of long practical experience, we made a mistake which, unfortunately, cost us very dearly. Taking into consideration all the conflicting requirements, and the peculiarly difficult conditions under which the ship was built, we do not really think that there can be any question of blaming anyone in particular. Let it be remembered that, had the accident not occurred, the weakness might have remained undiscovered, and more ships might have been built suffering from the same defect. As it was we learned, in that short, intense period, a great deal about airship design and construction which we should not otherwise have known. If it were not for the hideous loss of valuable lives, there would be little to regret having regard to the set-off of experience gained.

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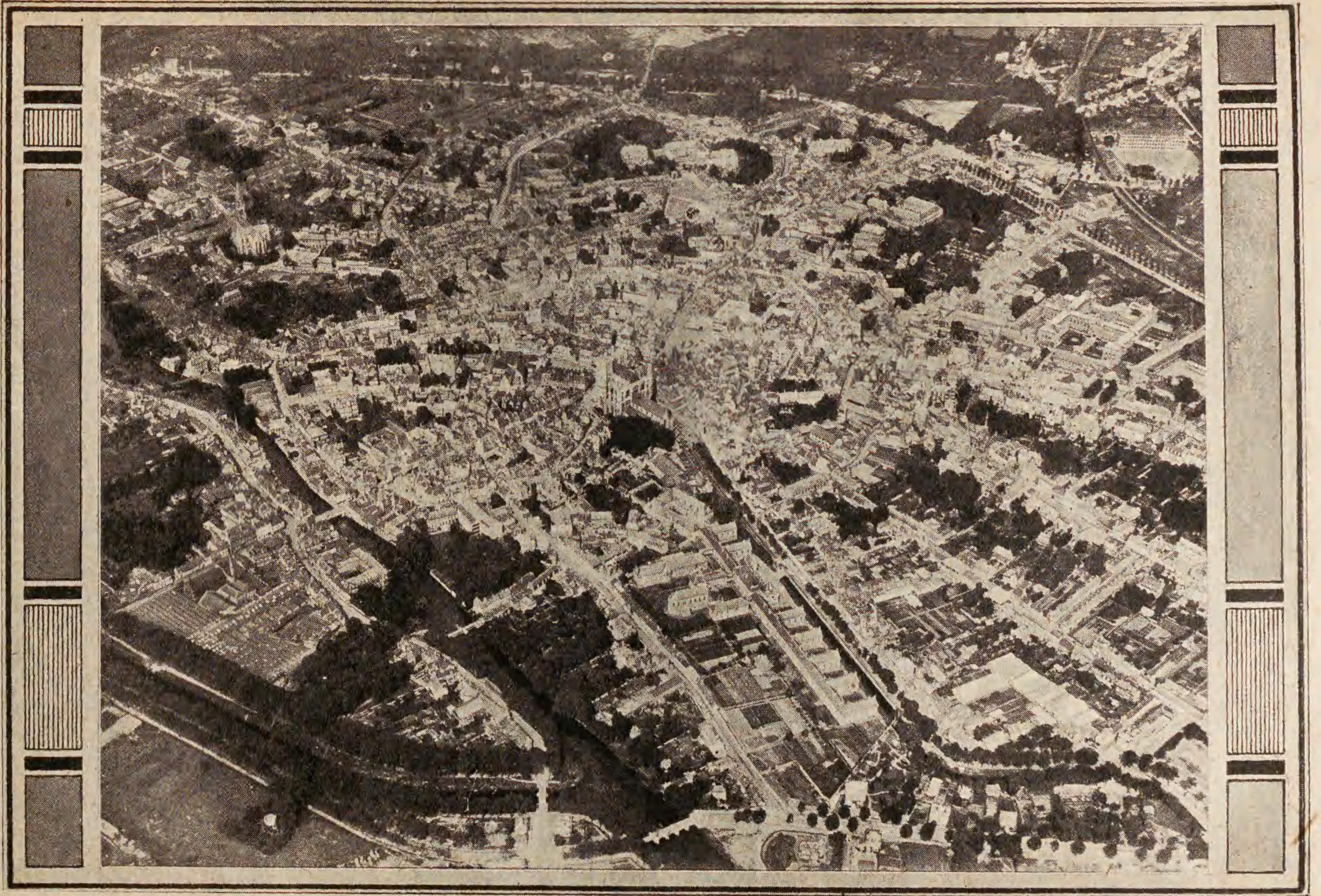
"Boats that Fly." It is with considerable satisfaction that we note the subject of Major Hume's juvenile lecture to the R.Ae.S. was "Boats that Fly." We have in this country sadly neglected the seaplane in the past, and although there are now signs of an awakening realisation of the importance of this type of craft to an Empire like ours, there is still room for vigorous propaganda among those who, by the time aviation takes its due place in the affairs of the world, will be the men and women to "see it through." We would like to point out that the subject is one which, although suitably treated with a view to the particular audience, is one of the greatest importance to those of us who can scarcely any longer come under the "juvenile" category. Separated (or connected, according to the point of view) as the parts of the British Empire are by leagues of sea, one would have thought that the natural development of aircraft would have been along the lines of seaplanes and flying boats rather than in the land aeroplane class. Yet this has not been the case, possibly because it is so very much easier to produce a machine which will get off comfortably from a specially prepared aerodrome than it is to produce a seaplane or flying boat that will get off a smooth or a rough sea as conditions dictate. The consequence has been that the land aeroplane has been developed to a very high state of efficiency, while its opposite number for use over the sea has been mainly confined to Naval requirements.

Realising the vital importance to the Empire of developing the seaplane—and incidentally the amphibian—it is a little strange that the Air Ministry, or rather the Controller of Civil Aviation, has not up to the present thought it worth while to allocate part of the Vote for Civil Aviation to the development of a regular seaplane service. There are in existence today machines which would certainly be able to meet the modest requirements of a mail service even if, through lack of development, we have not yet arrived at a satisfactory solution of the problem of the seaplane passenger machine. There is some talk of a service between London and one of the Irish ports, which would shorten the time taken by mails to America by at least one day. While there is no reason why such a scheme should not be perfectly feasible, there are possibly other routes which would be more promising.



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LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE: No. 23.—Abbeville.

For instance, the London-Brussels and London-Amsterdam lines form the direct route to northern and central Europe, and they might very well be covered with seaplane or amphibian services, which would be able to follow a more direct route than that at present taken by the land machines, and would thus be able to effect a considerable saving in time on that score only, apart from doing away with the tedious journey from towns to land aerodromes. Flights carried out between London and Paris have shown the possibilities of using the rivers in the centre of towns as "aerodromes," and in the summer at any rate such services should be capable of being run with good regularity. We recommend the subject to the very serious consideration of those in authority.

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Health of the R.A.F.

The report on the Health of the Royal Air Force for the year 1920 recently published by command of the Air Council does not include statistics relating to the Air Force in India, nor those relating to certain scattered units such as certain detached flights in the Middle East, drafts on board ship, and the African Aerial Survey Parties, for which it was found impracticable to introduce the approved system of returns.

The Royal Air Force system of medical administration is based on the principle originally instituted in the R.N.A.S. Stations, sick quarters being organised to provide bed accommodation for 1 per cent. of the station personnel, and having facilities for emergency treatment of serious accidents and cases requiring isolation. They are not intended to accommodate cases requiring hospital treatment. Illustrations of the value of this system, the report states, are especially shown in the many cases of sandfly fever and malaria treated entirely in sick quarters at Baghdad and Constantinople respectively in 1920, No. 55 Squadron, which was only at Constantinople during July and August, being able to cope not only with the majority of its sick without evacuation to hospital, but also to proceed to Mesopotamia practically intact.

The report shows the general state of health of the R.A.F. to be good, and incidentally it indicates that the R.A.F. is not nearly such a dangerous career as might be imagined, whether in the branches doing actual flying or those working on the ground in various capacities. Thus the case incidence of flying accidents among officers and cadets was 21·0 per 1,000 of strength, and the death-rate 8·5. A considerable number of accidents are shown to be due to starting engines and swinging propellers, but, as the report states, the majority of these accidents can be considered as preventable, as they are usually due to holding the starting handle with thumb opposed to fingers, in the case of starting engines. Propeller swinging always has been a dangerous practice, and in commercial aviation it is rapidly disappearing. For military flying, however, it will probably survive for some time, at any rate for the smaller types of engines. It is not without interest to find that the number of accidents due to athletics is vastly greater than that due to flying, although the death-roll of flying is naturally higher than in sports.

It is stated in the report that, although of a primitive nature, the air ambulance has had an opportunity of proving its worth, and "the old blood wagon," as the air ambulance (a converted "D.H.9") was generally called, did such good work as to call forth the following statement, reprinted in the report: "Thus the aerial ambulance has shown that, especially in operations over country where other transport is so tedious and trying, the aeroplane is a veritable godsend for sick and wounded."

AIR PARCELS POST

THE Postmaster-General states that parcels are now accepted on behalf of the British air transport companies, at sixteen additional Post Offices in London, and in twenty-two additional towns in the provinces for conveyance by aeroplane and delivery in Paris each week-day. The additional London offices are the following :—

Hatton Garden; East Strand; Fenchurch Street; Finsbury Park; Kilburn; Knightsbridge; Leadenhall Street; Northern District Office; North-Western District Office; Peckham; St. James's Street; Shaftesbury Avenue; Stratford; Throgmorton Avenue; Westbourne Grove; Young Street, Kensington.

The provincial towns which have been added to the list of accepting centres are the undermentioned :—

Aberdeen; Blackburn; Brighton; Burnley; Derby; Dover; Dundee; Halifax; Huddersfield; Hull; Ipswich; Leicester; Luton; Newport (Mon.); Norwich; Nottingham; Reading; Rugby; Southampton; Walsall; West Bromwich; Wolverhampton.

The London and provincial centres which already participate in the arrangement are as follows :—

General Post Office, E.C.; Lombard Street; Threadneedle Street; Fleet Street; Western Central District Office; High Holborn; Charing Cross; Parliament Street; Western District Office; 191, Oxford Street; 148, Regent Street; 294, Regent Street; South-Western District Office; South-Eastern District Office; 21, Regent Street; Church Place, Piccadilly; Spring Street, Paddington; Croydon; Birmingham; Bradford; Bristol; Cardiff; Coventry; Edinburgh; Glasgow; Leeds; Liverpool; Manchester; Newcastle-on-Tyne and Sheffield.

Parcels may be posted in the morning at certain London post offices for dispatch by aeroplane on the same day. At other London offices, and at the provincial offices parcels posted in the afternoon or evening will be forwarded by air on the following day. Enquiry as to the latest time of posting should be made at any accepting Post Office.

The aeroplanes leave Croydon about noon, and are due at Le Bourget (Paris) about 2½ hours later. The parcels are cleared through the French Customs, immediately after arrival, by the air transport companies, and are normally delivered to the addressees by the companies on the day of arrival, subject to payment of the small extra charge, usually made for such delivery. The saving in time of transmission afforded by the use of the air service and by the rapid clearance of parcels by the French customs is considerable.

The rates for parcels sent by air service are as follows :—

Up to 1 lb., 1*s*. 6*d*.; 2 lb., 2*s*. 3*d*.; 3 lb., 3*s*. 3*d*.; 4 lb., 4*s*.; 5 lb., 4*s*. 9*d*.; 6 lb., 5*s*. 9*d*.; 7 lb., 6*s*. 6*d*.; 8 lb., 7*s*. 3*d*.; 9 lb., 8*s*. 3*d*.; 10 lb., 9*s*.; 11 lb., 9*s*. 9*d*.

The above amounts are the inland parcel post rates, plus an air conveyance charge of 9*d*. per lb.

Further particulars of the conditions of the service may be obtained on application at any accepting Post Office. The names of the accepting offices and the latest times of posting in any of the provincial towns mentioned may be ascertained from the local Head Post Office.

Abolition of Air "Corridors"

THE regulations which have hitherto been in force relating to the "corridors" by which aircraft might enter and leave the U.K. have now been abolished, according to an Air Ministry "Notice to Airmen," which states: "The provisional agreement relating to aerial communication between Great Britain and France (Article 12) has been amended in the following respect :—"The corridors of entry into Great Britain have been abolished. Aircraft may therefore cross the coast of Great Britain at any point, except over a prohibited area. The corridor of entry into France from Great Britain extends from Etaples to the Belgian frontier."

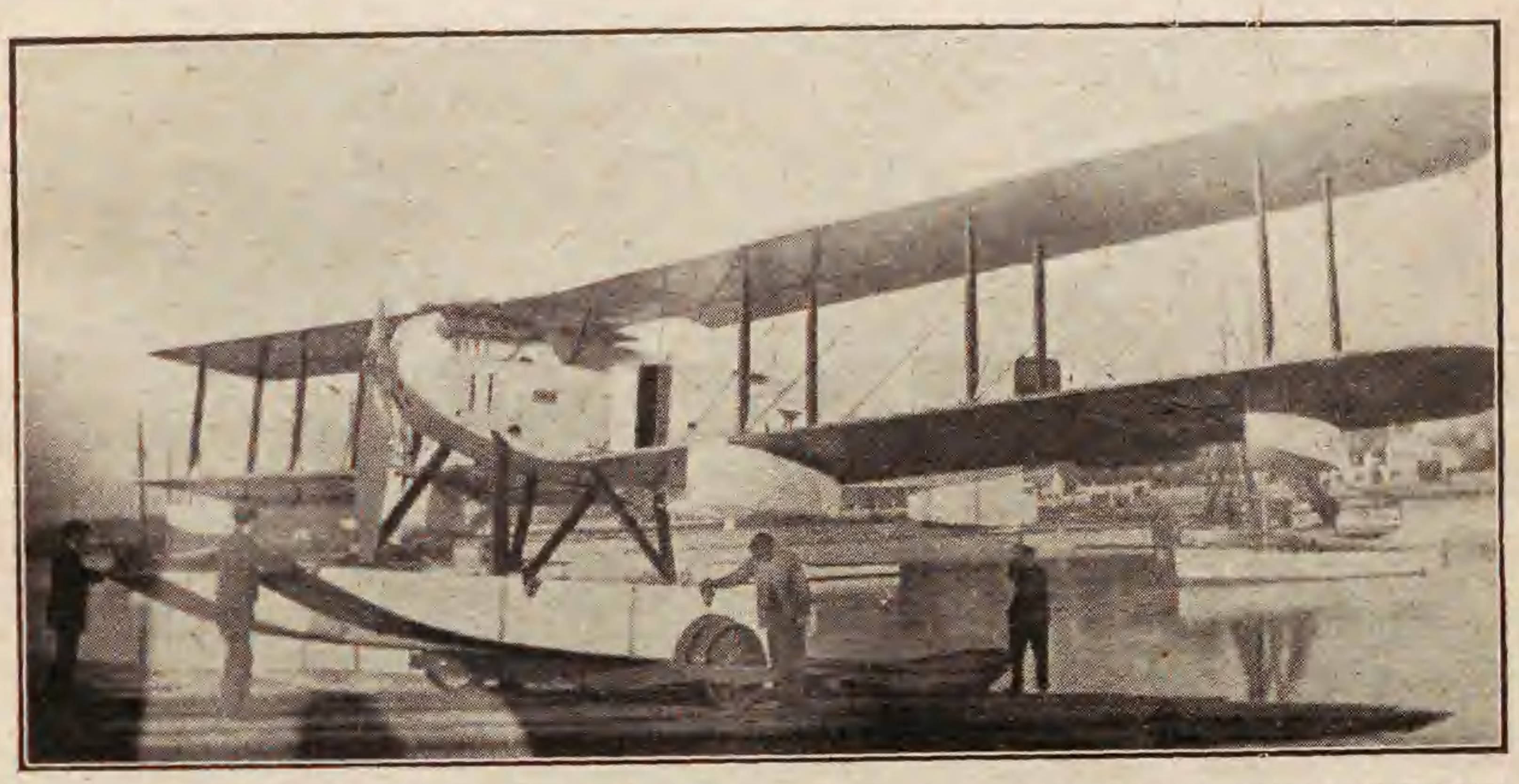
THE NEW FAIREY LONG-DISTANCE SEAPLANE

Rolls-Royce "Eagle" Engine

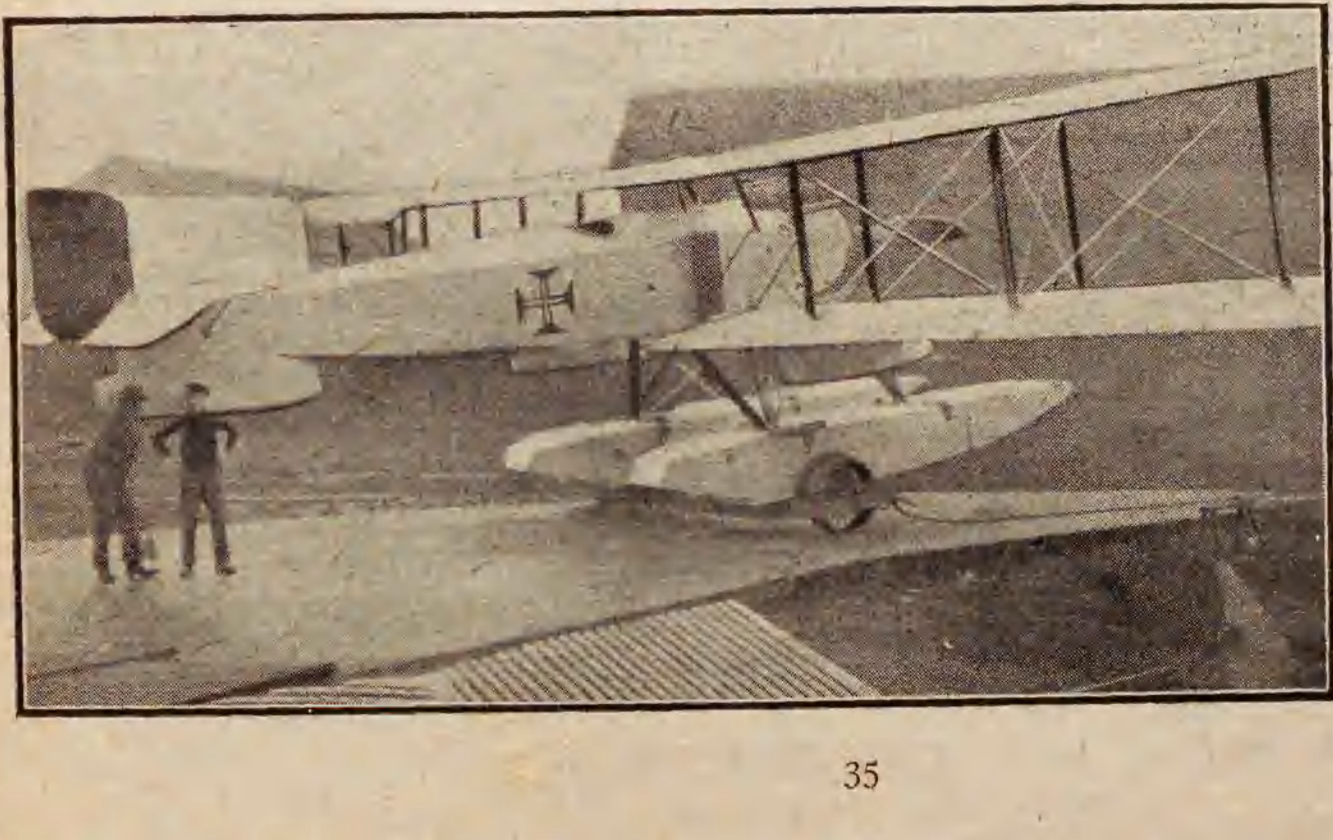
IN our last issue we recorded briefly that a new Fairey seaplane had succeeded in carrying a useful load of over 3,000 lbs. with one Rolls-Royce engine. Taking the power of the "Eagle" as 375 h.p., the *useful* load carried was over 8 lbs./h.p., which is an extraordinarily good figure, and one which, incidentally, promises well for the future of commercial aviation. In war type of machines the useful load was frequently so small as to leave no margin, but as we get away from the war type and learn more about the commercial type, the increase in useful load per horse-power expended tends to show that it is only a matter of development to reach a point where a very considerable margin of useful load exists, which can be used for carrying passengers, goods, etc. Although the Fairey seaplane is not a commercial type, in the ordinary sense of the word, it will be useful to regard it in this light, specially as nothing may be said about the purpose for which the machine is actually intended.

The machine is well shown in the accompanying photographs. In its general lines it resembles the famous "C.III's," although naturally its proportions are quite different. The wings, it will be seen, are of very much larger span than those of the "C.III," measuring in fact 62 ft. from tip to tip. The overall length is 36 ft. 6 ins., as compared with just over 36 ft. for the "C.IIID." Thus the length has scarcely been increased at all, the *fuselage* being practically that of the standard "IIID." The floats are somewhat larger, to support the extra load, but otherwise the machine is, in the main, a standard *fuselage* fitted with large wings. The Fairey Patent camber gear is, of course, incorporated, and this probably accounts in a great measure for the fact that the machine gets off well with such a heavy load.

It has already been mentioned that we are not at liberty to state the exact purpose for which the machine has been built, but it is not without interest to note that the machine was sold under a firm guarantee to carry out the stipulated performance within four months from the date of the order, so that it had to be designed, built and tested within that period. That the machine not only reached, but actually slightly surpassed, the calculated performance will not come as a surprise to those who know the Fairey designing staff, but it is a fine achievement nevertheless. The top speed developed was 95 m.p.h., with a power loading of over 19 lbs./h.p. and a wing loading of over 10 lbs./sq. ft. Naturally the climb, with such loadings, was not spectacular, but

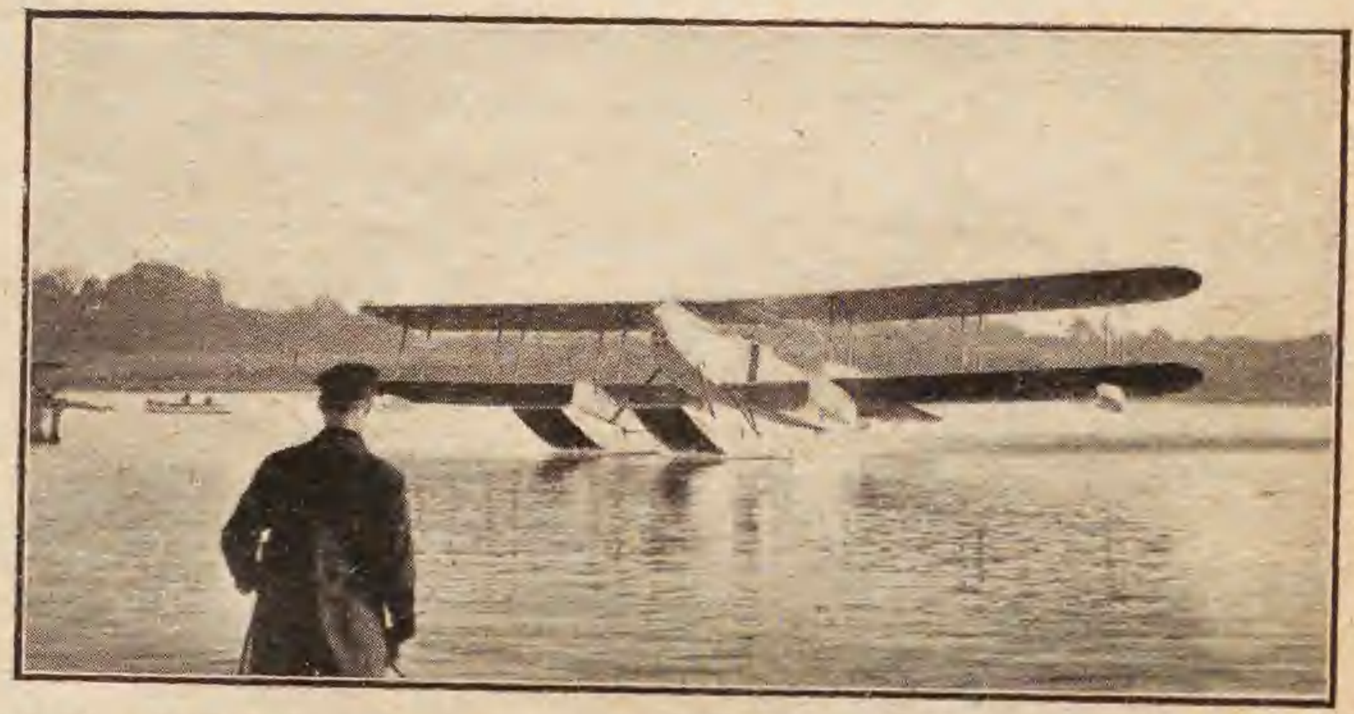


THE FAIREY LONG-DISTANCE SEAPLANE : Three-quarter front view of the machine on the slipway.



The Fairey long-distance Seaplane: Three-quarter rear view.

it reached 350 ft./min. in the earlier stages, which is certainly better than one would expect, again probably due to the camber gear. The landing speed was 42 knots, which would appear to give a very high lift coefficient, although some of the lift at large angles is, of course, due to other parts than the wings. As stated last week, the weight of the machine empty was 4,150 lbs. and the useful load 3,100 lbs., bringing the total loaded weight up to 7,250 lbs. Probably this is the greatest weight ever lifted by a single Rolls-Royce "Eagle."



The Fairey long-distance Seaplane: View of the machine taxying in after a flight.

It is interesting to speculate on the possibilities of a similar machine, intended for commercial work and fitted with a wheel undercarriage. The saving in weight would be very considerable. We have no figures relating to the weight of the floats, but let us assume that the land undercarriage would be 300 lbs. lighter than the floats. The useful load would then become 3,400 lbs., which could be divided into any desired proportion of fuel and paying load. If we assume four hours' fuel, the remaining available load would be approximately 2,500 lbs. After deducting the weight of crew, with their paraphernalia, there would still be close on one ton available load left, which is surely approximating to a record for a machine fitted with an engine of 375 h.p. only. And even at that, the maximum speed is 95 m.p.h. with full load. This would appear to be sufficient for work on most "airways," although running the engine "all out" normally would not tend to give it a long life. By slightly reducing the useful load, however, the engine could be "nursed" once the machine was off the ground, and its life correspondingly increased. Such a machine should prove extremely useful, for instance as a goods carrier. This would mean enlarging the *fuselage* somewhat, but this need not entail any very great increase in structure weight, nor in resistance.

Altogether the achievement is one of which the Fairey Aviation Company may well be proud, and when, in the near future, we come to use specialised types instead of "general utility" machines, the firm should be in a position to supply extremely economical machines somewhat of this type.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JANUARY 8 AND JANUARY 14, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon-Paris	16	17	6	16	10	2 18	D.H. 4 G-EAWH (1h. 49m.)	B. (1), D.H. 4 (1), D.H. 18 (2), G. (3), H.P. (2), Sp. (4), V. (1).
Paris-Croydon	18	39	4	14	12	2 58	D.H. 18 G-EARO (2h. 8m.)	B. (1), D.H. 4 (1), D.H. 18 (3), G. (4), H.P. (1), Sp. (3), V. (1).
Totals for week ...	34	56	10	30	22			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc. :—Co. des Grandes Expresses Aériennes ; Handley Page Transport, Ltd. ; Instone Air Line ; Koninklijkie Luchtvaart Maatschappij ; Messageries Aériennes ; Syndicat National pour l'Étude des Transports Aériens ; Co. Transaérienne.

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Honours

In the *London Gazette* of Jan. 13 the Air Ministry announces that the following decorations have been conferred by the President of the French Republic in recognition of valuable services rendered during the War, and that H.M. the King has given unrestricted permission to the officers concerned to wear the decorations awarded :—

Croix de Guerre

Capt. C. A. Taylor, R.A.F.
Lieut. R. J. Rodwell, R.A.F.

Aero Club of France President

As we foreshadowed, M. P. E. Flandin was, at the last meeting of the Executive Committee of the Club, elected President in place of M. Michelin, who recently resigned owing to ill-health—not fortunately through the death of this great patron of sport, as by a regrettable slip was erroneously stated last week. M. Flandin headed the voting list with 24, and from his past official connection with aviation should prove an active and valuable advocate of aeronautical progress.

THE "BRISTOL" 10-SEATER COMMERCIAL AEROPLANE

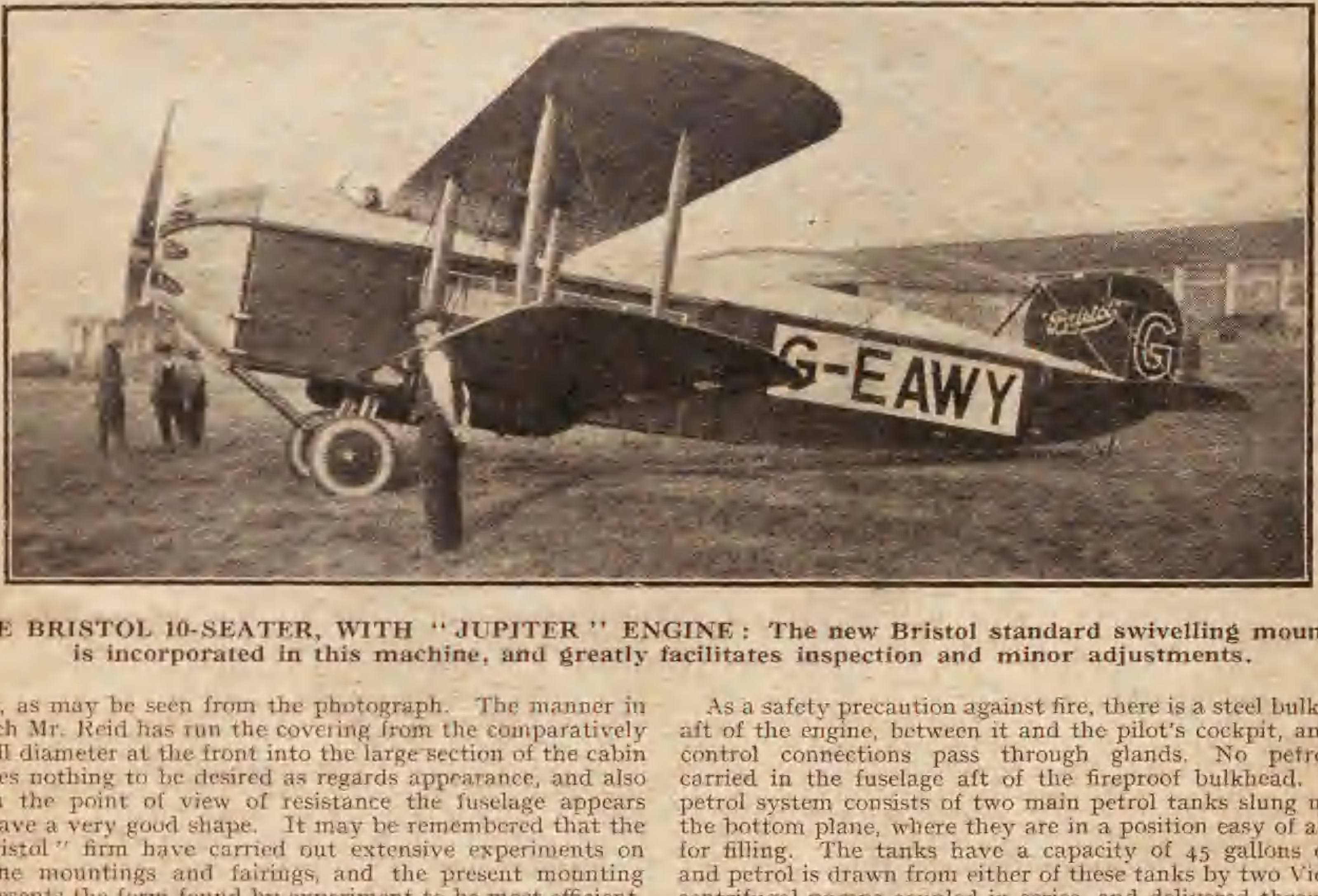
400 H.P. Bristol "Jupiter" Engine

In our issue of July 7, 1921, we published an illustrated description of the "Bristol" 10-seater commercial biplane in its original form, with Napier engine and a four-wheeled undercarriage. This machine, it may be remembered, was designed by Mr. Reid, who has now succeeded Captain F. S. Barnwell as chief engineer and designer of the "Bristol" Aeroplane Company. Since the building of the original machine certain modifications have been made to component details, such as the undercarriage. As it was found that, even without the front wheels, the machine handled remarkably well on the ground, it was decided to do away with the extra weight of the two front wheels, which were consequently omitted. The machine has been to Martlesham for its type-tests, and has paid several flying visits to the Croydon aerodrome. It has been found to handle very well both on the ground and in the air, and it is expected that it will be put into actual commercial use on the airways in the coming spring and summer.

Lately the machine has been re-designed to take the Bristol "Jupiter" radial air-cooled engine. The result is shown in the accompanying photograph. It might have been thought that fitting a radial in the nose of the machine, and the absence of a radiator would have resulted in spoiling the appearance of the machine. This, however, is not the case, as may be seen from the photograph. The manner in which Mr. Reid has run the covering from the comparatively small diameter at the front into the large section of the cabin leaves nothing to be desired as regards appearance, and also from the point of view of resistance the fuselage appears to have a very good shape. It may be remembered that the "Bristol" firm have carried out extensive experiments on engine mountings and fairings, and the present mounting represents the form found by experiment to be most efficient. This engine mounting was described and illustrated in our issue of October 13, 1921, and little need therefore be said about it here, beyond recalling that its distinctive feature is that it is swivelled or hinged along one side in such a manner that by undoing a few bolts the whole mounting can be swung laterally so as to give ready access to the rear of the engine without disturbing the petrol leads, which are so arranged that they run down along the hinged side and have sufficient flexibility to allow of a small amount of twisting and bending without requiring to be disconnected. The advantages of such a mounting for commercial work are obvious, as inspection is greatly facilitated. This should result in increased reliability, as it is well known that a part which is difficult to get at is often left alone, whereas a part that can be readily inspected usually receives its fair share of attention.

Apart from the alterations necessitated by the installation of the "Jupiter" engine, the 10-seater remains practically the same as before. The cabin has accommodation for eight passengers, of whom six are seated in upholstered seats facing forward, the other two occupying a cross-seat along the front wall of the cabin and face aft. A ninth passenger, or a mechanic, can be carried in the seat in the pilot's cockpit. The chairs are designed to fold up when not in use, and should it be desired for a single journey to use the machine for carrying goods, the cabin is fairly clear when the seats are folded. When the seats are removed from the cabin, a space for cargo is left measuring 10 ft. 6 in. in length 5 ft. 9 in. in height (in the centre), and 4 ft. in width. The cabin is lighted by windows in the sides, and there is an emergency exit in the roof. For cold weather flying the cabin can be heated by means of hot air muffs round the long exhaust pipes. Aft of the cockpit there is a lavatory, and in front of the cabin, under the pilot's cockpit, is a luggage compartment reached through a trap door in the floor. This luggage compartment measures 4 ft. 6 ins. in length, 4 ft. in width, and 2 ft. 6 ins. in height.

The pilot's cockpit is placed between the engine bulkhead and the front spar of the upper plane. From this position he obtains an excellent view forward and downward while, being practically on a level with the top plane, he can also see fairly well backwards. A wireless telegraph and telephone installation is provided for in the cockpit, and this is so placed as to be completely accessible to the engineer or navigator.



THE BRISTOL 10-SEATER, WITH "JUPITER" ENGINE: The new Bristol standard swivelling mounting is incorporated in this machine, and greatly facilitates inspection and minor adjustments.

As a safety precaution against fire, there is a steel bulkhead aft of the engine, between it and the pilot's cockpit, and all control connections pass through glands. No petrol is carried in the fuselage aft of the fireproof bulkhead. The petrol system consists of two main petrol tanks slung under the bottom plane, where they are in a position easy of access for filling. The tanks have a capacity of 45 gallons each, and petrol is drawn from either of these tanks by two Vickers centrifugal pumps coupled in series, and delivered through a Vickers hand pump to the carburettors, any surplus being returned through a 10-gallon gravity tank fitted high up on the fireproof bulkhead. Smith's capacity gauges for both tanks are fitted on the instrument board.

As already mentioned, the undercarriage of the new machine is of the two-wheeled type. Rubber rings are used for suspension, and their carriers are so designed that the rings can be easily and quickly renewed. An oleo damper gear is incorporated, the special feature of which is the tapered needle valve so shaped as to give constant oil pressure through the whole stroke of the plunger (about 8 ins.).

The main characteristics of the "Bristol" 10-seater are as follows: Span, 57 ft. 6 in.; length o.a., 40 ft. 6 ins.; height, 11 ft.; weight of machine empty, 4,000 lbs.; 90 gallons of petrol and 6 gallons of oil, 715 lbs.; crew (2), 320 lbs.; passengers (8), 1,200 lbs.; luggage, 350 lbs.; wireless, etc., 65 lbs.; total loaded weight, 6,650 lbs.; wing loading, 9·3 lbs./sq. ft.; power loading (Bristol "Jupiter" at 400 h.p.), 16·6 lbs./h.p.; speed at ground level, 112 m.p.h.; speed at 5,000 ft., 110 m.p.h.; climb to 1,000 ft., 1½ minutes to 5,000 ft., 13 minutes.

THE HANDLEY PAGE W.8 B.

Two Rolls-Royce "Eagle" Engines.

AFTER winning the Air Ministry Competition at Martlesham in 1920, the Handley Page W.8 remained, for various reasons, idle until fairly late in 1920, at any rate as far as actual commercial flying was concerned. When it was, finally, put on the London-Paris route it soon demonstrated that it was capable of making excellent time and of maintaining a good schedule, due to the ample margin of power which the two Napier "Lions" provided. Anyone who has seen the W.8 take off at Croydon must have realised that the reserve power was more than ample, the machine literally bouncing into the air after an exceedingly short run, and climbing at an angle which was more reminiscent of a scout than of the usual commercial passenger carrier. While, however, a good margin of power is the best possible manner of securing regularity and safety, a point is ultimately reached where economical reasons dictate a stop. For instance, although normally running the engines throttled down to about three-fourths or two-thirds of their maximum power results in increased life and reliability, the efficiency of the engines is not so good, owing to the smaller compression, if throttling is carried much farther. The petrol consumption is greater per horse-power developed, although smaller per engine, and consequently too great an excess of power results in a certain amount of waste.

In the case of the Handley Page W.8, practical experience has shown that not only is the excess of power provided by the Napier "Lions" too great, but that the speed of the machine so fitted is greater than is necessary for the work on the London-Paris line. It has, therefore, been decided to replace the present engines by Rolls-Royce "Eagles" of about 360 h.p. each, which will still give a sufficient margin of power and the requisite speed, while giving greater economy in running. Several of the new machines, which will be known as the Handley Page W.8 B, are to be put on the service in the spring, and will serve as a happy mean between the admittedly too-slow 0-400's and the too-fast W.8.

In order to obtain actual flying data of performance before installing the Rolls-Royce engines, an interesting experiment was tried. The Napier engines were fitted with Rolls-Royce propellers and the "Lions" throttled down to the power of the "Eagles." In this way actual conditions were fairly represented, and the tests thus carried out gave a very good indication of the performance which may be expected from the machine in its new form. The machine was loaded up with its proper quantity of petrol, and carried, in addition to pilot and mechanic, 16 passengers. The machine weighed, with fuel and water, 9,672 lbs., and the 20 passengers brought the weight up to 12,000 lbs. On a basis of 360 h.p. per engine this gave a power loading of 16·7 lbs./h.p. With this loading, the following performance was obtained:—

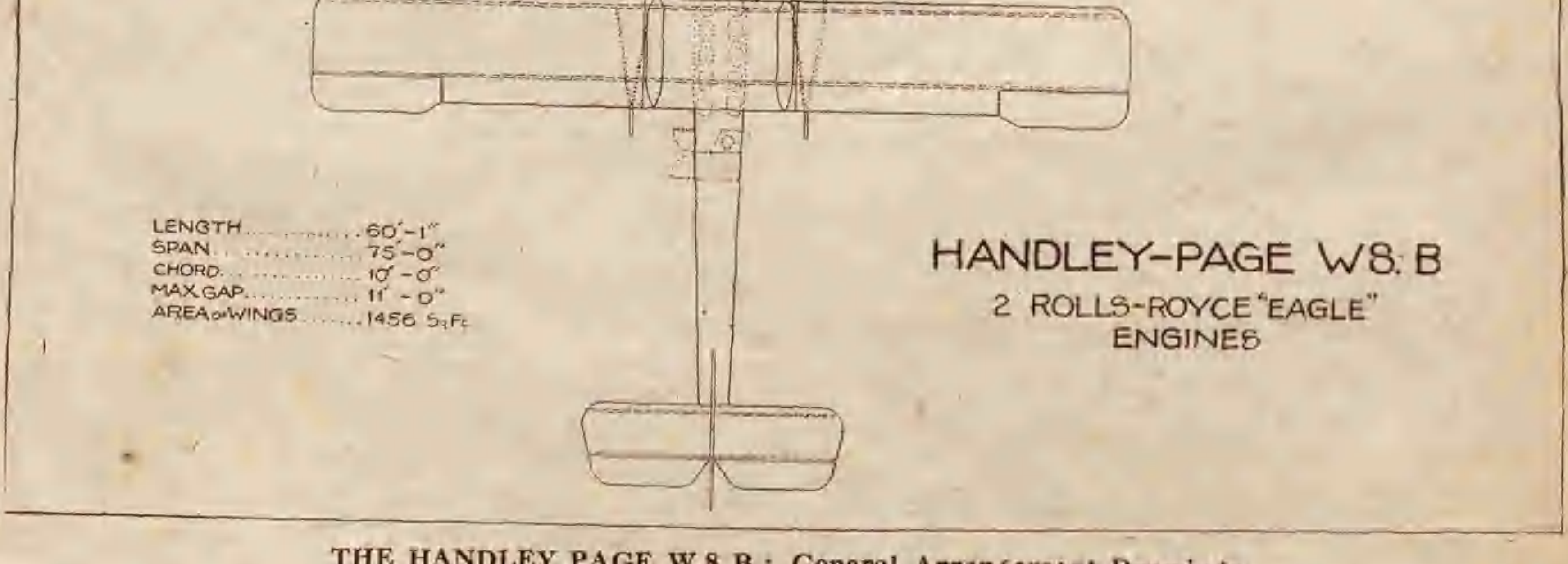
Time (mins.).	Height (ft.).	R.P.M. (average).	I.A.S. (m.p.h.).
1	425	1,510	73
2	1,000	1,525	75
3	1,550	1,530	75
4	1,900	1,550	75
5	2,300	1,560	79
6	2,850	1,550	75

The full speed was 103 m.p.h. at 1,675 r.p.m. and the cruising speed 90 m.p.h. at 1,500 r.p.m.

The accompanying general arrangement drawings, which have never hitherto been published, show the machine as it will appear when fitted with Rolls-Royce engines. Several modifications will at once be noticed. Thus an interesting innovation, as far as H.P. machines are concerned, is found in the placing of the petrol tanks. Instead of having the tanks in the engine *nacelles*, behind the engines, they are placed, in the W.8B, on top of the upper plane. One result of this arrangement is a greatly simplified petrol system. Instead of gravity tanks, petrol pumps, etc., with their extensive piping and joint there is a single pipe leading direct to the engine, with gravity feed from each main tank. Each tank has a capacity of 100 gallons, and great attention is being paid to such few joints as still remain in the petrol pipes. These joints, we understand, are to be metal couplings of the Air Ministry type, and no rubber joints will be employed. Each tank is provided with a petrol level indicator of the "Clift" pattern. Each of the engines is provided with an oil tank of 6¼ gallons capacity, to which a thermometer is fitted.

Generally speaking, the mounting of the engines will not be greatly altered, except for such variations in dimensions as are necessitated by the difference in size of the two types of engine. Also, of course, with the transfer of the petrol tanks to the top plane, the long streamline fairing containing the present tanks will disappear, and we understand that it is not intended to streamline the Rolls engines, experience with the type 0-400 machines having shown that the gain in speed resulting from such streamlining is so small as to be scarcely worth while, especially when taking into consideration that the engines are very much more accessible when left uncovered. The engines will be fitted with long exhaust pipes of the R.A.E. pattern.

Apart from the alterations indicated above, the machines


LUGGAGE
LUGGAGE
10°
LENGTH..............60'-1"
SPAN..............75'-0"
CHORD..............10'-0"
MAX GAP..............11'-0"
AREA of WINGS..............1456 Sq Ft
HANDLEY-PAGE W8 B
2 ROLLS-ROYCE "EAGLE"
ENGINES

THE HANDLEY PAGE W.8 B: General Arrangement Drawings.

will remain almost identical with the present W.8. The large cabin will have accommodation for 12 passengers, and light racks will be provided for light luggage. For heavier luggage there will be two special compartments, one between the pilot's cockpit and the cabin, of 80 cu. ft. capacity, and one aft of the cabin, of 70 cu. ft. capacity. A tip-up seat is placed at the side of that of the pilot so that, if desired, a mechanic can be carried here.

Needless to say, the machines will be constructed in accordance with all the usual requirements of the Air Ministry, and including a good degree of positive stability in all directions. A trimming tail is fitted so that the pilot may adjust the machine for any given conditions of load and speed in order that the machine may fly horizontally with little attention from the pilot except for corrections of course.

As regards equipment, the machine will be provided with the following instruments: Wireless telegraphy apparatus, 2 air-speed indicators, 2 altimeters, clinometers, 2 revs. indicators, 2 radiator thermometers, 2 oil pressure gauges, 2 petrol level indicators, 2 oil thermometers, and 2 Pyrene fire extinguishers (one in cabin).

The weight of the machine, and the loads carried are as follows:—Weight empty (with water): 7,700 lbs. Pilot, 160 lbs. Petrol for 3½ hours (this is not the full capacity of the tanks), 1,000 lbs., 10 gallons of oil 100 lbs. 12 passengers (at 180 lbs.), 2,160 lbs. Cargo, 880 lbs. Total loaded weight, 12,000 lbs.

The performance with full load will be approximately as follows:—Maximum speed near ground, 104 m.p.h.; maximum speed at 5,000 ft., 101 m.p.h.; ground rate of climb, 550 ft. per minute; service ceiling, 10,000 ft.; landing speed, 54 m.p.h.

Several of the W.8 B type of machines are now being built, and will be put on the London-Paris service in the spring.

THE LOSS OF "R.38."

The Report of the Admiralty.

At the time of the disaster which overtook the rigid airship "R.38" it was announced that the Admiralty would investigate the history of the design and earlier stages of construction, and that when these investigations had been completed, a report would be issued. This has now been done and the following statement issued by the Secretary of the Admiralty: "A full investigation has, in accordance with the decision of the Board of Admiralty at the time of the loss of the airship, been held into the history of the design and of the initial stages of her construction up to October, 1919, when responsibility for the design and construction of airships was transferred to the Air Ministry. The investigation was presided over by the Controller of the Navy (Rear-Admiral F. L. Field, C.B., C.M.G.), who was assisted by Sir Eustace d'Eyncourt, K.C.B., F.R.S., Director of Naval Construction, and Sir Charles Walker, K.C.B., Deputy Secretary of the Admiralty. The Committee, after careful consideration of all official records dealing with the design and construction of "R.38" up to the date mentioned, and after taking verbal evidence in amplification of them, have reported to the following effect":—

"During the period when the design of this airship was in preparation the Director of Airship Production was responsible for the design and manufacture of airships. His department comprised, *inter alia*, sections dealing with airship design, machinery design, hydrogen, chemical laboratory work, and experimental work. His instructions required him to keep in close touch on design matters with the Superintendent of Airships. The latter was responsible for the formulation of general requirements in respect of the equipment and fittings of airships and for the final trial and acceptance of airships from the point of view of utility and fighting efficiency. The general requirements for new airships, *i.e.*, the performances of which they were to be capable, were laid down by the Naval Staff, the Air Division of which acted as liaison with the Air Ministry.

"During the summer of 1918 the design and performances of British rigid airships received much consideration. Nos. 'R.33-37' were then the latest types in hand, and of these 'R.33-34' followed the German 'L.33' design and 'R.35-37' that of 'L.48.' It was thought that the stage had been reached when instead of copying German practice, with the consequent lag of many months, a design could be produced to meet specific British requirements. The requirements for such a vessel, to be ready for service about the end of 1919, were accordingly drawn up by the Naval Staff. These were for war operations in particular areas demanding a wide radius of action with high speed. It was found, however, that to meet these requirements it would be necessary to design a very large ship of 750 ft. in length, which moreover, could not be built in the existing constructional sheds. It was then decided that the requirements of the Naval Staff should be revised so as to fall within the limitations imposed by the existing constructional sheds. These requirements were reconsidered at a conference of the Director of Air Division, Director of Plans, Superintendent of Airships, and Director of Airship Production, and the conference recommended that a design known as Design A, which would meet the revised requirements and the constructional limitations, should be proceeded with. The Board of Admiralty approved on September 30, 1918, that the new airships 'R.38-41' should be built to this design.

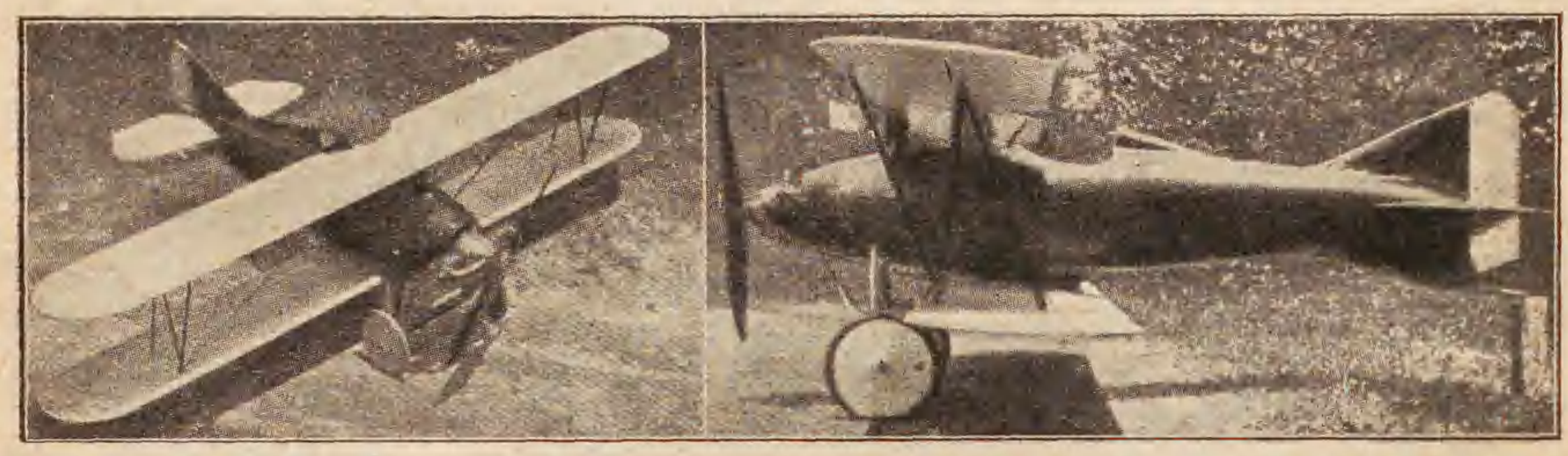
"By January 20, 1919, about 100 girders for 'R.38' were made, and steady progress was made with this work until towards the end of August, 1919, when practically all the girders for the main structure were completed, except those required for the extreme fore and aft portions of the ship. The erection of the frames was started about this time, and the first two frames were completed on October 21, *i.e.*, a day before the transfer was made to the Air Ministry. The remaining frames were completed after the transfer to the Air Ministry, at various dates up to November, 1920. There had been a continual progressive increase in the dimensions of rigid airships previously designed. Design 'A' was in the same way an advance on its predecessor, and necessitated fresh calculations. The new requirements did not, however, involve the introduction of any new principle, and on that account the design cannot be considered a novel one. In its preparation the Airship Production Department made use of existing information obtained from British experience and the experience and information of our French and Italian allies, and of such information in regard to German designs as could be obtained by the examination of those which fell into our hands, and, in fact, from all available sources of information. From the structural point of view the design followed closely that of 'R.33' and 'R.36,' with minor alterations introduced as a result of experience and later information. No undue risk was taken in the design, and there was no change from previous practice as regards safety which experience or a comparison with German airships did not make permissible.

"The evidence furnished to the Committee shows that no modifications were made in the main structure of 'R.38' during the period the Admiralty were responsible for its construction, and that although additions were made in weight, there was nothing in these which would affect the structural strength of the ship. Evidence was furnished also that no important alterations were made in design after 'R.38' was turned over to the Air Ministry, but some modifications were made as a result of experiments to the fins and cars and in other parts of the vessel for lightness, which would not, however, affect the strength of the structure. With regard to the suggestion made by the Court of Inquiry into the circumstances of the loss of the airship that the 'R.38' design should have been discussed by an official and competent committee before actual construction was commenced, there was at the time no body in existence which could have been called in to advise on the structural design of 'R.38.' Practically all the expert opinion which could have been of any assistance was already engaged upon the work. Had therefore any special committee been formed before the construction of 'R.38' was commenced it would necessarily have been composed mainly of these Admiralty and Air Force expert officers.

"The Director of Airship Production was a member of the Advisory Committee for Aeronautics, and other Admiralty officers were associated with the sub-committees appointed by the Advisory Committee. The Airship Production Department was in constant touch with the National Physical Laboratory, and received much information from the experiments carried out there, and, as already stated, it had available the results of French and Italian experience and such information as was available regarding German ships. The actual flying officers responsible for taking over the ship were located in the same offices as the design staff, so as to facilitate the closest co-operation between the designer and user of the ship."

THE MUMMERT "BABY VAMP" SPORTPLANE

In our issue for July 28 last, brief mention was made of a small machine—which was erroneously referred to as the "Maumert" instead of "Mummert"—tested by Bert Acosta, and we now give illustrations and some further particulars, for which we are indebted to our American contemporary *Aerial Age*, of this interesting little machine. It is of interest to note that on the same day as Bert Acosta tested the "Baby," he tried out the Remington-Burnelli 30-passenger 'bus—described in FLIGHT for July 28; and one of the accompanying illustrations showing these two machines together forms an amusing comparison.



THE MUMMERT "BABY VAMP" SPORTPLANE : On the left, a three-quarter front view from above, and on the right, a side view.

On the first test of the "Baby" the pilot held the machine on the ground for an initial run of about 200 ft. before taking off, but as soon as the machine got into the air it was observed to be flying very steadily at a speed even greater than its theoretical performances indicated—90 m.p.h.—estimated by observers on the ground at about 100 m.p.h. Later Acosta made an "Immelmann," which manœuvre, as well as many others, the little machine performed in fine style. After fifteen minutes of flying, during which an altitude of 1,500 ft. was reached, the pilot made a perfect landing, and reported very favourably on the machine's behaviour. He stated that it had "absolutely no 'tricks,' and needed very few minor adjustments," but, as to be expected with machines fitted with two-cylinder opposed engines, there was a certain amount of vibration, though this was by no means excessive.

The Mummert "Baby Vamp" Sportplane: A contrast in sizes. The "Baby," of 18 ft. span and 25 h.p. in front of the Remington-Burnelli 30-passenger twin-engine biplane of 74 ft. span and 800 h.p.—both of which were tested the same day by Bert Acosta.

Many new features of design and construction are to be found in various parts of the "Baby," and, apart from its extremely diminutive proportions, perhaps the most striking feature is the extensive use of veneer. This is used for the entire *fuselage*, and for covering the main planes and tail surfaces. Besides adding to the rigidity of the wing construction, this employment of veneer enables the correct shape of the wing section (R.A.F. 15) to be maintained at all times, thereby allowing the full value of this section to be obtained. The "Clark Truss" is used for the interplane bracing system. The principal characteristic of this truss consists in the elimination of the usual set of bracing cables between upper and lower rear spars and incidence and drift cables. To replace these there is but a pair of stream-line wires running from the *fuselage* at the lower front spar attachment to the upper rear spar at the point of attachment of the interplane strut. These wires constitute the flying wires, and also act as drift wires. There is but a single landing wire (stream-line) on each side of the *fuselage* running from the lower end of the front interplane strut to the top of the rear *fuselage*-strut. The interplane struts are of stream-line steel tube, of N-formation, and two single struts support the top plane at the centre above the *fuselage*, into which they are built and form a part thereof.

The top plane is built in one continuous panel, with a cut-out portion at the trailing edge above the pilot's cockpit. The lower plane is also in one piece, and is mounted below the *fuselage*. The wings are built up with a total of 9 spars, not including the leading and trailing edges, which are of rectangular section ¼-in wide and varying in depth according to their location in the wing. The upper rear main spar and the lower front main spar are of the box type. Mahogany veneer, 1/16-in. thick, tacked to all the spars and edges is employed for the entire wing covering. *Ailerons* are fitted to the lower plane only, and these extend from wing tip to *fuselage*, where they are directly connected to the control stick. They are set into the wings on steel tubes, which leave no gap between the surfaces; and as the inner ends are operated by a small lever inside the *fuselage*, there are no external fittings to offer resistance.

The *fuselage* is of the monocoque type, built to stream-line shape on a specially constructed form. The veneer is wrapped spirally and reinforced internally by means of light hoops. At the stem the fin—which is in upper and lower sections—is built into the *fuselage*. The lower part of the fin carries the tail skid. Stick and rudder-bar control of the usual type is fitted, but the rudder is operated by cables enclosed in the *fuselage* and connected to projections in continuation of the *fuselage* stream-line; these projections fit into the stem after the fashion of a socket and are "airtight."

A dashboard in front of the pilot carries the usual instruments, and the pilot's seat is of the bucket type, formed from a continuous strip of aluminium. A V-type landing chassis is fitted, the V's being of stream-line dash. The wheels are attached with the usual shock-absorber sprung axle.

The engine is an air-cooled twin cylinder opposed Lawrence, developing 25 h.p. at 1,800 r.p.m. Provision is made for carrying 12 gallons of petrol and two gallons of oil.

Mr. H. C. Mummert, the designer of the "Baby," is associated with the engineering department of the Curtiss Company's Garden City plant.

The principal characteristics of the "Baby" are:—

Span	18 ft.
Chord	2 ft. 7⅝ ins.
Gap	2 ft. 9 ins.
Area of main planes (total)	90 sq. ft.
Area of tail plane	5 sq. ft.
Area of elevators	4 sq. ft.
Area of rudder	3 sq. ft.
Area of fins	3 sq. ft.
Weight (empty)	350 lb.
Weight (fully loaded)	590 lb.
Weight/sq. ft.	6·5 lb.
Weight/h.p.	23·6 lb.
Speed range (estimated)	43-90 m.p.h.

* * *

Cables Break Down; Aeroplanes Carry On

In the Mediterranean violent storms have prevailed recently, like unto those raging here, with the result that cable communication broke down between France and Morocco, touch being maintained by aeroplanes only, for several days. From Casablanca 600 telegrams, it is reported, were delivered by aeroplane the following day at Toulouse.

Air Mail Stamp Issues

Special issues for special flights appear to be the system employed by the Uruguay Post Office for the issue of air mail stamps. Some little time back, that country overprinted a small quantity of the 1900 25 c. stamps, with the device of an aeroplane and the inscription "Correo Aero" in black. These were apparently used on some special flight (real or imaginary), and are hard to get—and expensive at that. Now a second issue has, we understand, been put out, this time the overprint being in red, for an exhibition flight that was made between Mercédès (Soriano) and Rocha. No doubt these, also, are limited—except as regards price. What a game! Some countries have the air stamps, and no air services, whilst *we* have the air service, but no stamps!!

Berlin–Moscow by Air

From Berlin it is reported that the Moscow Soviet has approved a draft agreement with a German air line company for a regular service of postal and passenger aeroplanes between Moscow and Berlin *via* Kovno and Königsberg. It is added that the Lithuanian and Lettish Governments have given their assent to the scheme.

Proposed Lisbon–Paris Air Service

The Companhia Portugueza de Navegacao Aeria, it is reported, intends to open a regular air service between Lisbon and Paris shortly, with intermediary landings at Castello-Branco, Valladolid and Bordeaux. The Portuguese Government has, it is stated, placed the main aerodromes and various intermediary landing grounds on Portuguese territory at the disposal of the company gratis, and has promised that these grounds shall pass into the possession of the company in five years' time. The working capital of the undertaking is stated to be two million escudos. The following lines are projected:—Lisbon–Sines–Faro, Lisbon–Panpilhosa–Opporto, Lisbon–Portalegre–Madrid.

Air Routes in Brazil

The President of Brazil has, says *The Times* Rio de Janeiro correspondent, given his assent to an Act authorising the expenditure of over £235,000 for the establishment of two aerial routes between the capital and Porto Alegre (in Rio Grande Do Sul). The one route, which is for hydroplanes, will follow the coast, while the other will be inland, following the railways where possible.

The routes are to be inaugurated before the opening of the Centennial Exhibition next September. Their primary object is military defence, but the routes may be used for commerce, with the Government's consent. Wireless telephone and telegraph stations with a range of 300 miles are to be established at convenient points at a minimum distance of 190 miles apart, and at the terminal points there will be powerful plants capable of direct intercommunication. Modern meteorological stations are also included in the scheme.

Canadian Aerodrome Facilities

We have received from the Air Board of Canada "Notice to Airmen No. 8 of 1921," according to which it is evident that the Canadian Air Board is anxious to assist commercial aviation companies by placing at their disposal landing and storage facilities for aircraft at the Air Board Stations throughout the Dominion. The charges made appear to be very reasonable, stores being available at ledger prices *plus* 10 per cent. to cover freight and handling charges, services of mechanics charged by the hour at cost accounting charges, and the landing and taking off charges being as follows:—For small machines 50 cents, for medium machines 1 dollar, and for large machines 2 dollars. Open air storage is charged for at the following rates:—From two hours up to eight hours 25 cents per machine of any size; above eight hours, for each 24 hours, including first eight hours, 1 dollar per machine of any size. Charge per machine of any size per month 15 dollars. Hangar storage is correspondingly cheap, the fee per 100 sq. ft. or part thereof being 15 cents per day for unheated and 25 cents per day for heated hangar storage, the corresponding figures for monthly storage being 3 dollars and 5 dollars respectively.

The Second Peugeot "Aviette" Prize

Conditions governing the second prize offered by M. Peugeot of 20,000 francs for a "flight" by a man-propelled machine have now been published. The new prize was offered immediately after the first prize of 10,000 francs was won by Gabriel Poulain on his Nieuport aviette, when in a "flying" jump he covered 10 metres both ways.

The main conditions set out are that the 20,000 francs prize goes to the first man who shall cover a distance of 50 metres (164 ft.), both ways, upon any form of machine propelled entirely by muscular effort. No independent assistance, force or power may be employed except upon the condition that any instrument of propulsive assistance so used must be carried by the competitor on his machine during his "flight."

The dates for making attempts in 1922 to gain the prize are April 23-30, June 23-30, July 24-31 and September 23-30, and possibly a supplementary date.

The number of tries for each competitor is limited to three, but the judges have powers to permit, in their discretion, extra attempts.

Up to 20 minutes' interval is allowed before the return "flight" in the opposite direction is made. In case no competitor succeeds in fully qualifying for the prize, but has covered the 50 metres in one direction, he may recommence his attempts *de novo*, and the judges may permit a restart to those competitors whom, although they may not have covered the first 50 metres, they deem worthy of another attempt.

Entries (fee 10 francs, returnable under certain conditions) must be made at least 10 days prior to any of the Aviette weeks above to the Maison Peugeot, 80 rue Danton, à Levallois-Perret (Seine), in the name of the competitor, together with the name of the constructor of the machine. The competition is international, but for both competitors and machines Germany, Austria, Turkey and Bulgaria are barred. The organising committee comprises: MM. le colonel Ferrus, Emmanuel Aimé, Jacques Balsan, Baudry, de Saunier, Charles Faroux, Isaac Kœchlin, Chevalier Reén de Knyff, Lumet, Paul Panhard, Frantz-Reichel, Paul Rousseau.

Mr. Ashbolt and an Imperial Airship Service

Mr. Ashbolt, Agent-General for Tasmania, is, if anything, more determined than ever that the one great necessity for Imperial linking-up is by means of an Imperial Airship Service. Last week he lectured to the members of the Victoria League, when Dame Meriel Talbot presided. His delightful lecture, illustrated with photographs, was greatly appreciated, and it is very encouraging to learn from his closing remarks that he had been practically promised support for his scheme, to the extent of four million pounds, with which to initiate the commercial airship fleet which would be necessary for the experimental two years' period.

An "R.38" Memorial

Hull Corporation Parks Committee is consulting the Air Ministry on the question of a site for a memorial to the men who lost their lives in the "R.38" disaster.

PERSONALS.

Married

Flight-Lieut. CLAUDE HILTON KEITH, R.A.F., was married on January 4, at St. Mary Abbots, Kensington, to MARY ANGEL CONSTANCE, elder daughter of Mrs. J. P. MONTGOMERY, of Jesmond, Warsash, Hampshire. The Rev. H. D. L. Viener, C.B.E., Chaplain-in-Chief to the Royal Air Force, officiated.

The marriage took place on January 10, at St. Mary Abbots, Kensington, of Lord GORELL, Under-Secretary for Air, of 11, Catherine Street, Buckingham Gate, and ELIZABETH, daughter of Mr. and Mrs. ALEX. N. RADCLIFFE, of 45, Kensington Square, and Bag Park, Widecombe-in-the-Moor.

Among those present were: Air-Marshal Sir Hugh and Lady Trenchard, and Mr. W. F. Nicholson (representing the Air Council).

To be Married

A marriage is arranged, and will take place on February 1, at Farnborough, between Flying Officer B. CAILLARD, R.A.F., youngest son of Mr. and Mrs. Esmond Caillard, of Hove, Sussex, and MARY LILIAN, eldest daughter of Mr. and Mrs. MORRAT, of Cotswold, Farnborough Park, Hants.

The engagement is announced between Lieut. EDWARD MORTON DRUMMOND, Black Watch, attached R.A.F., eldest son of Mr. and Mrs. Gerald Drummond, Dayleside, Woodford, Essex, and DAPHNE EUNICE, youngest daughter of Mr. and Mrs. WILFRID TAYLOR, 12, Mitre Court Chambers, Temple, and 5, Norfolk Mansions, Battersea Park.

Deaths

Group-Captain ALAN JOHN LANCE SCOTT, C.B., M.C., A.F.C., passed away on January 16 in a nursing home, of double pneumonia, after only a few days' illness. The funeral service took place on Wednesday at Brompton Cemetery, with military honours. Captain Scott was probably one of the most efficient and practical officers connected with the Air Ministry. He was aged 39, and was the son of the late Henry Alan Scott, of Holbrook, Horsham. Educated at Merton College, he was, as undergraduate, Master of the University Draghounds. On the outbreak of war he was studying for the Bar, and was an officer in the Sussex Yeomanry. He joined the R.A.F. early in the War, and was badly injured in an aeroplane accident in England, but eventually went to France in command of a squadron. Major Bishop, V.C., was at one time under his command. In 1920 Captain Scott wrote the history of his squadron (the 60th). When the War ended he was offered a permanent commission in the Air Force, and was shortly afterwards appointed Air Secretary to Mr. Winston Churchill, retaining that position under Captain Guest, and holding it up to the time of his death. Although not in the lime-light with the public, Captain Scott has probably one of the finest war records to his credit. His death will be keenly felt in the Air Ministry and with those left to mourn his loss.

The death of FRANCIS FARNALL THURSTAN, late Flight-Commander, R.N., is announced as taking place, at the early age of 44, on January 7, in a nursing home at Bournemouth, as the result of war service. Commander Thurstan was closely associated with aviation, having been with the Bristol Company from 1910 to 1914. When War broke out he joined the R.N.A.S., and served in Paris, Dunkerque, Newfoundland, etc. After the War he again took up aviation work for a short period, but tuberculosis, contracted in 1918 during his War work, speedily closed his career, he having to enter a nursing home, where he failed to recover. He leaves a widow and four children.

Items

LIEUT. FLORMAN, who has been appointed Air Attaché to the Swedish Legation, has arrived in London, and entered upon his duties.

GENERAL MITCHELL, chief of the American Aviation Corps, has arrived in Rome, and will, it is reported, visit the Italian aeronautical establishments.

ROYAL AERONAUTICAL SOCIETY

(OFFICIAL NOTICES)

Election of Members.—The following Members were elected at a meeting of the Council held on Friday, December 16:—Associate Fellow, O. E. Simmonds, B.A.; Students, A. O. Adams, F. G. Kay, T. H. Smith; Members, V. S. Gaunt, D. Woods Mason, Capt. F. H. Parkes-Warmington.

Journal.—The January number of the *Aeronautical Journal*, which is now available, price 2s. 6d., contains the following papers:—"Requirements and Difficulties of Air Transport," by Col. F. Searle; "The Present State of Airship Development," by Major G. H. Scott.

Lecture.—The next meeting will take place at 5.30 p.m. on Thursday, January 19, at the Royal Society of Arts, John Street, Adelphi, when Brig.-Gen. R. K. Bagnall-Wild C.M.G., C.B.E., will read a paper on "Aeroplane Installation."

The lecture by Dr. V. E. Pullin on "Radiological Examination of Materials" has been postponed from February 2 to March 16, at 5.30 p.m., at the Royal Society of Arts.

Provincial Lectures.—In addition to the paper read on January 6, by Mr. H. L. Stevens, Associate Fellow, before the Coventry Engineering Society, on "Research on Full-Scale Aeroplanes," the following lectures to provincial engineering Societies have been arranged:—February 23 at 8 p.m., "Airworthiness," by Mr. F. E. Cowlin, A.F.R.Ae.S., before the Leeds Association of Engineers. March 1, "The Control of an Aeroplane," by Capt. G. T. R. Hill, A.F.R.Ae.S., before the Nottingham Society of Engineers.

Students' Meetings.—The next Students' Discussion Meeting will be held in the Society Library at 7 p.m., on Thursday, January 26, when Mr. Colin Daniel will inaugurate the discussion with a paper on "Practical Points of Fuselage Construction." Mr. J. D. Frier, Associate Fellow, will take the Chair.

Swiss Glider Competition.—Details have been received through the Controller of Information, Air Ministry, of a soaring flight competition which is being held by the Suisse-Centrale Section of the Swiss Aero Club from March 8 to March 15 at Gstaad (Bernese-Oberland). A translation of the regulations can be inspected at the Society's Offices, and intending participants are asked to communicate with the Secretary. A course of instruction in practical soaring is being arranged at Gstaad from February 15 to March 15 in connection with the Competition.

Air Conference.—The following Members have been nominated to represent the Society at the Air Conference to be held in the Guildhall, London, on Monday and Tuesday, February 7 and 8:—Brig.-Gen. R. K. Bagnall-Wild, Dr. L. Bairstow, Wing-Cmdr. Cave-Browne-Cave, H. Glauert, Major F. M. Green, Capt. G. de Havilland, Sqdr.-Ldr. R. M. Hill, Prof. B. Melvill Jones, Major D. H. Kennedy, Major A. R. Low, Lieut.-Col. W. Lockwood Marsh, A. Ogilvie, Lieut.-Col. M. O'Gorman, Dr. A. J. Sutton Pippard, A. V. Roe, Sir R. M. Ruck, Major G. H. Scott, R. V. Southwell, H. L. Stevens, H. T. Tizard, Major H. E. Wimperis, R. McKinnon Wood.

Library.—The following books have been received and placed in the Library:—"Bibliography of Aeronautics, 1909–1916, N.A.C.A.," "The Diesel Engine" by G. J. Wells and A. J. Wallis-Taylor, Howard Lectures on Aero Engines, A. E. L. Chorlton, Alloys Research Committee Reports Nos. 8, 9, 11, Institution of Mechanical Engineers, "Structural Analysis and Design of Airplanes," by Major T. H. Bane.

W. LOCKWOOD MARSH,
Secretary

THE ROYAL AIR FORCE

London Gazette, January 10, 1922

General Duties Branch

Flight-Lieut. J. R. McCrindle, O.B.E., M.C., is placed on half-pay, Scale B, from November 25, 1921, to December 31, 1921, inclusive. (Since resigned). Flight-Lieut. H. V. German is placed on half-pay, Scale B; December 27, 1921. Group Capt. J. H. W. Becke, C.M.G., D.S.O., A.F.C., is placed on the retired list, and is granted the hon. rank of Brig.-Gen.; February 29, 1920. (Substituted for *Gazettes* March 2, 1920, and March 12, 1920).

Memoranda.

Two Cadets are granted hon. commns. as Sec. Lieuts., with effect from the dates of their demobilisation.

The permission granted to Sec. Lieut. E. L. Finch to retain his rank is withdrawn, on his joining the Territorial Army; November 1, 1921.

Erratum.

New Year's Promotions, FLIGHT, January 5, 1922, page 12:—For Hugh Vernon Champion de Crespigny, read Hugh Vivian Champion de Crespigny; for Allen Robert Churchman, read Allan Robert Churchman.

London Gazette, January 13, 1922

General Duties Branch

Flying Offr. H. G. Crowe, M.C., is granted a permanent commn., retaining his present substantive rank and seny.; Nov. 17, 1921. Flying Offr. H. E. Ranson is granted a permanent commn., retaining his present substantive rank and seny.; Dec. 19, 1919 (*Gazette*, Dec. 19, 1919, appointing him to a short serv. commn., is cancelled).

The following are granted short serv. commns. as Pilot Offrs. on probation, with effect from, and with seny. of, the dates indicated:—*H. V. Alder; Dec. 31, 1921. A. K. Crowther, C. F. H. Grace, E. Marler, *R. L. Palmer, J. S. Phillips, H. J. Wykes, W. A. C. A. Yearsley; Dec. 29, 1921. (*Denotes previously served in R.A.F.)

Flight-Lieut. L. H. Slatter, O.B.E., D.S.C., D.F.C., is placed on half-pay, Scale B, from March 11 to March 20 inclusive. Flying Offr. J. H. Jephson resigns his permanent commn. and is granted rank of Capt.; Nov. 2, 1921. Flying Offr. E. G. Gaff resigns his permanent commn., and is permitted to retain the rank of Lieut.; Jan. 7. Flying Offr. R. F. Wallas resigns his short service commn., and is permitted to retain the rank of Lieut.; Jan. 11. Flying Offr. L. G. Shipcott is placed on the retd. list on account of ill-health, and is permitted to retain the rank of Lieut.; Jan. 11.

Stores Branch

Flying Offr. L. G. Stevenson is granted a permanent commn. retaining his present substantive rank and sen. with effect from Sept. 12, 1919, and is transferred to the Stores Branch, with effect from June 17, 1920. *Gazette* of Sept. 12, 1919, appointing him to a short service commn. is cancelled.

Flying Offr. F. C. Worton is placed on the retd. list on account of ill-health, and is permitted to retain the rank of Lieut.; Jan. 11.

Medical Service

G. Kinnear is granted a short service commn. as a Flying Offr., with effect from and with sen. of, Dec. 19, 1921. Flight Lieut. R. W. Ryan is granted a short service commn., retaining his present substantive rank and seny.; Jan. 1.

Capt. J. S. Smith, Army Dental Surgeon, is granted a temp. commn. as a Flight-Lieut. while attached for duty with R.A.F., with effect from Nov. 1, 1921, and with seny. of Jan. 27, 1919. He will continue to receive emoluments from Army funds. (Substituted for *Gazette* Dec. 27, 1921.)

Memorandum.

Capt. W. R. Baldwin-Wiseman relinquishes his temp. commn. on ceasing to be employed, and is permitted to retain his rank; Jan. 1.

Erratum.

Gazette of Nov. 15, 1921, page 9058, for L. B. J. Bunstead, read L. B. J. Bumstead.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Pilot Officers G. A. F. Bucknall, to No. 5 Flying Training School (Inland Area). On appointment to Permanent Commission. 30.12.21. H. J. Wykes, to No. 5 Flying Training School (Inland Area). On appointment to short service commission (on probation). 29.12.21. A. K. Crowther, to No. 5 Flying Training School (Inland Area). On appointment to short service commission (on probation). 29.12.21. C. F. H. Grace, to No. 5 Flying Training School (Inland Area). On appointment to short service commission (on probation). 29.12.21. J. S. Phillips, to No. 5 Flying Training School (Inland Area). On appointment to short service commission (on probation). 29.12.21. E. Marler, to No. 5 Flying Training School (Inland Area). On appointment to short service commission (on probation). 29.12.21. R. L. Palmer, to No. 2 Flying Training School (Inland Area). On appointment to short service commission (on probation). 29.12.21. W. A. C. A. Yearsley, to No. 2 Flying Training School (Inland Area). On appointment to short service commission (on probation). 29.12.21.

Group Captain.—N. J. Roche, O.B.E., from Headquarters, Coastal Area, to R.A.F. Depôt (Inland Area). (Supernumerary.) Whilst attending course at Royal Army Medical College. 16.1.22.

Wing Commanders.—F. Rankun, O.B.E., from Air Ministry (Directorate of Operations and Intelligence) to R.A.F. Depôt (Inland Area). (Supernumerary.) 6.1.22. H. W. Scott, M.B., B.A., to Headquarters, R.A.F., Cranwell, for duty as Principal Medical Officer and as Officer in charge of R.A.F. Hospital, Cranwell. 1.1.22. C. E. C. Stanford, D.S.O., M.B., B.Sc., from Inspctorate of Recruiting, Coastal Area, to Headquarters, Coastal Area, for temporary duty as Principal Medical Officer. 16.1.22.

Squadron Leaders.—A. A. B. Thomson, M.C., A.F.C., from Inter-Allied Aeronautical Commission of Control (Hungary), to R.A.F. Depôt, Inland Area. Attached to Air Ministry (Directorate of Operations and Intelligence) for temporary duty. (Supernumerary.) 18.12.21. T. G. Hetherington, C.B.E., from Half-pay list to Headquarters, Middle East Area. 6.1.22. W. B. Callaway, A.F.C., from R.A.F. Cadet College (Ground Wing) (Cranwell) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 23.1.22. R. S. Maxwell, M.C., D.F.C., from No. 55 Squadron (Middle East Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) 4.11.21.

Flight Lieutenants.—J. W. Harper, M.D., from Research Laboratory and Medical Officers' School of Instruction (Inland Area) to No. 1 School of Technical Training (Boys) (Halton), for duty as Medical Officer at Halton Hospital. 9.1.22. R. M. Bankes-Jones, from No. 1 School of Technical Training (Boys) (Halton) to No. 7 Group Headquarters (Inland Area). 12.1.22. A. R. Arnold, D.S.C., D.F.C., from Air Ministry (Directorate of Operations and Intelligence) to R.A.F. Depôt (Inland Area). (Supernumerary.) 10.1.22. J. H. W. Fitzgerald, from R.A.F. Depôt (Inland Area) to Central Flying School (Inland Area). 9.1.22. O. W. De Putron. The recent notification wherein this Officer was posted from Experimental Section, Royal Aircraft Establishment, to School of Army Co-operation, with effect from 18.1.22, is hereby cancelled. C. H. B. Jenner-Parson, from Inspector of Recruiting (Newcastle) (Coastal Area) to Seaplane Training School (Coastal Area). 15.1.22. E. G. Hopcraft, D.S.C., from R.A.F. Base, Leuchars (205 Squadron) (Coastal Area) to Seaplane Training School (Coastal Area). 15.1.22. C. S. Richardson, M.B.E., from No. 4 Flying Training School (Middle East Area) to No. 6 Squadron (Middle East Area). 19.12.21. G. Bowen, from No. 45 Squadron (Middle East Area) to Iraq Group Headquarters (Middle East Area. 19.12.21.

Air-Commodore Swann, Director of Personnel

It is notified, by the Air Ministry, that Air-Commodore Oliver Swann, C.B., C.B.E., assumed duty as Director of Personnel on January 5, 1922, in succession to Vice-Admiral Sir C. F. Lambert, K.C.B., who recently relinquished this post.

R.A.F. Memorial Fund Football Week

A NOVEL scheme has been, through the R.A.F. Sports Board, adopted by the Royal Air Force this year, in an endeavour to increase the receipts of the R.A.F. Memorial Fund.

By the generosity of Mr. Alexander Duckham, the fund has recently come into the possession of a large house and grounds known as Vanbrugh Castle, near Blackheath, and in August last a home for sons of deceased airmen was opened there. Sixteen boys were taken in immediately, and it is hoped to increase this number to the full capacity of 22 in the Spring. The boys are educated, fed and clothed, entirely by the Fund, at a cost of about £2,000 per annum.

To assist in this, and the several other objects of the Fund, the Royal Air Force Football Association have inaugurated an "R.A.F. Memorial Fund Football Week," lasting from January 21 to 28. During this period, all units have been asked to organise football matches, and to devote all gate receipts to the Fund, to make collections on all their grounds, and to endeavour to raise as much money as possible. The proposal has been received with enthusiasm, and it is hoped to raise a not inconsiderable sum. Diversions in the way of side-shows, and comic football matches are also being organised.

It is hoped that the public will give their generous support to the scheme, to enable the Fund to commemorate the splendid services given to King and Country in the Great War, by the various branches of the flying services now all merged in the Royal Air Force.

The Memorial Fund Committee require £400,000 to enable them to carry out their original schemes. At present, a little over one-third has been raised.

Royal Air Force Hockey

THE results of the first round of the R.A.F. Inter-Unit Hockey Competition are as follows:—

No. 1 District

Gosport 4, Calshot, 3.
Winchester 7, Upavon 0.
Netheravon 11, Andover 0.
Lee-on-Solent—a bye.

No. 2 District

Martlesham w.o., Bircham Newton scr.
Leuchars w.o., Spittlegate scr.
Cranwell w.o., Shotwick scr.

No. 3 District.

Halton (E) 2, Manston 0.
Uxbridge (H.Q.) 1, Grain 2.
Henlow 3, Ruislip 0.

The following is the draw for the second round, which is to be played off by January 23, 1922:—

No. 1 District.—Gosport *v.* Winchester; Netheravon *v.* Lee-on-Solent.

No. 2 District.—Leuchars *v.* Martlesham; Cranwell—a bye.

No. 3 District.—Henlow *v.* Halton (E); Grain—a bye.

THE STUDENTS' SECTION OF THE ROYAL AERONAUTICAL SOCIETY

A Promising Branch of Interest to the Younger Generation

Since their inception a few months ago, the monthly discussion meetings of the Students' Section of the Royal Aeronautical Society have gradually become very popular, and there is now a very good attendance at these discussions. It is the custom to limit the attendance to Students of the Society, with a Member in the chair. Usually a Paper is read, and the rest of the evening is spent in discussing it. At the first meeting, which was held on October 13 last, a paper entitled "A Comparison of Different Types of Aerofoils" was read by Mr. T. A. Kirkup, the Chairman being H. B. Irving, B.Sc., A.F.R.Ae.S., of the N.P.L. On November 10, Mr. W. L. Le Page read a paper on "The Soaring Flight Problem," when Mr. Handley Page, A.F.R.Ae.S., was in the chair. The next meeting will be held on January 26, when Mr. Colin Daniel will read a Paper on "Some Practical Points in Fuselage Construction." The chair will be taken, on this occasion, by Mr. J. D. Frier, A.R.C.Sc., A.F.R.Ae.S. On February 23, Mr. G. R. Irvine will read a Paper entitled "Some Possible Improvements in Aero Engine Installation."

The Committee is, at present, composed as follows—Stanley H. Evans, Hon. Sec. (East London College), L. J. Jones (N.P.L.) and W. H. Rossiter (Northampton Engineering College).

For the information of those of our readers who are not already acquainted with the object of the Students' Section of the R.Ae.S., we might point out that membership is reserved for those under the age of 26 who are receiving a technical training such as will fit them in due course to become Associate Fellows of the R.Ae.S. There is no entrance fee, and the subscription is only one guinea. Among the privileges enjoyed by students, mention may be made of the fact that students are entitled to attend the Society's lectures, receive the monthly journal free of charge, and borrow books from the Society's library. We can thoroughly recommend young men possessing the necessary qualifications to join this section of the Royal Aeronautical Society, and the subscription is so moderate that it need deter no one.

* * * *

The London Aero-Models Association

The Members' exhibits on the Association stand at the Model Engineer Exhibition has caused great interest in the Association's work. Over 75 per cent. of model aeroplanes exhibited were made by the members L.A.M.A.

An annual general meeting will be held on Thursday, the 19th of January, 1922, and members are specially requested to be present at the election of officers for the ensuing 12 months.

On January 26 a lecture will be given by Mr. F. J. Camm. His subject will be "Model Aeronautical Research."

Membership forms can be had from the Hon. Sec., Mr. A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

"The Model Engineer" Exhibition

"The Model Engineer" Exhibition, which was held last week at the Royal Horticultural Hall, Westminster, was extremely successful—from the technical point of view, at any rate. On the occasion of our visit we were particularly and favourably impressed with the quality of the models exhibited—especially some of the competition models. We were somewhat disappointed, however, with the small part played by model aeroplanes and motor boats, the former being—as far as we could see—solely represented by a small exhibit by the London Aero Models Association. If the quantity was at fault, this was certainly not the case as far as quality was concerned, for the "L.A.M.A." models left little to be desired in this direction. In nearly every case these models—which were actual flyers—resembled "the real thing" to a remarkable degree, and the "flying stick" element was entirely absent, or almost so.

We noticed a model of a direct lift machine, but failed to gather anything of a startling nature from an inspection of same.

Wireless Telegraphy was well represented on many of the stands, and it is gratifying to see the increased interest this important and fascinating science is creating. Model railways and locomotives, however, seemed to be the most popular—and we are not surprised, for it was with the greatest difficulty that we could tear ourselves away from the fascination of watching a beautifully-made scale model locomotive of no more than 2 ft. or so, realistically puffing up and down the track with two 28 lb. weights as freight!

IMPORTS AND EXPORTS, 1920-1921

Aeroplanes, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "Flight" for January 25, 1912; for 1912 and 1913, see "Flight" for January 17, 1914; for 1914, see "Flight" for January 15, 1915; for 1915, see "Flight" for January 13, 1916; for 1916, see "Flight" for January 11, 1917; for 1917, see "Flight" for January 24, 1918; for 1918, see "Flight" for January 16, 1919; for 1919, see "Flight" for January 22, 1920; and for 1920, see "Flight" for January 13, 1921.

	Imports		Exports		Re-Exportation	
	1920.	1921.	1920.	1921.	1920.	1921.
	£	£	£	£	£	£
Jan. ...	2,323	4,459	32,752	87,128	697	2,285
Feb. ...	9,320	2,379	68,932	59,829	—	19
Mar. ...	2,092	14	67,600	118,199	—	1,565
April...	5,918	1,370	148,484	138,983	—	450
May ...	761,425	3,350	237,627	59,624	400	1,818
June ...	491	5,181	300,572	79,713	61,150	—
July ...	51,020	540	286,646	530,628	—	850
August	116	343	130,774	111,595	2,544	—
Sept.	386	620	302,802	145,755	—	—
Oct. ...	445	4,256	106,954	101,567	913	580
Nov....	9	504	165,607	144,073	—	20
Dec. ...	2,805	950	69,720	116,430	405	2,120
	836,350	23,966	1,918,470	1,693,524	66,109	9,717

* * * *

Aircraft Company Registrations

From the summary of company registrations at Somerset House during 1921, compiled by Messrs. Jordan and Sons, Ltd., of Chancery Lane, new aircraft concerns do not loom very largely in the grand total of 99 million pounds odd (against about 569 millions in 1920!). The numbers recorded are two public companies with £1,100 capital and nine private companies with £78,300 total capital.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS.

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published January 12, 1922

19,791. C. L. Kee. Laying of submarines by aircraft. (147,770.)
25,635. Albatros Ges. fur Flugzeugunterne-mungen. Shock-absorbers for aircraft. (172,697.)
26,362. R. R. Reed. Captive aeroplanes for training and amusement purposes. (172,732.)

If you require anything pertaining to aviation, study "Flight's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

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The Aircraft Engineer and Airships

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued*

(Continued from p. xiv.*)*

LUBRICATING OILS—
Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cheery," Cent. London.

MACHINING—
Arnott & Harrison, Ltd., Hythe Road, Willesden Junction. Willesden 2297.
Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—
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OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Jan. 26	**Lecture, "Some Practical Points in Fuselage Construction," by Colin Daniel, before Students' Section, R.Ae.S.**
Feb. 2 ..	**Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.**
Feb. 7 & 8	**Second Air Conference at Guildhall**
Feb. 16	**Lecture, "Methods of Instruction in Aeroplane Flying," by Sq.-Leader Portal, before R.Ae.S.**
Feb. 23	**Lecture "Some possible Improvements in Aero Engine Installation," by G. R. Irvine, before Students' Section R.Ae.S.**
Mar. 2.	**Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.**
Mar. 26–April 2	**Nice Meeting**
Mar. 30	**Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**

EDITORIAL COMMENT

Field-Marshal Sir William Robertson's Views on Poison Gas and Aircraft

FROM a brief article the other day in the *Evening Standard*, following the reported Washington resolution for barring the use of poisonous gases in warfare, Sir William Robertson's views would appear to regard such pious resolves as merely sops to placate the idealists who still believe in the possibility of bringing into being a real League of Nations which can for all time abolish war. When human nature has been completely revolutionised—a few thousand million years hence—such a much-wished-for bond of perfection may materialise. In the meantime, what concerns most over-taxed crawlers upon this sphere is what may reasonably happen in the next couple of decades. Washington Conference resolutions notwithstanding, there is no use shirking the question, and therefore it is refreshing to find Sir William Robertson ignoring the likelihood of any beneficial results from these political formulæ. He just plunges straight into realities and discusses what developments of poison gases, combined with aircraft, amongst other means, as distributors thereof, really give promise of in the next little scrap which all wise folk agree we should be prepared to deal with "peacefully" when it comes our way.

Rifles, guns, and men are all very well, and without question useful in their way, but what Sir William states is "we need to realise that, with the exception of the aeroplane, the introduction of poisonous gases has worked a greater revolution in the conduct of warlike operations than has any other invention since the advent of gunpowder, and that chemical warfare has become an important arm of the fighting services. . . . Again, obstacles, both natural and artificial, have always constituted in the hands of a skilful commander one of the most useful aids both to the attack and defence. . . . There were some examples of these gas obstacles on the West Front in 1918."

The use of chemical compounds in aeroplane bombs also opens up a wide field of action. As everybody knows who went through air-raids in London, Sir William points out, the ordinary explosive bomb rarely does serious damage. Important objectives are easily missed, and within a short time after the departure of the hostile machines everything resumes its normal course.

"But if bombs containing a really harmful chemical substance were used—even such substances as are known today—the whole life and business of the raided city might be dislocated for a week or more, and all the inhabitants be driven from their homes. Much the same remarks apply to air attacks on strategic points in rear of the field armies, such as great railway centres. During the last War these had sometimes to be kept almost constantly under attack, and it was seldom that any lasting damage was done. By the use of the right sort of poisonous gas the whole locality could be made impossible for days, thus conferring the further advantage of economy in aircraft material and men."

In conclusion Sir William, after pointing out that "prohibition" is meaningless unless steps can and are taken to enforce the edict, suggests that the only way to give effect to the pious decisions is to reduce and restrict the chemical factories to the peace-time requirements of the respective countries, plus a margin for world trading. "This is a tremendous proposition," Sir William concludes, and he says, "I shall say nothing as to its feasibility. The point I desire to make is that unless and until some control is exercised over the activities of these factories—which are simply arsenals in disguise—prohibitions, resolutions, and similar pious aspirations for abolishing chemical warfare will be not only futile but dangerous, in that they will lull the nation into a feeling of security for which there is no sufficient justification."

Cranks and others who would again "trust Germany" should take these well-thought arguments to heart.

◆ ◆ ◆

Second Air Conference

Elsewhere in this issue will be found particulars of the papers to be read at the Second Air Conference, which is to be held at the Guildhall on February 7 and 8 next. The list is not a long one, consisting of five papers only, but this is evidently due to the arrangement that has been decided upon of devoting the whole of the first day to the reading of papers, and the second day to discussion of them. While Civil Aviation cannot well be dealt with at all adequately in five papers, this year's arrangement has, at least, the advantage that it sets aside as much time for the discussion of the papers as it does for the reading of the papers themselves. At the first Air Conference, it may be remembered, time was sadly lacking in which to discuss the various papers, and as frequently the discussions prove at least as valuable as the lectures, it is all to the good that ample time should be devoted to them. We could have wished, however, to see the Air Conference extended over a longer period, so that the vast subject might have been dealt with more adequately than is possible in five papers, no matter how good individually.

Another respect in which we think that not all has been done that might have been done to render the Second Air Conference more valuable is that it should, we think, have been made international. Commercial aviation must, in the very nature of things, become mainly International in character, and consequently the problems connected with it should be, as far as possible, discussed Internationally. There is already an excellent precedent in the First International Air Congress, which was held in Paris concurrently with the Paris Aero Show at the Grand Palais. This Congress was open to the world, and anyone was free to send in communications under suitably classified heads. We have just received the official account of this Congress, and there can be no doubt that it has brought in a surprisingly fine collection of contributions, some on technical, some on operational, and some on financial subjects. The range is wide, and an extraordinary variety of data, facts and opinions are contained in the official volumes. This country is very well represented by contributions from many well-known men in the aircraft industry, some of which we have already published, and others of which we hope to publish shortly. The ventilation of views which such an International Congress affords cannot but be to the ultimate good of aviation in general.

Compared with the French Congress, our Air Conference cannot be expected to attain the world-wide interest which the subject merits. Nevertheless, it can scarcely fail to do a certain amount of good, having in mind the publicity which will be given to it in the Press, and which, it is to be hoped, will once more call the attention of the public to the vital importance to the nation of fostering Civil Aviation. For the moment we leave the matter at that.

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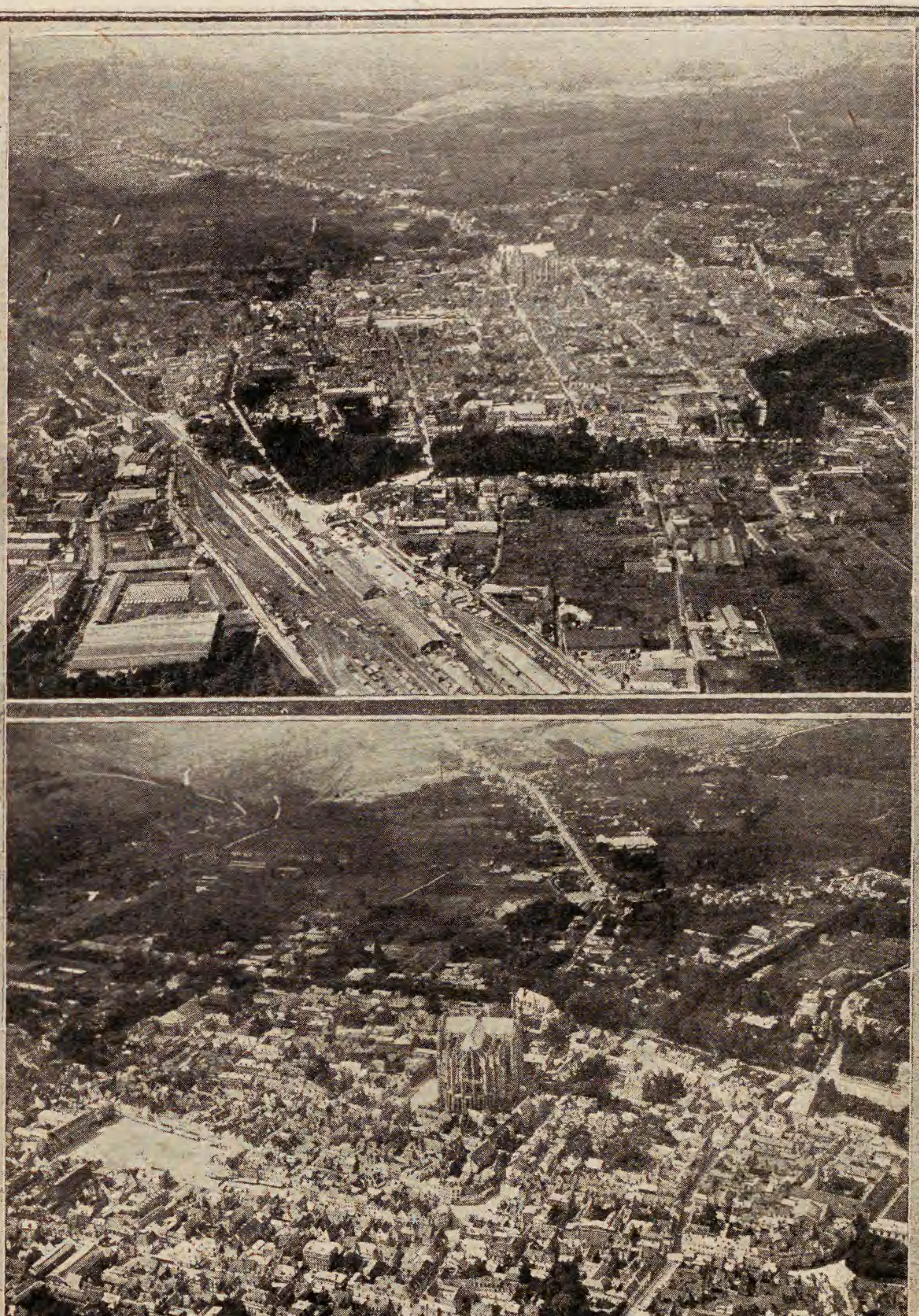
The Importance of Research

It is, we think, a very timely warning which the Royal Aeronautical Society is sounding in the communication which a deputation of the Society presented to the Secretary of State for Air. In the hurry for tests on wing sections, *fuselages*, etc., one is apt to lose sight of the far greater problems which still await solution, problems which affect fundamental principles rather than relatively slight differences in efficiency of components of aircraft. It was research which enabled the performance prediction of an aeroplane to be reduced to simple curves of speeds and climb against a base of power loading and wing loading. These curves, it is true, are approximations only, and designers who have had experience of a certain type of machine will be able to make a somewhat closer prediction. The curves are, however, of the greatest value in enabling one to make a rapid estimate of the performance of any machine, provided the power of the engine, the weight of the machine, and the area of its wing surface are known. Incidentally, not the least valuable feature of this curve is that it has been found to give equally close approximations for the smallest and for the largest machine.

To take another problem which is, perhaps, of even greater importance than that of performance—the question of stability. Already much work has been done on the determination of rotary derivatives, but the subject is one of enormous complexity. Yet we have the assurance of one of our best known aerodynamic experts that there is every reason to hope that, by close and extensive study, it will be possible to reduce stability questions to an equally simple curve or set of curves. But to attain this end a great deal of pure research work will have to be done, for which there will obviously not be the time and money if the N.P.L. and R.A.E. are starved for funds or reduced to a mere nucleus.

We have mentioned the case of stability as one



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LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE:

No. 24.—Two general views of Beauvais.

example only. One could continue enumerating problems which call for pure research, but the stability problem gives, perhaps, the clearest picture of the sort of research work which is in danger of being swamped by other work of a less fundamental, although more immediately promising, nature. We can heartily endorse the views expressed by the R.Ae.S. regarding the need for safeguarding research, and trust that the present need for economy, urgent though it be, will not be allowed to cause us to lose sight of the ultimate gains which knowledge attained by research alone can ensure.

* * *

Engine Installation Some two years of practical commercial aviation have demonstrated that about seven out of eight forced landings are due to breakdown not of the engine itself but to some part of the engine installation. This is proof, if such were needed, that the question of engine installation is one of the very greatest importance. It was therefore with considerable satisfaction that we heard the new Director of Research, Brig.-Gen. Bagnall-Wild, take this subject for his text in one of the most valuable contributions which has been made to the Royal Aeronautical Society for some time. The General realises to the full the vital necessity of paying the closest attention to the question of engine installation if that regularity and safety is to be attained upon which the success of commercial aviation will depend. A resumé of the paper is published on another page of this issue of FLIGHT, from which the main points in the lecture will emerge. We would, however, call attention here to one or two items in the paper which appear to us to call for special attention.

The Director of Research in his paper admits that he sometimes wonders whether designers really realise and fully appreciate the simplicity and other advantages of direct gravity feed from the main petrol tanks to the engine. Judging from the number of machines still flying in which one finds a superfluity of pumps, windmills, gravity tanks, piping, joints, etc., we should say that the majority of designers do not yet quite realise what a simple gravity system will do in the matter of simplification and, incidentally, weight reduction. It is true that of late there has been noticeable a tendency towards gravity feed, but still one finds new machines coming along in which this feature is not incorporated. There are very few designs in which it would not be possible, by a slight sacrifice of appearance, and possibly a certain amount of loss in aerodynamic efficiency, to employ direct gravity feed. The 18 inches of "head," which is the minimum at which the majority of carburettors will function, should be fairly easily attainable without necessitating other alterations than the placing of two petrol tanks (so as to avoid getting a tank immediately above the *fuselage*) on top of the top plane over the first pair of interplane struts of a biplane. This arrangement has been in use on a Spad-Herbemont type for a year or more with, so far as we are aware, excellent results. From the way in which this type of machine handles, it does not appear that the increase in moment of inertia due to this placing of the tanks in any way interferes with manœuvrability. Certain machines have the tanks slung under the bottom plane. This arrangement, while being as safe from fire, and offering greater facility for hand-filling of the tanks, still necessitates the use of pumps, and as bulk storage of petrol is now the accepted method, the question of filling should not be allowed to prevent the high placing of the tanks.

Intimately connected with the question of engine installation is that of easy interchangeability. Almost the only type of engine which was readily accessible and quickly changed in the earlier days of flying was the rotary, mounted on a front plate and having a second support somewhere on the fixed shaft. When the rotary type began to be supplanted, the water-cooled type was installed with but little regard to accessibility, and unfortunately this feature of the installation appears to have remained with us right up to the present time. A few attempts have been made to render the engine more accessible in the latest types of commercial machines, but with one or two exceptions we are, it is to be feared, still a long way from Gen. Bagnall-Wild's ideal of an engine which can be changed for a fresh one in about two hours. Yet there does not appear to be any very great difficulty in attaining this ideal. In fact, although we can scarcely agree with Gen. Brancker that it should be possible so to design the engine mounting that the engine could be changed in ten minutes, we think that the Director of Research was very moderate in his suggestion of a two hours, change. His ideal of being able to change the engine much as a railway locomotive is now changed is thoroughly sound, and is one which merits the very closest attention on the part of designers.

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SEMI-RIGID *v.* RIGID AIRSHIPS*

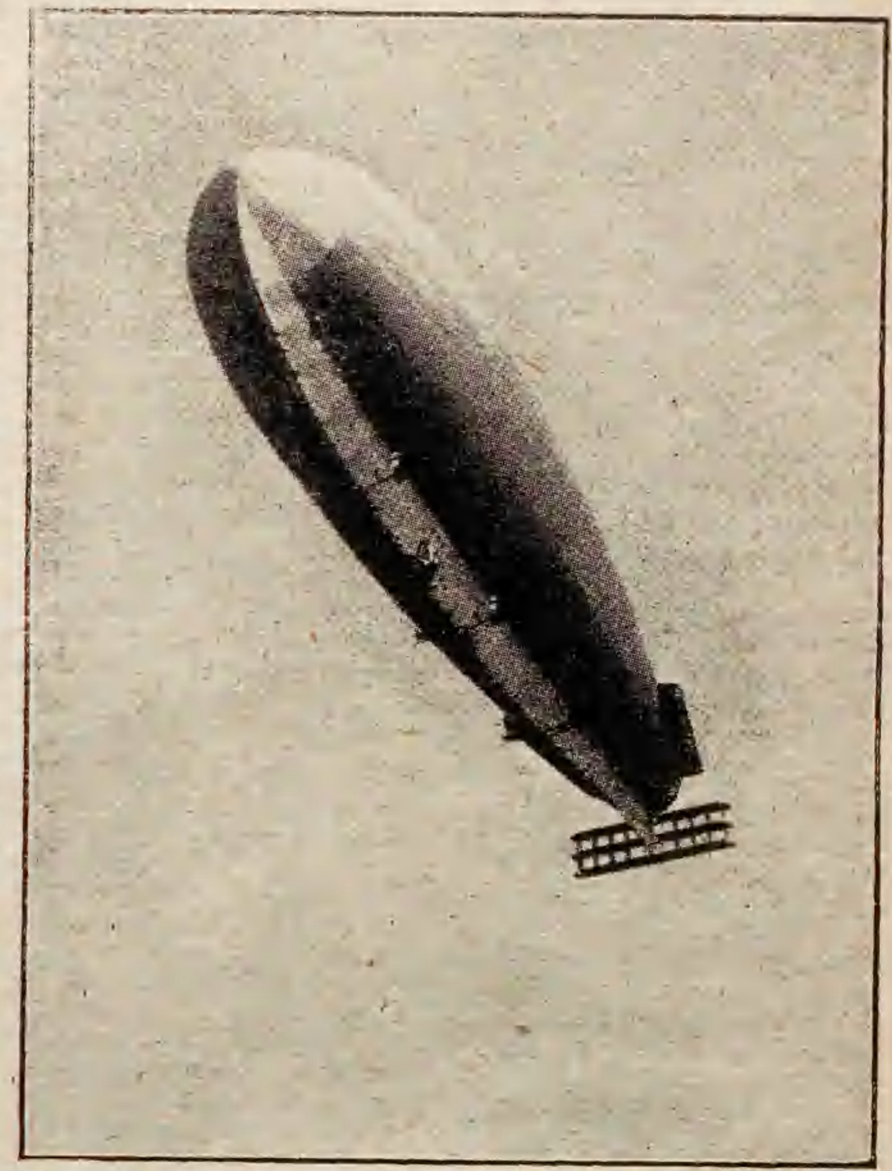
By UMBERTO NOBILE, Director of the Italian Government Airship Factory

THERE exist today two types of airships which are contending for supremacy: the semi-rigid Italian type, and the rigid German or Zeppelin type. The former may be divided into two sub-types: one having an articulated longitudinal keel or backbone, the other a rigid one.

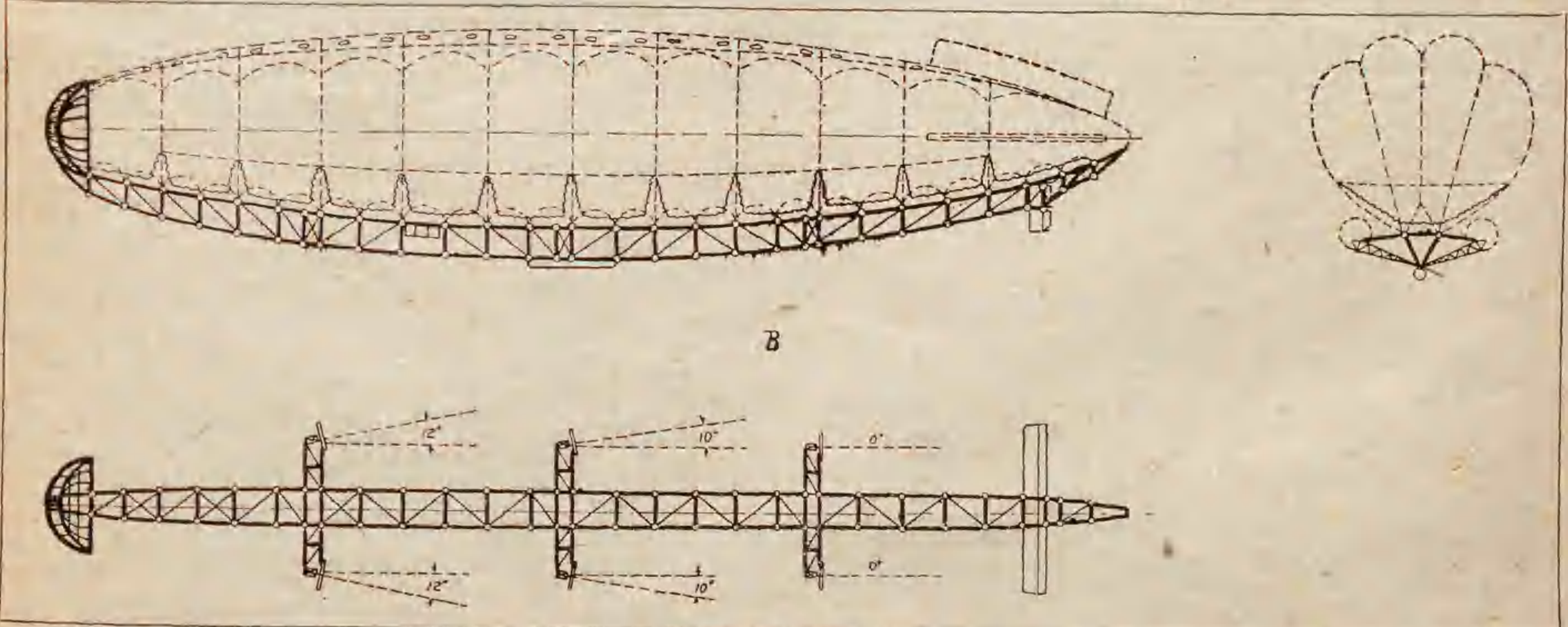
While for small volumes the superiority of the articulated keel type is generally recognised—and proved by the numerous requests from foreign Governments for trial airships of this type†—many experts maintain that, even for the larger airships, the Italian semi-rigid type can successfully compete with the rigid or Zeppelin type. Though there may be doubt concerning the articulated type, there can be none whatever as regards the rigid girder type, as shown by the brilliant success experienced with our first model "T" airship, the "Roma"—the general arrangement of which is shown in the accompanying diagrams. We are convinced that to whatever dimensions our "T" type may be increased—within practical limits—we shall always find that the particular characteristics which constitute its fundamentally good qualities are not only preserved, but even accentuated. Of course, I do not say that great increase in capacity can be made without giving rise to difficulties. When the volume exceeds 3,500,000 cubic ft., the problems of construction and assemblage take on a certain importance, but though these problems may be difficult of solution, they are never such as to lead to unfavourable conditions.

We consider that the essential reason why our type is superior to the rigid Zeppelin lies in the conception of the rigidity itself. In the latter type, the whole of the external surface is made rigid, even where the natural pressure of the gas is sufficient to preserve the shape. In the Italian semi-rigid, only those parts are made rigid which really require it, thus greatly simplifying construction and assembling, which more than compensates for the slight disadvantages of a less penetrating form. Moreover, as regards the preservation of the form, the rigid type does not appear to have much advantage over the Italian semi-rigid, since, with the rigid bow of the "T" type, the excess pressure of the gas in the envelope can be maintained relatively low, without fear of any inconvenience arising either during navigation or during mooring operations.

The superiority of the Italian conception appears, however, not merely in simpler construction, but also and more especially in greater strength. This is evident when we compare the huge, delicate arrangement formed by the metallic framework of the Zeppelins with the strong, elastic backbone formed by the longitudinal girder of the Italian type. This backbone is strong because its parts, being relatively small and exposed to great forces, have a resistance which we seek in vain in the framework of the Zeppelin. It is elastic, because its articulated joints—the peculiar characteristic of our longitudinal girder—give it an elasticity which enables the airship to withstand shocks and bumps, while the Zeppelin, as experience has proved, cannot support such shocks without serious damage.



The "Roma" (U.S. Army) Italian semi-rigid airship in flight.



The general arrangement of the Italian semi-rigid airship "Roma," which has been bought by the U.S. Government. The envelope, which resembles somewhat the Astra-Torres type in cross-section, except that it has four "lobes," is divided by diaphragms into twelve compartments, and is attached to an articulated metal backbone. Capacity, 1,200,000 cu. ft.; length, 412 ft.; max. diam., 82 ft.; disposable lift, 16 tons; six 400 h.p. Ansaldo engines, separate propellers; speed, 68 m.p.h.; range, 5,300 miles.

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* From an article published in *Giornale del Genio Civile.*

† The Italian Airship Factory have just completed one "M" type airship for Great Britain, and two "O" types, one for the U.S.A., and one for the Argentine. Another "O" type is being built for Spain. This type of ship, derived from the "P" type (Crocco-Riccaldoni), may be considered as the most successful of Italian small capacity airships: it was designed by Engineers Pesce and Nobile.

In addition to these two most important advantages of the Italian type over the Zeppelin type, may be mentioned the following :—

1. Rapidity and certainty in designing.
2. Rapidity of construction and utilisation of materials of current use and constant characteristics.
3. Great rapidity and simplicity of mounting.
4. Possibility of quickly dissembling the airship for storage or transport. A Zeppelin cannot be taken apart.
5. Possibility in the future of assembling the airship out in the open. In fact, the assembling of the longitudinal keel, complete with all its accessories, comprising the stiffening of the bow, the power plant, rudders, etc., can be done without inconvenience in the open air, if protected from the weather by a temporary covering of limited dimensions. When the rigid keel is assembled, we can, given favourable weather conditions, proceed immediately with the inflation of the envelope, and to its connection to the backbone. After this, the airship may be ready in a few days, if not to fly, at least to be moored, so that the final adjustments may be made without danger.
6. Great facilities of inspection and repairing of single metallic parts. This considerable advantage arises immediately from the fact that the rigid part occupies only a small space, and also that the various parts are articulated together, so that a damaged part can easily be changed.
7. Lower cost of construction and assembling.

This advantage, however, must be set off against the cost of operation. As a matter of fact, in the Italian type, when from any cause the gas bag becomes inefficient, it must be entirely renewed. It is certain that to change one of the gas compartments of the Zeppelin is a much less costly operation, but, on the other hand, when we consider that the maintenance cost of the rigid portions is much less in the Italian type, we come to the conclusion that, on the whole, the upkeep of a Zeppelin is more costly than the upkeep of an Italian semi-rigid.

In summing-up all the advantages of an Italian semi-rigid over a Zeppelin, we must, however, admit that in one point the latter is superior, *i.e.*, in the coefficient of head resistance. But we are convinced that this inferiority will soon be eliminated by successive improvements in the Italian semi-rigid type airships.

"R.38" Disaster Inquiries

Now the Admiralty have had their say in regard to this great calamity, it should be of more than ordinary interest to receive the report on the subject of the Aeronautical Research Committee, who have been making careful investigation into the disaster and its cause.

Morocco Air Post Charges Reduced

THE Postmaster-General announces that the special air mail fee which is payable in addition to the ordinary foreign postage rate on packets posted in this country for Morocco and directed to be forwarded by the French Air Mail Service from Toulouse to Casablanca is now reduced. The new rates will be as follows :—

3*d*. up to ½ oz. ; 6*d*. up to 3½ oz. ; 3*d*. for each additional 3½ oz.

Postal packets by the Toulouse-Casablanca Air Mail service will also in future be subject only to the same conditions regarding maximum weight and dimensions as those forwarded all the way by the ordinary route.

Packets may be posted up to 6.30 a.m. (printed papers 6 a.m.) at the General Post Office, London, on Monday, Tuesday, Thursday and Saturday, to connect with the air mails for Morocco which leave Toulouse on Tuesday, Wednesday, Friday and Sunday respectively. The mails are due to reach Casablanca on the following day in each instance. The public, both in London and the provinces, are advised to send their postal packets by the air route on any day of the week, as in the normal course transmission will be greatly accelerated.

Flying the Desert

A VERY human story of flying the Desert *en route* from Cairo to Baghdad appeared recently in *The Times* from a Special Correspondent. The methods employed from start to finish are detailed and the flight over the Desert itself is well described as follows :—

"The flight from Amman onwards is across the Arabian Desert to Ramadi, a distance of about 600 miles. Except here and there, there are few physical features which would be of much assistance to a pilot in finding his way ; and although it would be possible to fly on a compass course until the River Euphrates was reached, it would be very difficult to find where a machine would land on account of engine trouble. In order to overcome these difficulties, a track has been made by a number of motor lorries following each other across the desert.

"The desert is not pure sand, but sufficiently loamy to adhere when squeezed in the hand, and camel scrub and other vegetation spring up after the rains, which come between November and April. The general level varies from about 1,500 to 3,000 ft. above sea level, with considerable local undulations, watercourses, mud flats and rock outcrops, so that the car track is by no means a straight one, but winds about, choosing the easiest path. Large arrows have been made in the soil to indicate to the airman a coming change of direction. Twenty suitable areas for a landing have been marked with large circles in the course of the 600 miles. Some of these landing-grounds are of a gravelly nature and some are mud flats. The track does not get covered up, as it probably would in sand, and although it is difficult to pick up in places, it is, generally speaking, fairly easy to follow, and, so far, does not seem to be affected much by the limited amount of rain which falls in these parts.

"Due to certain misadventures, the party was three days on the journey, although the time in the air was only 10 hours, and in the summer there is no difficulty in going from Cairo to Baghdad in the day. To reach Baghdad, except by air, would entail going to Port Said, catching a steamer to Basra on the Persian Gulf, by way of Bombay and Karachi, and from there by train—a journey of about 30 hours—to Baghdad. This route would probably take a month, and this short description of the new air mail route to Baghdad is an illustration of the great saving of time in the new method of travel. An additional advantage is the feeling of freshness on landing as compared with the effects of a railway journey of similar length, an important matter to business men."

ROYAL AVIATION ENTHUSIASTS : For a considerable time the King of the Belgians has done a great deal to encourage aviation by using his aeroplane for travelling. Now the Queen of Belgium is preparing to do the same by accepting from the Aircraft Disposal Co., Ltd., a "Bristol Fighter," similar to that used so extensively by the King. Our photographs show the two machines, the one on the left being that presented to the Queen. It is finished in aluminium throughout, which makes it look very light and graceful. The machine was flown from Croydon to King Albert's private aerodrome at Brussels by Capt. Muir, and Col. Darby, General Manager of the A.D.C., made the trip as passenger in order to make formal presentation to Her Majesty.

AN AIRCRAFT DISPOSAL CONVERSION

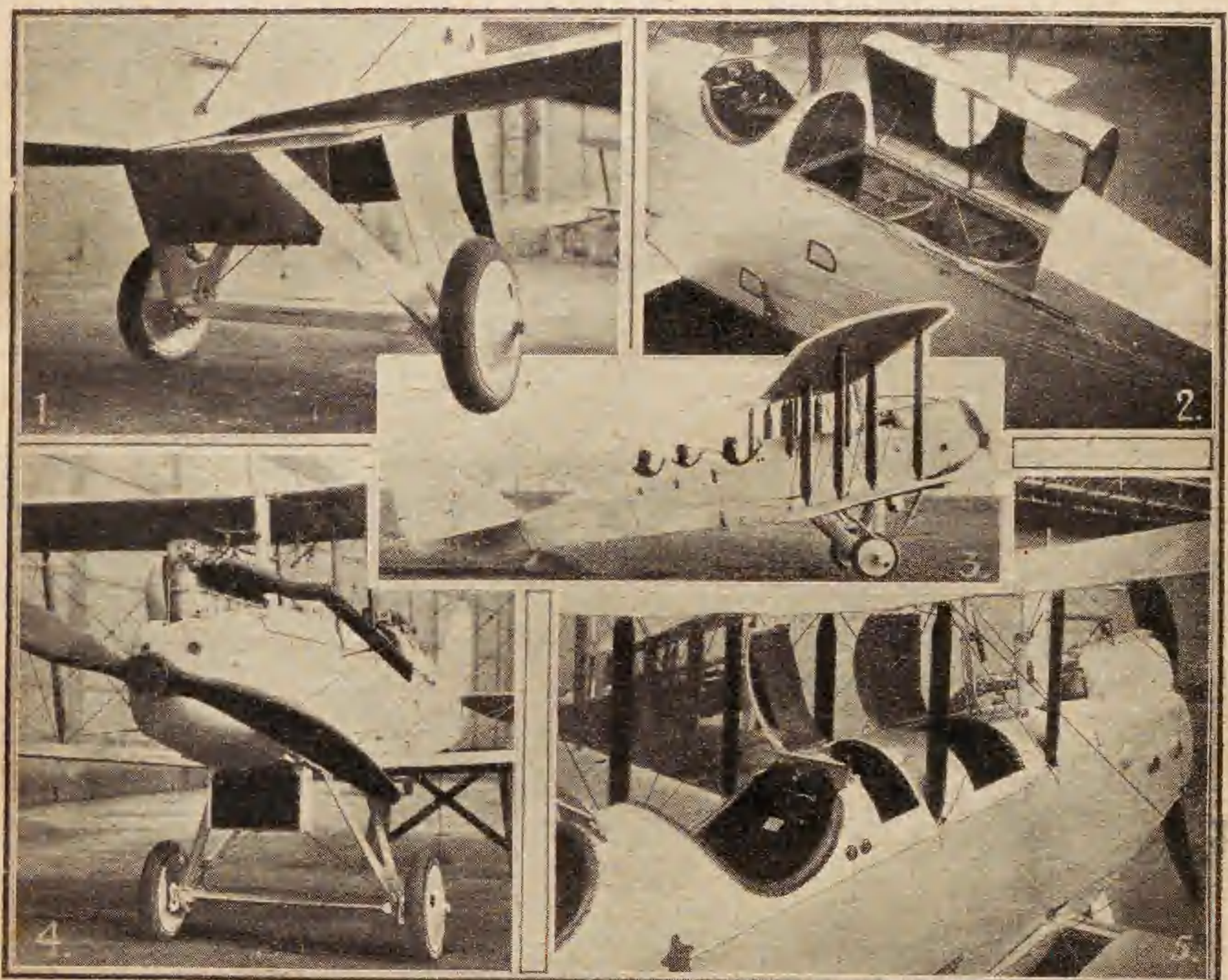
By some it is considered necessary only to remove the gun-ring or bomb rack, and put in a passenger's seat, to convert a military machine into a commercial one. As a matter of fact, it would seem that a considerable amount of work has to be done on such a machine before it can be really suitable for any particular form of commercial work. Such was the impression we gained, however, as the result of a visit to the Aircraft Disposal Co.'s Works at Waddon last week, for the purpose of inspecting two machines that have just been turned out for a Swiss company. The latter, which makes a special feature of aerial tours over the Alps, has already had other machines from the A.D.C., and it is owing to the successful results obtained with these that the 'planes under review were ordered specially for Alpine work.

As may be seen from the accompanying illustrations of one of these models, it consists of a modified D.H.9 having a 240 h.p. Siddeley "Puma" engine, and converted into a three-seater. Where the gun-ring used to be in the original type there is now a double cockpit for the two passengers, who are seated in tandem. The installation of this cockpit, as well as the other modifications, have been carried out exceptionally well, and with considerable attention to detail. For instance, the portion of the turtle deck around the double cockpit is hinged—as shown in the illustration—so that the passengers are able to take their places with the greatest facility and comfort. It may be mentioned in passing that the view obtained by the passengers is excellent, but we should think that flying in bumpy weather—as probably exists over the Alps—being seated so far back, may call for a certain amount of "airworthyness" on the part of the passengers.

In front of the pilot's cockpit are two freight holds, with hinged hatchways in the turtle deck, whilst under these is another compartment for passengers' luggage. This latter consists of a very neat arrangement, in which by means of a quick-release arrangement a door opens in the bottom of the *fuselage* and a large "box" slides down below the latter, permitting the luggage to be stowed away with ease.

In place of the hinged canopy over the passengers' cockpits, a complete covering, with windows, may be fitted, converting the machine into a limousine.

Both these machines were to have been delivered by air to Debendorf, near Zurich, last week, but the exceptionally bad weather necessitated a postponement until this week. The machine illustrated, however, was taken out for a trial flight last Thursday by Mr. Muir, which we had the pleasure of witnessing. In spite of the atrociously bad weather—wind and rain *ad lib.*—the machine put up a very fine performance. The approximate speed of these 'buses at 4,000 ft. is 115 m.p.h. with full load, and the climb is said to be 10,000 ft. in 20 minutes.



AN AIRCRAFT DISPOSAL D.H. 9 CONVERTED FOR ALPINE TOURS: (1) The passengers' automatic luggage "lift." (2) The hinged canopy over the passengers' cockpit, giving easy access. (3) The complete (3-seater) machine. (4) The 240 h.p. Siddeley "Puma." (5) The pilot's cockpit and the two freight holds.

* * *

Swedish Aviatrice Killed

FROM Stockholm it is reported that Sweden's only woman aviator, Miss Elsa Andersson, was killed at Askersund on January 22 while making a parachute descent from an aeroplane from a height of about 2,000 ft. No details relating to the cause of the accident are available.

AERIAL LIGHTHOUSES

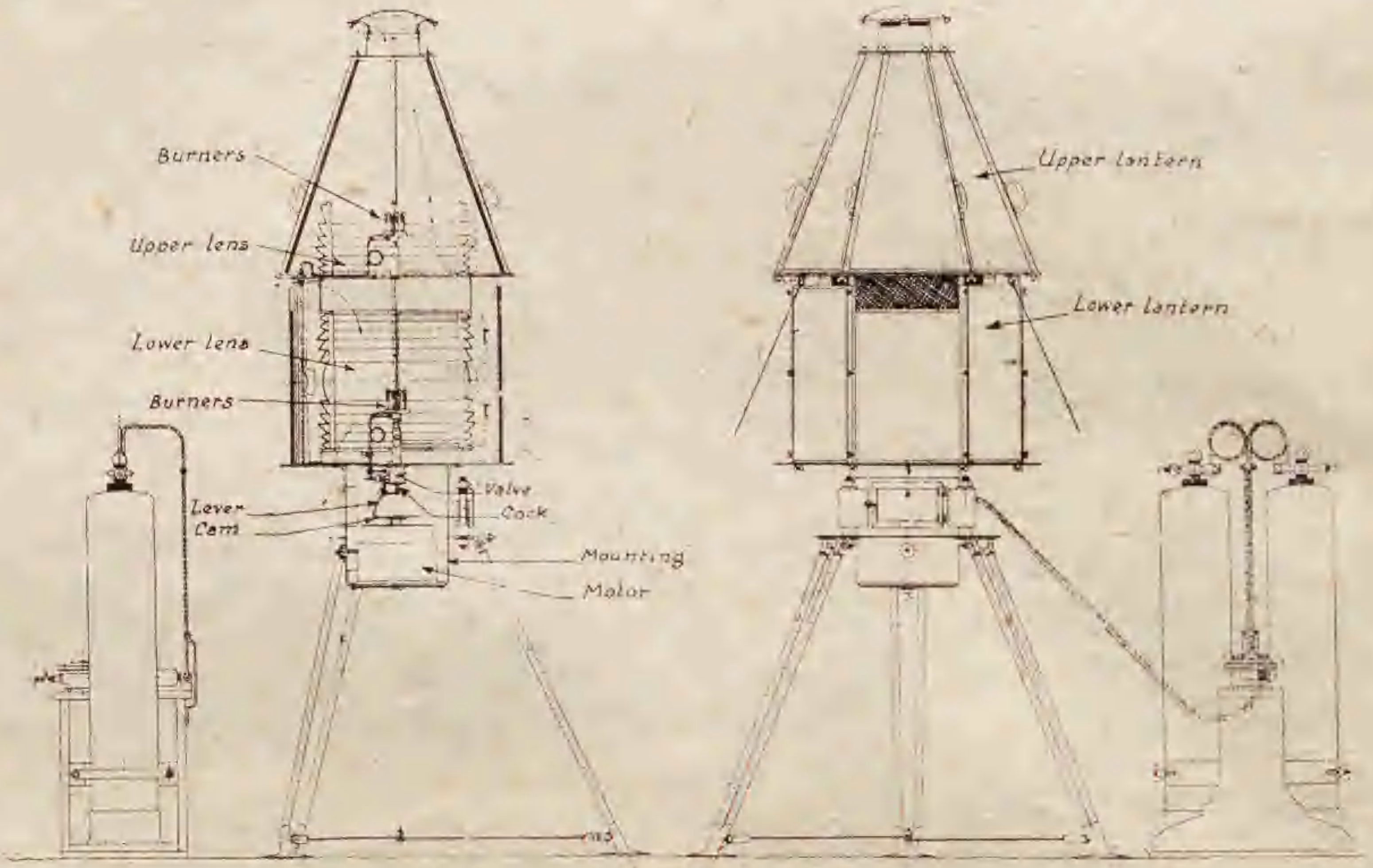
1,000,000,000-c.p. Lighthouse

WE are able this week to give some brief particulars of the interesting aerial lighthouse that is being erected at Dijon in order to provide a suitable guiding light for the aerial routes between Paris and Algiers, Italy and Switzerland. This light, which is the largest and most powerful one in existence, was made by the famous French optical firm of Barbier, Bernard and Turenne of Paris, whose British representative is Major J. P. Ashley Waller of Audrey House, Ely Place, London, E.C. 1.

The range of this light in normal northern weather conditions will be about 65 miles, and in clear weather will be not less than 130, and more probably about 200 miles at a height of 6,000 ft. or thereabouts. The source of illumination is from powerful electric arcs, automatically adjusted and formed between horizontal carbons, which are surrounded by eight lenses, each composed of seven dioptric (refracting) and ten catadioptric (refracting and reflecting) parts. These lenses are so arranged that they divide into two groups of four, the axes of the two groups being opposed, and the beams from each group converge to form one large beam. This arrangement of lenses will be seen from the accompanying diagram. A special point to be noted is that the lenses are split vertically at the centre. This splitting is a patented device of the designers to enable the beam of light to take a greater speed vertically than horizontally, in order that the light may be visible outside and above the main beam. The arcs and lenses are carried on two platforms, two lenses of each group being on the top platform and the remaining pairs on the second. Below these platforms is a third, carrying a set of stand-by lamps, together with the necessary apparatus for bringing these into action and focus when required.

All three platforms are connected, and, together with all the mechanism, revolve on a vertical shaft to which they are keyed. This shaft is mounted on ball bearings and stepped in a cast-iron socket which rests on a concrete base. An electric motor with reduction gear is fitted under the lower platform and serves to revolve the whole.

Surrounding all the above is an 18-ft. diameter "house," the upper portion, opposite the lights, consisting of a double tier ventilated lantern; inner and outer galleries, with ladders, are provided for the crew. All the controls are fitted on the lower platform, whence every lamp can be inspected by means of special reflecting prisms, and its focus adjusted.



The Barbier, Bernard and Turenne Portable Flashing Aerial Beacon (4th Order).

This particular light is intended for the present to give flashes at regular intervals, but, as it might be necessary to change this later on and to provide intermittent flashing of irregular periods, cams have been fitted which can be brought into play at any time to vary the length of flash and the intervals between flashes. The electric arc has been selected by the French Government for this Dijon light, as the necessary current is available in this case, but filament lamps could equally well have been fitted, with a considerable reduction in current consumption for the same intensity of light.

Powerful as this light is, we understand that the makers have full designs prepared for lights of even greater range, such as would be necessary for lighting desert routes when the number of lights employed should be kept down to a minimum. Where electric current is not available, as in the above case or Central Africa, etc., either acetylene gas or paraffin vapour would form the source of illumination, whilst automatic devices would be fitted which enable the lights to operate unattended over periods of many months.

This automatic device, which is fitted on many marine lights erected all over the world by Messrs. Barbier, Bernard and Turenne, automatically lights and extinguishes the lamp at any predetermined times, and is operated by the combined action of a clockwork motor and the flow of gas leading to the bye-pass—or an electrical device where electric light is employed.

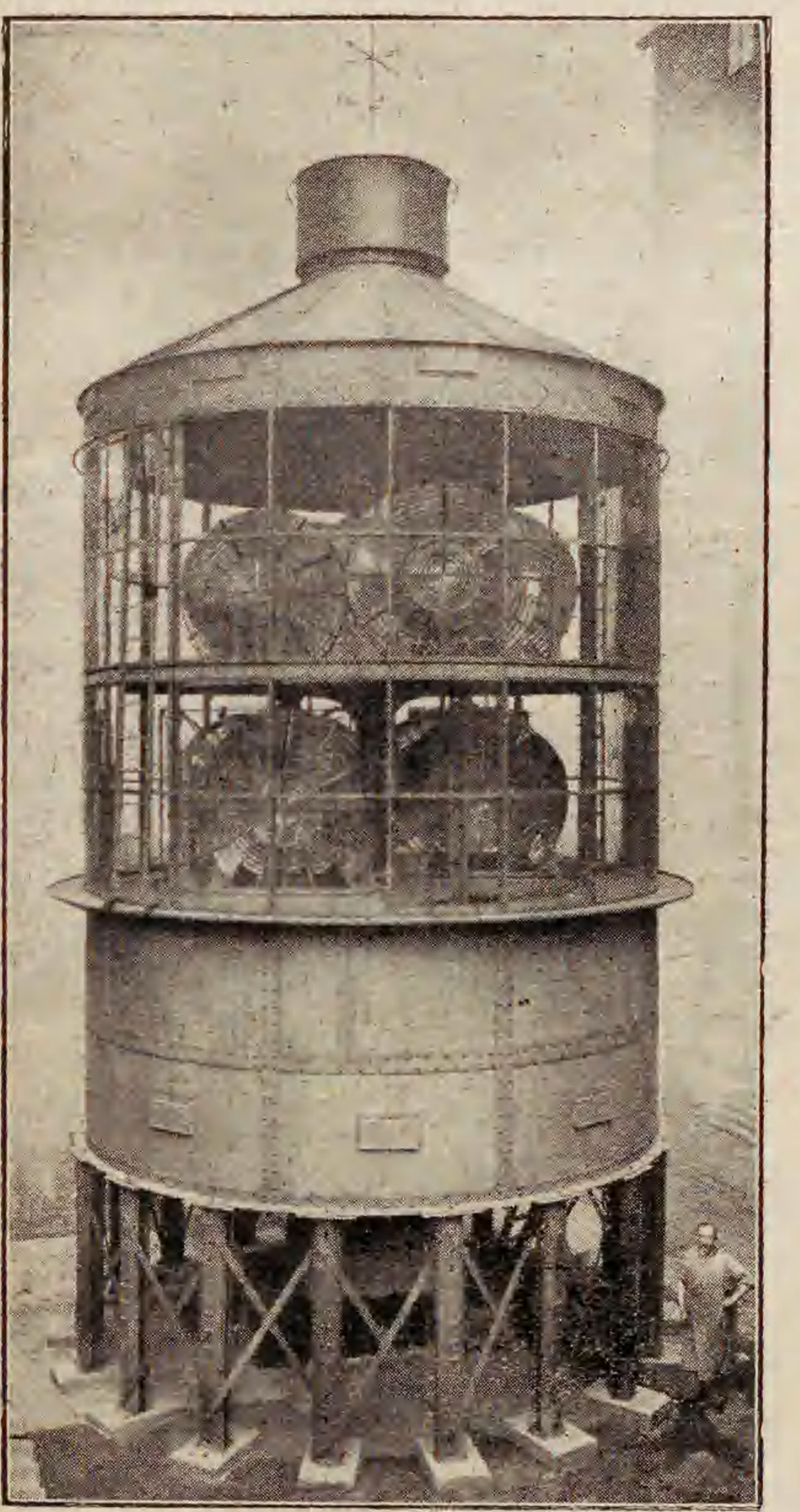
The whole gear is extremely ingenious, but lack of space will not, at present, permit a full description here. Briefly, however, it is composed of a clockwork movement with anchor release carrying a timing-box and timing disc divided into 24 hours, the last making one revolution per day. The timing disc carries two circular slots which engage two levers suitably disposed which open and close a valve controlling the gas supply. Winding of the spring is effected by a gas motor driven by the gas leading to the bye-pass and working a ratchet driving the drum containing the spring. A gas pocket regulates the pressure and feed to the bye-pass.

Gas from the main supply enters a valve leading to the burners, thence to the gas motor. The latter consists of a box containing a membrane, which is raised by the pressure of the gas, and in so doing operates a ratchet gear, which in turn winds the spring drum—a friction slipping device being, of course, provided.

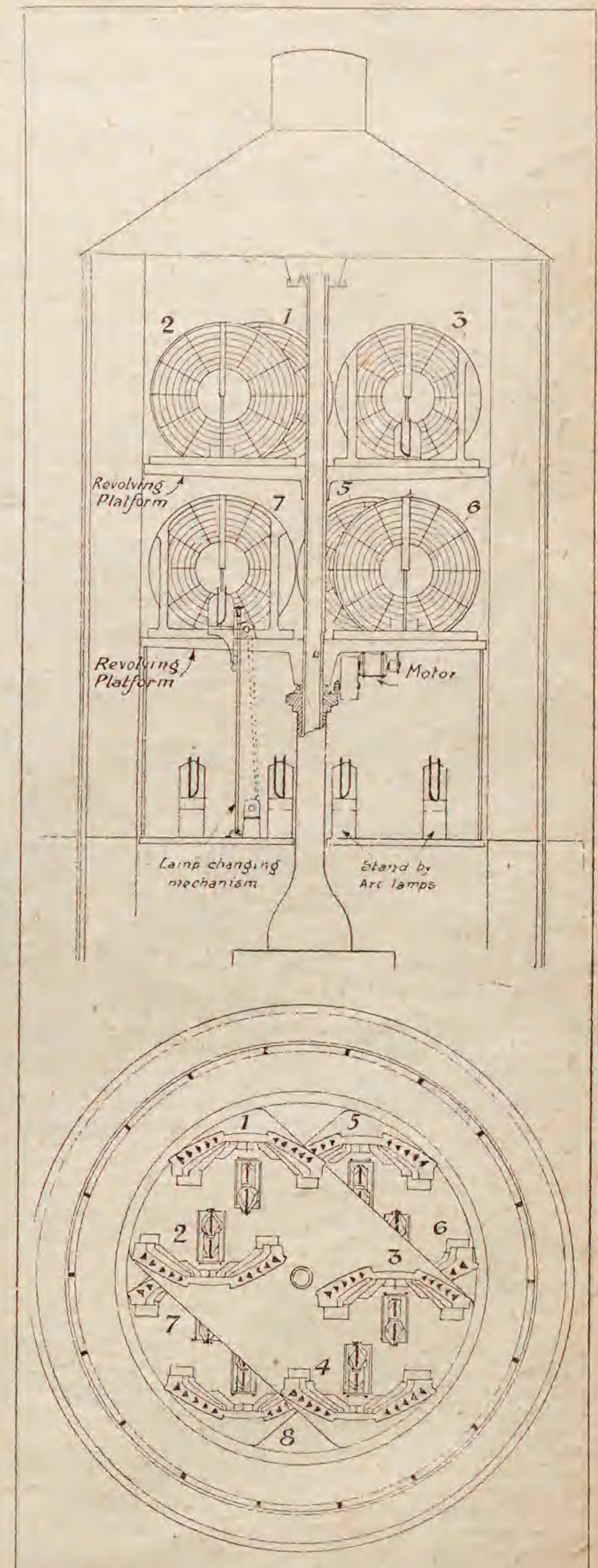
From the motor the gas passes to the gas pocket which, through the medium of an arrangement of membranes and springs, feeds the bye-pass with a constant supply of gas. The opening and shutting of the valve is effected by the movement of adjustable keys fitted on the timing disc between the arms of the lever which controls the valve—the timing disc being, of course, driven by the clockwork motor.

During the Great War Messrs. Barbier, Bernard and Turenne carried out a considerable amount of work in connection with aerial guiding, landing and other lights, and as a result of the experience thus gained have produced a number of standard patterns of aerial beacons, etc. Amongst these brief mention may be made of two, one a special medium-range flashing light of the fifth order, and the other a portable flashing light of the fourth order, which is shown in the accompanying illustration.

The former light has an optic composed of five annular panels, disposed in pentagon, which permits the following signals being given: (*a*) 1 flash, (*b*) 1 group of 2 flashes, (*c*) 1 group of 3 flashes, (*d*) 1 flash followed by a 2-flash group, (*e*) 1 group of 4 flashes. For these different combinations metal panels are employed to mask the appropriate lenses. Each annular panel is composed of three dioptric, five upper catadioptric and three lower catadioptric rings. The optic is arranged to give a beam of light whose axis, allowing for atmospheric refraction, at the limit of range crosses the 13,000 ft. altitude, and in order to give visibility right up



The Barbier, Bernard and Turenne One-Thousand Million Candle-power Lighthouse. A general view of the complete lighthouse, which is being erected at Dijon, showing its huge proportions.



Elevation and plan, diagrammatic, of the Dijon light, showing the arrangement of the eight lenses and arcs into two groups, on two revolving platforms. The beams from 1 and 3 on the upper platform converge with those from 5 and 7 on the lower platform and form one large beam. In a similar way the beams from 2 and 4 (top) converge with the beams from 6 and 8 (lower) and form one beam, but opposed to the first.

to the zenith, the panels are split on their middle vertical line as previously described.

The source of light may be either electric or acetylene, or an adaption to take either at will. If electric, a 3,000-c.p. metal filament lamp is used, absorbing 15 amps. at 110 volts. For acetylene, either a 12-burner naked-flame light (300 litres/hr.) may be used or an incandescent burner. The support for the burner is adjustable for focussing, and a sight tube enables the latter to be accomplished whilst the light is burning. Rotation is effected in three different ways: (1) If electrically lit, by an electric motor coupled direct to a reduction gear, all on one base plate. (2) If lit by acetylene, by weights and gearing. (3) If for alternate lighting, the base of the light takes both electric motor and weights, a clutch system being fitted to transfer from one to the other. The optic, its base and the rotating gear are all enclosed in a lantern having a metal lower part with doors for access to the gear; the top is fitted with glass and is ventilated.

The fourth order light is especially suitable for military work, or for marking out temporary air routes. It consists of a tripod supporting a mounting in which is fitted a clockwork rotating device (or gas motor or electric motor). The upper part of this mounting also carries, on a circular plate, the valve and adjustable holder for the burners (12-burner, 30 litre/hr. type). Covering the whole mounting is a hexagonal plate on which is fitted the lens, composed of 11 dioptric elements, enclosed by a hexagonal lantern. On the top of the latter is another hexagonal plate carrying a second and similar burner surrounded by a half-lens composed of 6 dioptric elements, all enclosed in a cone-shaped lantern.

The rotating device carries a cam which controls by a lever the cock on the valve so as to give instantaneous closing and opening, thus producing successive periods of illumination and extinction—according to the type of cam fitted—of both burners simultaneously. Two bye-passes of a special type are fitted to each burner, giving instantaneous re-lighting of the burners. The clockwork device is very strong, and is powerful enough to actuate the light all night without rewinding. A movable stand at the side of the tripod carries two or more bottles of dissolved acetylene (4,000 litres each) for supplying the burners.

As previously noted the clockwork device can be replaced by a gas motor or by an electric motor (when electrically lit). These motors carry the cam, and their installation eliminates the necessity of daily winding the clockwork. The automatic lighting and extinguishing device, previously described, may also be fitted. The total weight of this light, without the gas bottles, is about 825 lbs.

NOTICES TO AIRMEN

Great Britain and France: Aerial Corridors

THE provisional agreement relating to aerial communication between Great Britain and France (Article 12) has been amended in the following respect:—

The corridors of entry into Great Britain have been abolished. Aircraft may therefore cross the coast of Great Britain at any point, except over a prohibited area.

The corridor of entry into France from Great Britain extends from Etaples to the Belgian frontier (*vide* Notice to Airmen No. 36 of 1921).

(No. 6 of 1922.)

Belgium: Erection of Wireless Mast at Haren

1. A wireless mast, 28 metres (92 ft.) high, has been erected near the aerodrome control office on the western side of Haren aerodrome. The mast is marked by day by three red flags, and at night by three red lights.

(No. 7 of 1922.)

France: Emergency Landing Grounds, Lighthouses, Etc.

PREVIOUS Notices to Airmen relating to France have been amplified and amended in regard to emergency landing grounds at (*a*) *Berck-sur-Mer*, (*b*) *Poix*, (*c*) *St. Quentin*, (*d*) *Beauvais*.

2. *Marking of Landing Grounds.*

The following system of marking the boundaries of the landing grounds of *Berck-sur-Mer, Poix and St. Quentin* has been adopted:—

Horizontal and vertical iron plates, painted white, are mounted on posts 1 metre in height at intervals of 50 metres round the edge of the landing ground.

In order to indicate the boundary of the ground when it is covered with snow, the following additional markings are used:—At each of the principal corners of the landing ground vertical panels, painted with alternate black and white horizontal bands, are placed on posts 3 metres (9 ft. 10 ins.) in height.

Caution. The height of some of these markings necessitates care in their avoidance. Pilots are also warned that the circles and names mentioned above are constructed of concrete, and although all possible care has been taken to make them level with the surface of the aerodrome, it is inadvisable to taxi over them at any considerable speed.

3. *Aerial Lighthouses.*

4. *Customs Regulations.*

(For details application should be made to the Air Ministry for No. 8 Notice of 1922.)

Wireless Telegraphy Stations in Operation in Connection with Civil Air Routes

A NEW Notice to Airmen (No. 9 of 1922), obtainable from the Air Ministry, is substituted for No. 61 of 1921 in regard to the wireless stations operating in connection with civil air routes, which are classified as follows:—*Class "A"*—Stations directly concerned with flying operations, whose routine is primarily intended for aircraft. *Class "B"*—Stations indirectly concerned with flying operations, whose routine is not primarily intended for aircraft.

These are classified for: I, British Isles; II, Belgium; III, France; IV, Holland; V, Other countries.

This Notice cancels Notices to Airmen Nos. 61, 77 and 91 of 1921.

(No. 9 of 1922.)

Sir Ross Smith's New Adventure

IT is now some time ago that the first rumours were heard of a proposed flight around the world by Sir Ross and Sir Keith Smith. It appears that plans are now fairly advanced and that there is a possibility of the flight starting within the next three or four months. We understand that Sir Ross intends to use a Vickers "Viking" amphibian, and after hearing his lecture on the flight to Australia and seeing the films, one feels convinced that the amphibian type of machine is the right one for the purpose. It is true that the land gear weighs a good deal, but on the other hand such a machine is not so restricted to long stages between aerodromes as is the ordinary land machine. The route to be followed has not been definitely decided upon, but it will probably be the eastern one—*i.e.*, London to Cairo and Baghdad, *via* France, Italy, etc., and thence to India, China, Japan, Alaska, Canada, Newfoundland, Azores, and home. The most difficult part of the route will, of course, be the Atlantic crossing, but if the route be laid over the Azores the distances should be within the capacity of the "Viking."

Diesel Engines for Aircraft

ACCORDING to the Aviation Correspondent of the *Daily Telegraph*, there is reason to believe that the Diesel type of engine will soon be a practical proposition for use on aircraft. We wish we could share his optimism. Although the type will probably be modified to suit aircraft conditions some day, we have no great hopes of this happening in the immediate future. At the Paris Aero Show was exhibited a radial engine which was said to be designed for operation on the Diesel principle. In view of the high compressions reached, however, it appeared distinctly on the light side, and although it represents an attempt at solving the problem, we should not think that success is yet within sight.

Washington Naval Treaty and Aircraft Carriers

IT looks as if the Naval Treaty for limiting armaments arranged at the Washington Conference is now likely to go through. The Article (9) dealing with aircraft carriers now reads as follows:—

"No aircraft carrier exceeding the 27,000-ton standard shall be acquired or constructed. It is provided, however, that any of the contracting Powers may, without increasing its tonnage of aircraft carriers, build not more than two aircraft carriers each of a tonnage of not more than 33,000, and in order to effect economy any of the contracting Powers may use for this purpose any two of their ships, whether already constructed or in the course of construction, which would otherwise be scrapped under the Treaty."

THE IMPORTANCE OF RESEARCH IN AERONAUTICS

The following is an epitome of the views of the Council of the Royal Aeronautical Society on the need for better safeguards to prevent the submerging of applied scientific research in aeronautics by technical experimental work. These views were laid before the Secretary of State for Air at a recent interview by a deputation of the Council of the Royal Aeronautical Society, consisting of Lieut.-Col. M. O'Gorman, C.B. (Chairman), Prof. L. Bairstow, C.B.E., F.R.S., Sir Mackenzie Chalmers, K.C.B., C.S.I., Prof. B. Melvill Jones, A.F.C., Lieut.-Col. Alec Ogilvie, C.B.E.

The Council of the Royal Aeronautical Society asks to be allowed to put before the Air Minister in person certain views which have been borne in upon them in relation to applied scientific research in aeronautics. They would first desire to lay before the Minister the standing of the Royal Aeronautical Society and its quality to approach him on technical matters.

Four bodies represent British Aeronautical activity, and these bodies respect each other's domains and are connected by agreements and joint committees; they are :—

(*a*) The Royal Aero Club, concerned with the control of races, competitions and touring, the international sporting and touring rules and triptyques. (*b*) The Air League of the British Empire, concerned with propaganda, mainly in the interests of aerial defence. (*c*) The Royal Aeronautical Society, whose province is the spread of the study of aeronautical technics, both in theory and practice, including those branches of physics, chemistry, etc., which relate to the aeronautics—as well as scientific research and publications therewith. This Society is officially represented on the Aeronautical Research Committee of the Air Council. (*d*) The Society of British Aircraft Constructors, the organised body of British aircraft constructional firms. The technical staff of the last are, in significant numbers, members of the Royal Aeronautical Society.

Applied scientific research has in England, for one reason or another, suffered from serious and increasing disabilities since the earliest flight. These disabilities arose from many causes, but notably from the fact that, though research has forced itself into public recognition as fundamental to any technical advancement, when it comes to the detailed allocation of time and work this recognition becomes blurred by reason of other factors, technical, administrative and financial, which tend to obscure its fundamental importance and crowd it out of existence. The occasional and (we venture to suggest) incorrect usage of the term "research" as a comprehensive name for all and any experimentation in aeronautical technics has led to its use to cover matters other than the true "applied scientific research" to which it is the object of the Royal Aeronautical Society to draw the Air Minister's attention.

"Aeronautical technics" (or research so-called) embraces many subheads, thus: not only (1) applied scientific research (properly so called), whether theoretical, model or full-scale work—and referred to hereafter for brevity as "research," but also (2) *ad hoc* experimentation and calculation on specific appliances, or proposals not forming part of an organised series; (3) experimentation to develop acceptable devices into standard useful appliances; (4) the improvement of such devices in accordance with the demands arising from use and the introduction of modifications specified for service reasons; (5) tests of performances of normal purchases for service.

This list may be extended (the above subheads are intended to be illustrative and not inclusive).

In a number of cases there is no confusion between what falls under one or another of these subheads; but there are limiting cases, when a form of words intended to lay down what is and what is not applied scientific research would lead to discriminating wrongly between "research" and other subheads. The desire of the Royal Aeronautical Society is to ensure, if possible, the continued and urgent prosecution of "research" as above defined. This is the Society's main plea.

As regards *method*, the Society hopes to give point to the above request by certain suggestions for the consideration of the Air Minister.

If the question of an organisation to deal with the matter be now considered, we find that on the one hand all the heterogeneous activities above enumerated as aeronautical technics, which often have little in common except the fact that they are susceptible of being called "technical," might be ascribed, as and when they arise, to the same chiefs, the same subsection of the money vote, dealt with by the same staff and in the same establishments; or on the other hand, if one of them appeared to be of basic importance it might be specifically protected from encroachments.

These encroachments are natural, are known to occur in technical organisations having this diversity of interests, and are easily explained; none the less, they are difficult to guard against. They have been observed both in this country and abroad where for any reason *ad hoc* experimentation and applied research are in juxtaposition—which implies competition for the use of the time and services of the same staff. Thus, each *ad hoc* experiment which presents itself as desirable—and such always looks desirable or it would not be touched (for example, the verification of some particular wing shape or wing thickness, put forward by an enthusiast or maker as having exceptional merits)—appears to call for prompt attention; it seems to offer a royal road to results. The experiment would appear to be one of which the end can be foreseen and the amount of expenditure estimated; while the answer which the experiment affords will apparently be either positive or negative, but in either case useful.

In contrast, "research" (for example, the investigation of aircraft control at low speeds, of pressure distribution on wings, or of the twist and vibration of airscrew blades in flight, or the control of aircraft from the ground at night or in fog) is rarely backed by the pressure of an enthusiast who wants the advantages of his specific device, nor is it clear how long such an investigation will have to be prosecuted; still less what important side issues will have to be explored before its harvest of results can be expressed in terms of actual aircraft.

The administrative head thus finds himself confronted on the one hand (*a*) by a number of requests for research of which he cannot foresee either the exact end, the total cost or the exact resulting advantage, and (*b*) with demands for the verification of the alluring claims of some particular device; while, and in addition to the above conflicting demands for technical attention, there are (*c*) the Service demands for introducing improvements in existing, and standardisation of proposed, technical appliances and other kindred matters. The plea of the Council of the R.Ae.S. is that, particularly in a time such as the present of reduced expenditure, the position of "research" as above defined shall be *specifically* safeguarded in some manner. Throughout the War it was openly urged that *ad hoc* experiments must take precedence of research, and there is no doubt but that they did so—an attitude with which the Royal Aeronautical Society is in full harmony. Prior to the War much the same result was to be observed, for reasons which need not be entered upon at the present time. In the post-War period analogous troubles are liable to arise. The Royal Aeronautical Society urges upon the Air Minister that research is the fertiliser at the root of the tree of progress; without it the tree will not only fail to grow, it will die, and all that will then be available is the standing wood.

Suggested Scheme.—The constructive suggestion which this Society puts forward to give point and practicality to its proposal for the safeguarding of "research" in aeronautics, which is its main theme, is that a precedent found in the organisation of the Admiralty be followed in its general outline by the appointment of an individual of high scientific qualifications whose specific duty will be the safeguarding of "research," keeping it in touch with the scientific work of the country and with the problems of civil and military aircraft. Those characteristics of the office in question to which we wish to draw attention are as follows :—(1) That a grant of money be specifically allotted to research, as above defined. (2) That the individual holding this office shall have access to the Members of the Air Council. (3) That he have access to private advice, and have money specifically available to him for the purpose of paying for such advice. (4) That there be an advisory Committee external to the Air Ministry, consisting of scientific men. This Committee to have no executive powers and be solely advisory. (5) That this Committee should supervise and publish such matters relating to research as are deemed to be publishable in the public interest.

In addition to the above, the Council of the Royal Aeronautical Society trust that support will be continued to the movement for giving scientific training to selected officers of the Royal Air Force, so that highly experienced pilots shall be able to suggest and intelligently take part in research work—to which such assistance will be invaluable.

In conclusion the Royal Aeronautical Society points out that any retrenchments of administrative staff or expenditure in construction form strong reasons for safeguarding that least expensive and most fruitful form of activity—research.

ENGINE INSTALLATION

By Brigadier-General R. K. BAGNALL-WILD

APART from the question of the aero engine itself, that of its installation is, perhaps, one of the most vital to the sound and efficient development of commercial aviation. That the importance of the question is appreciated was evidenced by the good attendance to the extremely informative paper read by Brig.-Gen. Bagnall-Wild, Director of Research, before the Royal Aeronautical Society on January 19. The following *résumé* gives the main points raised by the D. of R., but we would recommend all who can possibly do so to obtain the copy of the Society's Journal, in which the paper will be published in full.

In his introductory remarks the lecturer pointed out that, compared with the development of aircraft structures and aero engines themselves, that of installation has shown little progress, and that today the installation of the engine in a machine presents a wide field for sound engineering design and improvement. He stated that statistics, taken over a considerable period, have shown that of the forced landings resulting from engine stoppage, *seven out of eight are due to some trivial breakdown in the installation.* This in itself is ample proof that there is room for improvement in engine installation and that the lecturer's first remarks are justified. The lecturer then proceeded to state, in a few general remarks, the obstacles which in the past have militated against sound installations.

In the early days, he said, the engines themselves were utterly unreliable, and there was then no incentive to provide sound installation systems. Throughout the greater part of the War it was usually found that the engines for certain types of machines were many months late in delivery, and that consequently it was often necessary to put in some other type of engine, intended probably for a totally different design of machine. A third factor was the universal lack of co-operation between the engine designer and the aeroplane designer. Each worked towards efficiency in his own design, while overlooking the fact that unless the one provided the optimum conditions for the other the efficiency of the aircraft as a whole must be reduced and the value of the work of both designers correspondingly depreciated.

As an instance of this lack of co-operation the General cited the case of air intakes for the carburettor. With one or two exceptions, he said, engines now actually in use are sent out without these parts, although the form of air intakes must necessarily have considerable effect on carburation and general efficiency. The aircraft designer puts on intakes to suit his design, often having the appearance of having been put on as an afterthought—as a necessary but unimportant evil. While this state of things may not be readily remedied in existing types of engines, the lecturer thought that there is no obvious reason why in future designs standard air intakes should not be provided by the engine-maker. The aeroplane designer would then naturally provide for that particular form of air intake, just as he now does for overall dimensions of the engine itself and its bearer feet.

The lecturer then stated that recently considerable improvement has been effected, owing chiefly to civil aviation bringing aircraft and engine designers in closer contact, and proceeded to consider what are the principal features required for the evolution of a sound installation. The desiderata he enumerated as follows :—

" (*a*) Reliability and simplicity of arrangement of petrol, water and oil systems to ensure maximum engine efficiency.

" (*b*) Every possible safeguard to be taken against fire risks.

" (*c*) A high factor of safety in the mounting of the engine itself, together with all accessories and attachments required for its working, not only as regards initial soundness, but also in the individual capacity of the component details for long service.

" (*d*) Ready accessibility of the complete engine and installation, particularly for those parts which require frequent inspection, such as carburettors, magnetos, petrol pumps, petrol and oil cocks, filters, controls, etc.

" (*e*) The arrangement of the installation to be such that an absolute minimum of disconnection and displacement is entailed in the removal of the engine. It should be possible to remove an engine for overhaul and to replace it with a serviceable unit in, say, not more than two hours. Indeed, I look forward to the attainment of something approaching the replacement of a locomotive as now effected on long-distance ' through ' train services, so that the aerial passengers or cargo can proceed almost without interruption over considerable distances.

" (*f*) Arrangements for engine starting to be of a simple and reliable character."

Having defined the objects to be sought for, the lecturer proceeded to consider each in detail, and by applying the results arrived at the fundamentals of installation. As regards petrol systems, he outlined the four distinct methods which have been applied so far. These were : gravity feed from main tanks, air-driven petrol pumps pumping direct or *via* a gravity tank from the main tanks to the engine, air pressure raised in the main tanks by air pumps, petrol being forced from the main tanks to the engine direct or *via* a gravity tank, and finally, vacuum apparatus to raise petrol from the main tank to a gravity tank and thence to the engine.

The advantages of the direct gravity feed from the main tanks are so considerable that we quote General Bagnall-Wild verbatim on this subject. "It will be agreed," he said, "that for reliability and simplicity gravity feed is the ideal, but so far the difficulties, from the aerodynamic point of view, in the situation respectively of the engine and fuel tanks to utilise gravity feed have been considered too great. I sometimes wonder if the simplicity and efficiency of gravity petrol feed have been sufficiently realised by aircraft designers, and whether a satisfactory design could not be evolved if the provision of gravity feed were made a condition of acceptance of the aircraft. Indeed, in view of the comparative unreliability and complexity of other systems, it may eventually be found necessary by civil companies to specify gravity petrol systems even at a slight expense of aerodynamical efficiency. A very deep *fuselage* with the engine placed low in the front and the petrol carried as far back as possible and at the side or the top of *fuselage* should readily lend itself to the system, since most carburettors will function at a minimum head of 18 in."

The General then outlined the drawbacks to the various systems of non-gravity fuel supplies. Air-pressure systems were abandoned for service aircraft owing to their extreme vulnerability. The earlier pump systems, with slow-running windmill-driven plunger pumps, necessitated the use of a gravity tank owing to the intermittent delivery. High-speed windmill-driven centrifugal pumps were next introduced. Regarding these the lecturer stated that, as their average speed is 3,500 r.p.m., mechanical failure is, unfortunately, still too frequent. To guard against this two pumps are usually fitted, which means adding enormously to the complexity and weight of the system, especially in multi-engined machines.

Turning his attention to the question of petrol pipe lines, the lecturer pointed out the well-known troubles which are likely to occur, such as the deterioration of rubber joints, and the liability to breakage of rigid attachments when the usual union nut and nipple form of joint is employed. He called attention to two methods of eliminating the trouble. One is the Blaisdell Petroflex tubing, which has already been described in FLIGHT, and the other is a new rigid metal joint which eliminates the use of a nipple and avoids a brazing operation. After the nuts and collars are placed on the pipe the latter is expanded by a special tool. It is necessary to anneal the pipe before expanding, and it is advisable to anneal again after the operation. It is also important that the two ends of the joint are set in correct alignment before tightening up. "So far," the lecturer said, "this type of joint has stood up very successfully during tests. One machine to which it was fitted throughout was badly crashed, but the joints remained intact and did not leak. Further tests are being conducted with promising results."

Regarding the difficulties of getting a satisfactory petrol cock, the lecturer stated that Messrs. Vickers have designed a cock with a phosphor-bronze body and plug of stainless steel, hardened and ground to a very fine surface, which in conjunction with the hardness of the plug reduces the abrasive effect when the cock is operated. A spiral spring-loaded packing gland prevents leaks and ensures smooth and easy operation. Numbers of these cocks, he stated, are in satisfactory use on service and civil machines today.

In dealing with the question of engine mounting, the lecturer stated that the engine bearers, and in fact the whole mounting, should preferably be made of metal (steel), which overcomes the difficulties arising from shrinkage and deterioration that takes place in wood, and has the further advantage of reducing fire danger. Regarding the special type of mounting designed for the Rolls-Royce " Condor " engine, the General said :—

"Messrs. Rolls-Royce have introduced into the 'Condor' engine an interesting development comprising a bush which serves as a sort of universal joint. This bush, which is first fitted to the engine bearer tubes, has a spherical portion over which the actual engine feet are bolted. A close working fit obtains between the bush and the engine foot, so that should the bearers for any reason be thrown out of alignment or distorted temporarily by landing shocks, etc., the undue stressing of the crankcase which would occur if the feet were rigidly fixed, is obviated. Another feature of the same system is that provision is made for any longitudinal expansion of the crankcase by leaving the two bushes for the rear engine feet free to slide along the bearer tube, while the two front bushes remain fixed to the bearers."

The lecturer expressed the opinion that there is an inexplicable lack of uniformity in the types of engine controls. Positive-acting rod types are the most satisfactory, especially when the details are well designed and made. Controls should all be marked clearly to indicate their purpose and direction of operation. Even then the different levers should be quite distinctive either by position or shape.

Oil systems are usually of a simple character, and the lecturer confined himself to calling attention to the importance of fixing the oil tank above the pump to guard against failure due to suction leaks.

The question of water-cooling systems is one of very great importance, and was dealt with at considerable length by the lecturer. After pointing out the difficulty of determining originally the size of radiator for any particular machine, owing to the many variables encountered, General Bagnall-Wild gave the following table, based upon numerous tests carried out. The atmospheric temperature is taken to be that of the average English summer conditions, *i.e.*, 23° C.:—

		A	B
Altitude in feet.	Temp. Fall. °C.	Atmos. Temp. (Assumed °C.).	Boiling Point. (Approx. °C.).
0	0	23	100
2,000	3	20	98
4,000	6·4	16·6	96
6,000	9·4	13·6	94
8,000	13	10	92
10,000	16·4	6.6	89·6

Cowling is, the General stated, a much more difficult matter. With an air speed of 60 m.p.h. and the engine fully exposed, between 44 and 55 per cent. of the water-jacket heat can be dissipated by the engine itself. For efficient cooling it has been found that the exposed engine would require a rate of water circulation per 100 h.p. of 11 gallons per minute, while the cowled engine would require 22 gallons per minute. As engine water pumps cannot, of course, be designed to meet both of these conditions, a minimum of 15 gallons per minute is now specified for service aircraft.

While dealing with the question of petrol systems and tank disposition, the lecturer mentioned how these may affect the problem of fire risk. There are, however, other safeguards against fire which were indicated at some length. This important subject has been dealt with by the Fire Preventions Committee, and a summary of the recommendations made by this committee, which were recently published and endorsed by the Air Ministry, was given by the lecturer. They are now made a condition in all new service aircraft.

One very important item in the running of commercial aircraft is the accessibility of its engine for inspection and adjustment. This subject was very ably handled by the lecturer, who called attention to a number of details which affect the accessibility of an engine and the ease with which it can be "got at." He also suggested that in multi-engined machines it would be advisable if the designer gave the matter of easy removal careful consideration. It might be possible, he said, so to arrange the design that, with suitable ground equipment, the engine could be drawn along its bearers on to the ground apparatus sufficiently far to enable it to be picked up by a lifting gear. We believe that, as a matter of fact, some such system is already adopted by Vickers for use with the "Vimys" at their Weybridge works.

In conclusion, Gen. Bagnall-Wild turned his attention to the question of engine starting and ignition systems. He dealt with the various forms of starting gear now in use, and concluded by saying:—

"It is my view that in future we must concentrate on the auxiliary engine starter, with which promising results are already in sight. Briefly, the system now in use consists of a small air-cooled two-cylinder unit, one cylinder serving only as a pump and connected by a distributor valve to each of the main engine cylinders in turn. The pressure developed is sufficient within a few seconds to start up the auxiliary engine and to turn the main engine, filling the cylinders at the same time with a suitable explosive mixture, the auxiliary engine pumping cylinder being fed from the small engine carburettor."

The Discussion

The Chairman, Col. O'Gorman, then called upon Mr. Handley Page to open the discussion. This Mr. Handley Page did by first thanking Gen. Bagnall-Wild for a very solid contribution to aeronautical science by his valuable paper. Regarding the question of co-operation between engine designers and aircraft designers, he pointed out that during the War this was a matter of some difficulty, not to say impossibility. To take one example, his own firm was developing the large twin-engined machine, while Rolls-Royces were developing their engine, with which the H.P. machine was to be fitted. Yet so secret was the work of each considered that they were absolutely forbidden to communicate with Rolls-Royces at all. Even now it was a matter of some difficulty to attain the necessary co-operation. Personally he considered the engine the bugbear of aircraft design. What he would like to see, in order to render possible direct-gravity petrol feed, was an engine running with its cylinders turned downwards instead of upwards, which would bring the carburettor low down and also have other advantages. He thought that the ideal for multi-engined machines would be air-cooled engines with gravity feed.

Capt. Wilkinson said that as Mr. Handley Page had stated that he considered the engine the bugbear of the aircraft designer, he (Capt. Wilkinson) would say that he considered the aeroplane the bugbear of the engine designer. He would suggest that a great deal might be done if aircraft designers would get together and agree upon a few simple standard mountings and attachments, and thought that it should be possible to standardise, say, three different mountings for each type of engine, so as to suit all types of machines.

Gen. Sir Sefton Brancker said that first of all he would like to congratulate the Air Ministry on their choice of a new D. of R. (Gen. Bagnall-Wild), and then stated that personally he was all for the air-cooled engine. It seemed to him stupid to carry gallons of water about which was always either freezing or boiling when you did not want it to, and which meant extra complication, when already there was all around you an excellent medium for cooling in the simplest possible manner. He called attention to the fact that of the engines used in the East during the War, the one which always seemed happy and never gave any trouble due to cooling problems was the old air-cooled R.A.F. 4A. With regard to the lecturer's suggestion that it should be possible to change the engine in a very short time and so avoid transferring the cargo or passengers to another machine during a long voyage, he thought this was a most excellent idea and quite an original one, as far as he was aware. He did not see why, if designers applied themselves to the problem, it should not be possible to change an engine for a fresh one in about 10 minutes. As regards commercial machines, he would plead for simplicity and strength, even at the expense of a certain amount of weight.

Wing-Comdr. Briggs also pleaded for close co-operation between engine and aircraft designers, and said that he had found that exhaust manifolds were a source of trouble.

Maj. Heckstall-Smith thought it would be very helpful to people who, like himself, did not have ready access to such statistics, if tables of accidents and their causes were made available.

Maj. Wimperis said he would like to pay a tribute to the work done by the late Maj. Norman in experimenting with fire prevention. This work had been of an extremely hazardous nature, and no one could realise the value of the work done, and the courage and determination necessary for carrying it out. He called attention to a statement in the lecturer's paper which mentioned the placing of the petrol tank as far aft as possible. This placing would, he thought, tend to prevent the necessary minimum head of 18 in. from being maintained during a steep climb. He also stated that it had been found that in certain cases, if the hand-starter magneto was near the compass, the latter was upset.

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Retailers and Commercial Aviation

It should be helpful that the Incorporated Association of Retail Distributors are interested in the Air Conference next month. At a meeting last week the Council appointed Mr. T. Ernest Jackson, secretary, to represent the Association at the Conference, who will report upon the position of civil aviation and the transport of merchandise by air, as he may view it after the two days' sitting at the Guildhall.

LONDON TERMINAL AERODROME

Monday, January 23

PREPARATIONS for renewed activity on the "airways"—to follow the bad weather of the purely winter season—are already in evidence. The Air Ministry, one may mention, are erecting four new canvas hangars to alleviate the aerodrome's own particular "housing problem." These are being put up on the edge of the 'drome just below the public enclosure; and they will thus obviate any need to "taxy" machines right round to the other side of Plough Lane, as is done at present. This will be a great advantage when 'planes require merely to be re-fuelled and looked over before being turned round and sent back to Paris. The want of some such facility was, in fact, felt as far back as the summer of 1920. In the case of big repairs, or when machines are to be "garaged" for a day or so, they will of course continue to be "taxied" round to the main sheds.

The Instone people are now enlarging their main offices, in addition to building the new parcels' office. There are reports of big summer developments in connection with this air-line. They intend, as has been reported, to run goods' machines, and these are being built specially for this one purpose of transporting urgent merchandise. Such a step is obviously in the right direction. Hitherto only "general-purpose" machines, their main equipment being for passengers, have been seen on the "airways."

I understand that Instones' are now engaging new pilots in view of their summer campaign. There looks already like being keen competition this year for the service of pilots who are familiar with the London-Paris air route.

The Instone air-line uniforms have now received an addition in the shape of gold braid on the sleeves of the tunic, and on the shoulders of the greatcoat. These are markings to indicate the duties of the wearers, and to distinguish commodore and pilots from the purely ground staff.

A New and Improved Marconi-'plane

THE Marconi Company's new "Avro" was taken over on behalf of that company by Mr. Shaw during the week. The Surrey Flying Services, who have erected the machine, and converted it, appear to have put some good work into the job, and, as it has been done on the aerodrome, Mr. Shaw has been able to watch progress and have small modifications incorporated to suit his own convenience.

Instead of being fitted with a trailing aerial, the machine has a fixed aerial strung round it from wings to tail; while, in addition, all the plugs and leads from the magneto are covered by copper shields so as to minimise that interference from the ignition system which sometimes has a marked effect on wireless telephones in aeroplanes.

The Surrey Flying Services have nearly completed a second Avro which is, I understand, being built for a private owner whose name, when it is divulged, will be well known.

Weather has again dislocated the "airway" service. The standard of flying from the point of getting through when conditions are bad has deteriorated to a marked extent, and pilots are the first to admit it. It is probable that this state of affairs is due to a large extent to a desire to husband machines when there are not loads for them; whereas in the earlier, demonstration phase the object was not so much to get full paying loads as to prove that an aeroplane service could be run in all but the very worst of weather.

Mr. MacIntosh, who was injured in the foot when his 0-400 crashed the other day in a fog near Le Bourget, was down at the aerodrome during the week. He manages to hobble about fairly well on crutches, and tells me that an "X"-ray examination showed no bones to be broken. The muscles and tendons of his leg were, however, badly wrenched, and it will be some time before he is able to fly again.

The peculiar feature of the accident in which Mr. MacIntosh was hurt was that, though the Handley Page stopped dead on landing, and lurched forward on its nose, the actual injury was caused by great lumps of frozen earth being forced up through the floor, the nose of the machine itself being practically uninjured.

An Interesting Rolls-Royce Rumour

THERE are reports on the aerodrome that Rolls-Royce have produced a very successful modification of the Eagle "8," and that it is to be known as the Eagle "9." In this modified engine the epicyclic gear has, it is said, been replaced by a simpler arrangement; and, if rumour is to be credited, tests have produced already some very satisfactory results.

There was news from Mr. Alan J. Cobham, the "air-taxi man," during the week. He is at present, it may be remembered, on a 10,000 miles' tour of Europe and Northern Africa, and it is now learned that he has flown with his passenger across the Atlas Mountains in Morocco. This is the first time a British "taxyplane" has made a tour of Morocco, and it is understood that the French authorities in that country have been much impressed by the capabilities of the D.H. 9C and its pilot.

Captain Leverton is back from a tour of continental air-stations, having visited Amsterdam, Rotterdam, Brussels, and Le Bourget. He maintains that Croydon is the best of the lot, and that we have little to learn from those on the other side of the Channel in the matter of organising an air station. The boot, in fact, seems to be on the other leg.

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THE COST OF RUNNING A FLYING BOAT SERVICE

IN the course of an address before the Metropolitan Section, Society of Automotive Engineers, New York, recently, C. F. Redden—President, Aeromarine Airways, Inc.—gave some interesting figures relating to the operating costs based on the actual operation of several converted Navy flying-boats equipped with both single and twin engines. These figures, which we give herewith, include everything but administrative overhead and advertising, and show the actual operating costs and the possible profits, operating to a capacity of four hours per day.

Cost of Operating an H.S.2 L. Six-Passenger Aeromarine Navy Flying Boat with Liberty Motor.

Forty-five weeks per year, four flying hours per day, five days per week. Valuation, $7,500; life of motor, 800 hours; life of boat, 3 years; insurance, 32 per cent.; interest, 7 per cent.; petrol consumption for Liberty motor, cruising speed, 27 galls. per hour (at 25 cents per gall.); oil consumption, cruising speed, 1½ gall. per hour (at 80 cents per gall.); pilot, $50 per week; mechanic, $35 per week. Cost per flying hour, including pilot, mechanic, fuel, maintenance, depreciation, insurance and interest, $29.98.

Income—	$	
Figuring five passengers per load at $10 per passenger	50·00	
Four flights of 10 minutes each ..	200·00	per hour
Four hours per day	800·00	,, day
Five days per week—20 flying hours	4,000·00	,, week
Total Income—		
Figuring five passengers per load ..	4,000·00	,, ,,
Total cost	599·72	

This allows liberally for administrative expense, advertising and dividends—$3,400·28.

Cost of Operating an F.5 L. 11-Passenger Aeromarine Navy Flying Cruiser with Twin Liberty Motors.

Forty-five weeks per year, four flying hours per day, five days per week. Valuation, $30,000; life of motors, 800 hours each; life of boat, 3 years; insurance, 32 per cent.; interest, 7 per cent.; petrol consumption for Liberty motor, cruising speed, 27 galls. per hour (at 25 cents per gall.); oil consumption, cruising speed, 1½ gall. per hour (at 80 cents per gall.); pilot, $75 per week; mechanic, $45; bowman, $30. Cost per flying hour, including pilot, mechanic and bowman, fuel, maintenance, depreciation, insurance and interest, $71·12.

Income (based on prevailing charges—either $40 per flying hour or $10 per 10-minute sightseeing flight)—

	$	
Figuring nine passengers per load at $10 per passenger for 10-minute flights	90·00	
Four flights of 10 minutes each ..	360·00	per hour
Four hours per day	1,440·00	,, day
Five days per week—20 flying hours	7,200·00	,, week
Figuring five passengers per load at $10 per passenger for 10-minute flight	50·00	
Four flights of 10 minutes each ..	200·00	per hour
Four hours per day	800·00	,, day
Five days per week—20 flying hours	4,000·00	,, week
Total Income—		
Figuring nine passengers per load ..	7,200·00	
Total cost	1,420·00	
Balance	$5,779-42	
Figuring five passengers per load ..	4,000·00	
Total cost	1,420·00	
Balance	$2,579·42	

These balances allow liberally for administrative expense, advertising and dividends.

THE ROYAL AIR FORCE

London Gazette, January 17, 1922

Air-Commodore O. Swann, C.B., C.B.E., is appt. Director of Personnel, Air Ministry; Jan. 5.

General Duties Branch

Flying Offr. G. M. Bryer, A.F.C., is granted a perm. commn. in rank stated, retaining his present seny.; Oct. 24, 1919. (*Gazette* Oct. 24, 1919, apptg. him to a short service commn. is cancelled.)

The following are granted short service commns. in ranks stated, with effect from, and with seny. of, the dates indicated:—

Flying Offrs. J. E. R. Hyson; Jan. 7. B. P. Jones; Jan. 4. L. de C. Sieveking, D.S.C.; Jan. 6.

Pilot Offr. on Probation.—L. A. L. Firmin; Jan. 2.

Sqdrn. Ldr. F. W. Scarff, M.B.E., is placed on retd. list, and is permitted to retain rank of Maj.; Dec. 31, 1921.

Nursing Service.

The following ladies are confirmed in their appts. as Staff Nurses, with effect from dates indicated:—Miss D. H. Rich; Jan. 27, 1921. Miss L. E. Taylor; June 15, 1921. Miss A. M. Cosgrove; June 25, 1921. Mrs. L. L. Mackenzie; July 1, 1921. The following Staff Nurses to be Sisters (Jan. 1):—M. E. Cunningham, M. F. Sears.

Memoranda.

Lieut. E. Maffey relinquishes his temp. commn. on ceasing to be empld., and is permitted to retain his rank; Jan. 1. Maj. K. L. Buist, R.A.R.O., late Highland L.I., is granted rank of Lieut.-Col. R.A.F., on retirement from Army. Lieut. (actg. Capt.) F. A. Roberts is transferred to unempld. list; Feb. 2, 1919. (*Gazettes* July 22, 1919, April 27, 1920, and May 8, 1920, are cancelled) (since relinquished).

London Gazette, January 20, 1922

General Duties Branch

Observer Offr. H. Smith, D.F.C., is removed from the R.A.F.; Jan. 21. Sqdn. Leader T. G. Hetherington, C.B.E., is restored to full pay from half-pay; Jan. 6.

Memoranda

Two cadets are granted hony. commns. as Sec. Lieuts., with effect from the dates of their demobilisation.

Sec. Lieut. J. Miller relinquishes his temp. commn. on ceasing to be employed, and is permitted to retain his rank; March 22, 1919.

* * *

Personals.

Married

Mr. James Kidd, late 10th Hussars and R.A.F., of Capilla, Queensland, was married on January 10, in the Cathedral, Sydney, N.S.W., to Miss Mary Martin, only daughter of Mr. and Mrs. W. P. Martin, of Colleton, Chulmleigh, Devon.

Group-Capt. C. L. N. Newall, C.M.G., C.B.E., A.M., R.A.F., was married on January 18, at St. George's, Prince's Row, to Mrs. M. M. D. Weddell. Flight-Lieut. R. Addenbrooke-Prout, O.B.E., M.C., Royal Air Firce, was best man.

To be Married

An engagement is announced between Lord Carbery, who is at present in British East Africa, and Miss Anderson, of The Lodge, Riverdale, Nairobi. Lord Carbery, who was born in 1892, succeeded to the title in 1898, and served in the R.N.A.S. during the War. Lord Carbery's seat is at Castle Freke, Clonakilty, Co. Cork, but he has lived a great deal in Paris.

A marriage has been arranged between Mr. R. L. Barbour, D.F.C., R.A.F., eldest son of Mr. and Mrs. R. L. Barbour, Cape Town, South Africa, and Edinburgh, and Anna, the only daughter of Lieut.-Col. J. D. MacKay, D.S.O., late of the Hampshire Regt. and Seaforth Highlanders, and Mrs. MacKay, of The Rowans, Ashvale, Surrey.

Killed

Flight-Lieut. Albert Groundes Peace, A.F.C., No. 8 Sqdn. R.A.F., husband of Dorothy Helen Peace, of Salisbury, was killed in a collision during formation flying on January 13 at Hinaidi, Mesopotamia.

Capt. F. T. Williams, M.C., R.A.F., died in the Connaught Military Hospital, Farnborough, on January 18 from injuries received on January 10 from a crash at Farnborough. At the time Capt. Williams was flying a small B.A.T. 'plane. When over some huts adjoining the Connaught Hospital the engine appeared to stop, and the 'plane fell almost perpendicularly, crashing with the pilot through the roof of a hut. Capt. Williams was one of the best-known sportsmen in the garrison, and played cricket for Aldershot Command and for the Army.

Item

It is with regret that we have to record the death, under somewhat tragic and pathetic circumstances, of an old Hendonian friend in Michael Geoffrey Smiles, who was killed on Wednesday, the 18th inst., by a fall from a window of his house at Edgware. Mr. Smiles, it appears, was suffering from a serious nervous breakdown, brought about by the failure of his business—which was, we believe, connected with a chocolate factory—and was, it seems, so greatly depressed in consequence that he jumped from his window in the absence of the nurse attending him.

Smiles was an exceptionally skilful and daring pilot, and during the War, as chief pilot to the London and Provincial Flying School, was responsible for turning out very many first-class pilots. As an instructor he was one of the best, for he had that rare gift of being able not only to impart his knowledge to his pupil to the best advantage, but of understanding the individuality of each pupil and winning his absolute confidence. In 1916 he put up a looping record—with the representative of Flight as passenger—of 22 consecutive loops, on the L. and P. tractor biplane. To his widow, the daughter of his former partner, W. T. Warren, we offer our sincerest sympathies in her bereavement.

* * *

The Airship Officers Club

The next Dinner of the A.O.C. will be held on Wednesday, February 8. This date has been selected to suit officers interested in the Air Conference. Rear-Admiral Murray Sueter, M.P., has consented to preside. It is hoped that as many officers as possible will be able to attend.

The airship situation is now most interesting, and it is hoped that the Imperial Airship Service will be started in the course of the present year, and that the Airship Officers Club will then be able to enroll new members both at home and abroad to fill the places of those who have dropped out.

The Annual General Meeting will take place before the dinner.

Further particulars as to time and place will be published in Flight and *Morning Post* on February 1. The cost of the dinner (exclusive of wine) and subscription will be £1. Extra tickets 12*s*. 6*d*.

Applications and communications should be addressed to Major G. F. Herron (Hon. Sec.), at the Junior Naval and Military Club, Piccadilly, W.

Ex-R.N.A.S. Officers in Canada

The third reunion of ex-R.N.A.S. officers in Canada was held at the Ritz-Carlton Hotel, Montreal, on December 10, and took the form of a banquet. Wind-Comdr. Leckie, D.S.O., D.S.C., D.F.C., Canadian Air Force, presided, the following officers being present:—

Wing-Comdrs. J. L. Gordon, Robert Leckie, Ronald Redpath.

Sqdn.-Ldrs. Basil Hobbs, C. MacLaurin, A. B. Shearer, W. C. Power, L. S. Breadner, J. A. Glenn.

Flight-Lieuts. Geo. R. Hodgson, Fred Fraser, W. R. Kenny, Hugh Peck, York Wilks, Gordon Harrower, Frank S. McGill, A. T. Whealy, Philip Fisher, E. C. Stoneman, "Gus" Edwards, Marcil Dubuc, "Curley" Boswell, Barkley Drummond, Bainbridge Hall, Mostyn Lewis, W. A. Curtis, R. Keirstead, Allan Wilson, A. Partridge, Ross Johnson, "Bunny" Emery, Norman Scott, J. G. P. Cleland.

These first gatherings have proved such a success that it has been decided that the re-union should be held annually at a definite time and place to be fixed hereafter (the next, probably in the autumn or early winter of 1922, somewhere in Eastern Canada, possibly Montreal), and Flight-Lieut. H. Edwards, who sends us particulars of this gathering, would be glad to receive the names and addresses of any ex-R.N.A.S. officers who would care to be present should they find themselves in Canada about that time.

Announcements will be sent in good time, and those interested should address Flight-Lieut. Edwards at The Air Board (H.Q. Canadian Air Force), Ottawa, Canada.

CORRESPONDENCE

[*The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.*]

THE "R.38" REPORT

[2051] The report of the Admiralty Committee of Enquiry on the history of the design of the "R.38" calls for comment in certain respects.

While it is true as stated by the Admiralty that all the experts who could have usefully served on any Special Committee called in to advise on the structural design of "R.38" were already serving in either the department of Airship Production, or in that of the Superintendent of Airships, it should be pointed out that the officers serving in the latter department were debarred by instructions laid down in Admiralty Memoranda from expressing opinion on any matters except those regarding the equipment, *i.e.* fittings, of the airship as they affected her fighting and flying efficiency.

They were not, in fact, in a position to express an opinion on her structural strength, as they had no access to any of the figures, or technical data, necessary for doing so. The fact that one of the officers who was in 1918 serving in the Superintendent of Airships Department expressed grave doubts as to "R.38's" strength up to embarking in her on her last flight, from mere observation of her behaviour in previous flights, shows that the formation of such a committee might have been of value. The statement that the ship contained no novel principles in design can hardly be considered quite correct, in view of the fact that a quadrilateral keel was substituted for the previously universal triangular one, that the "stirrup" wires were omitted in spite of the employment of 15 metre spaces between the frames, and that an entirely new method of transmitting the lift of the gas to the framework was embodied.

Furthermore, although it is true, as stated by the Admiralty, that the modifications made to her fins and rudders would not affect the strength of the hull, they did however have an indirect effect by increasing the forces on the hull when turning. In many quarters it has been stated that the disaster was partly due to the fact that "R.38" was designed to go to great heights (22,000 ft.). This is doubtful, considering the fact that the German "L.71," although of smaller volume than "R.38," was designed to go higher, and had actually done so.

"ENSIGN."

* * * *

A SHORT COURSE IN ELEMENTARY METEOROLOGY.*

AN extremely instructive, and we should imagine very useful, work by W. H. Pick, B.Sc., under the above title has just been issued by the Air Ministry (Meteorological Office). As pointed out in the preface by G. C. Simpson (Director, Meteorological Office), this book is remarkable in that it is the first elementary textbook on meteorology to be written by a British teacher of this subject. This no doubt explains the remarkable lucidity with which the author has treated his subject, for only one possessing that rare gift, the power of imparting his knowledge to others, could have presented the *alpha* and *omega* of such a technical matter as meteorology so efficiently within 118 pages.

With most of the "elementary" textbooks on meteorology we have seen, it must be admitted that before we were half-way through them we either started "skipping" or quitted altogether with the excuse that life is not long enough to tackle such an intricate subject. With this book, however, we were able to read from cover to cover, and, what is more, understand what we read, and obtained an appreciable amount of knowledge of this most fascinating science.

The book is divided into three parts: Part I, General Meteorology, dealing with winds, trade winds, monsoons, etc., temperature, water-vapour in the atmosphere, fog and mist (a very interesting chapter), clouds and weather. Part II, Synoptic Meteorology: dealing with pressure and its measurement, the making of synoptic charts and some lessons derived from them, types of pressure distribution, special phenomena, forecasting and weather-lore. Part III, The Upper Air: the variation of wind with altitude, the troposphere and stratosphere, pressure, density and humidity in the upper air, etc. etc.

* **Published by H.M. Stationery Office, Imperial House, Kingsway, London. Price 1/6 net.**

The London Aero-Models Association

THE report of the annual general meeting will be published next week. A valuable Cup has been presented by Mr. F. Kelly to the Association, to be competed for by compressed air driven machines. Mr. F. J. Camm is giving a lecture on January 26 at 7.30 p.m., taking for his subject "Model Aeronautical Research."

February 2, General Purposes Committee Meeting will be held. Meetings held every Thursday at 7.30 p.m. at 20, Great Windmill Street, Piccadilly, W. 1. Hon. Sec., Mr. A. E. Jones, 48, Narcissus Road, West Hampstead, London, N.W. 6.

* * * *

PUBLICATIONS RECEIVED

Willing's Press Guide, 1922. James Willing, Ltd., 30, King Street, Covent Garden, London, W.C. 2. Price 2*s.* 6*d.* net.

"*Germ Process*" *Motoils.* Henry Wells Oil Co., 11, Haymarket, S.W. 1.

Scientific Papers of the U.S. Bureau of Standards. No. 423 *Operation of the Modulator Tube in Radio Telephone Sets.* By E. S. Purington. Washington. U.S. Government Printing Office. Price, 10 cents.

First Aid X-Ray of the Arteries. By H. C. Orrin. London: Baillière, Tindall and Cox, 8, Henrietta Street, W.C. 2. Price 2*s.* 6*d.* net.

Technical Note No. 79. *Effect of Aerofoil Aspect Ratio on the Slope of the Lift Curve.* By Walter S. Diehl. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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1,193. S. ROTHMÜLLER. Radiators for aircraft engines. (157,283.)

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(Continued from p. xii.)

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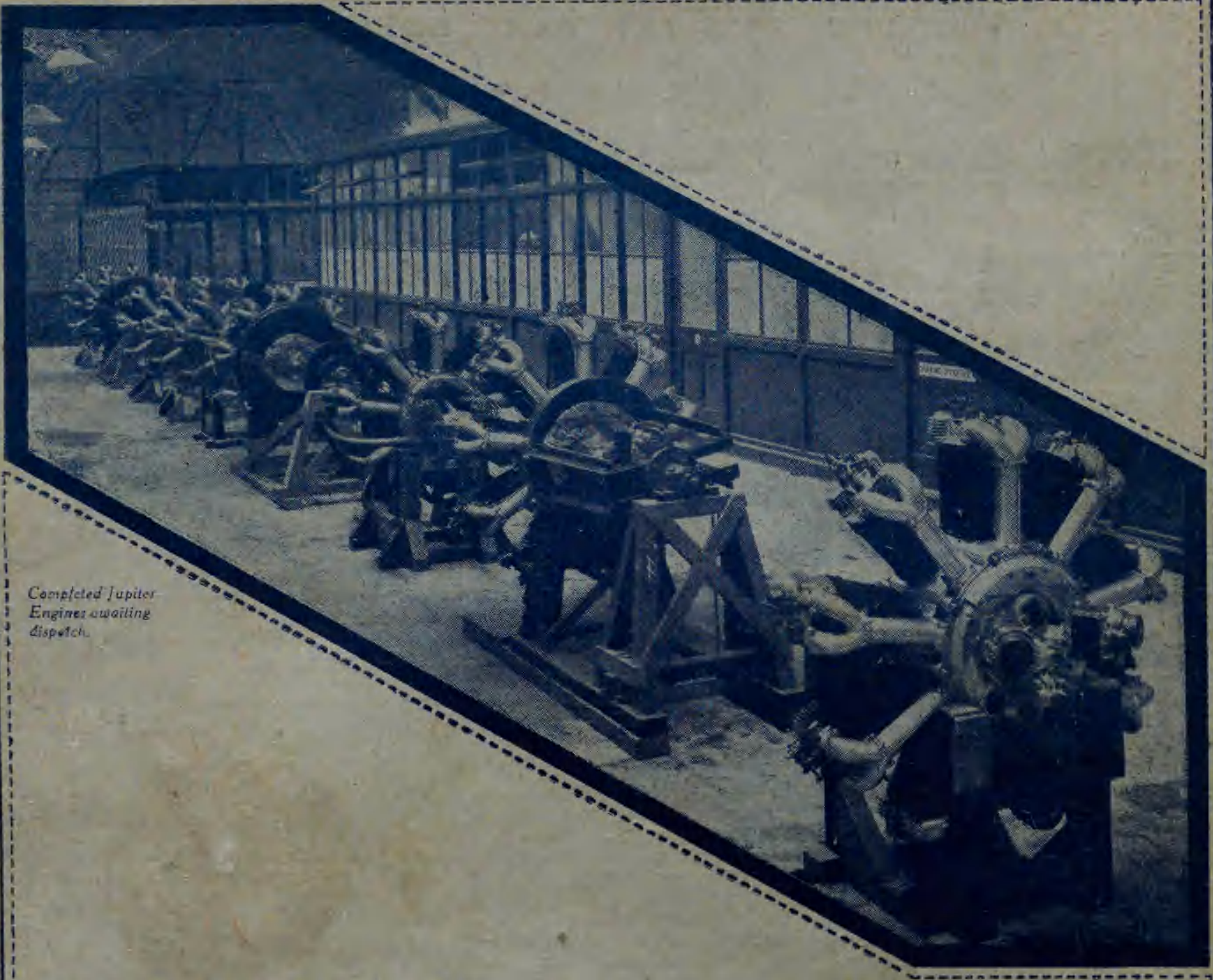

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

1922.	
Feb. 7 & 8	Second Air Conference at Guildhall
Feb. 16	Lecture, "Methods of Instruction in Aeroplane Flying," by Sq.-Leader Portal, before R.Ae.S.
Feb. 23	Lecture, "Some possible Improvements in Aero Engine Installation," by G. R. Irvine, before Students' Section R.Ae.S.
Mar. 2	Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.
Mar. 16	Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.
Mar. 26–April 2	Nice Meeting
Mar. 30	Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.
April 17	R.Ae.C. Race Meeting, at Waddon
June 5	R.Ae.C. Race Meeting, at Waddon
July 6–20	French Gliding Competition
Aug. 6	Gordon-Bennett Balloon Race, Geneva
Aug. 7	R.Ae.C. Race Meeting, at Waddon
Aug. (last fortnight)	Schneider Cup Seaplane Race, at Naples
Sept.	Tyrrhenian Cup, Italy
Sept.	Italian Grand Prix
Sept. or Oct.	R.Ae.C. Race Meeting, at Waddon

EDITORIAL COMMENT

Diesel Engines for Aircraft

IN our notes on the engines at the Paris Aero Show will be found a description of a new type of engine, new at least as far as aircraft is concerned, operating on the Diesel principle. In view of the attention given nowadays to the possibilities of using engines of this type for aircraft, more than ordinary interest attaches to this engine—the Garuffa-Gargiulo, even if, as the writer points out, the design is still to be considered an experimental one. The figures given of weight/horse power ratio are so low (about 1¾ lbs. per horse power) that one inclines to be doubtful as to the margin of strength for an engine using such high compression. However, even if it be found necessary to add another pound per horse power to the weight in order to make the engine reliable, the type should not be too heavy for use on aeroplanes, especially in view of the very good fuel economy which is usually associated with engines operating on the Diesel principle. Experiments are also being made in this country on the type, while in Germany, the land of origin of the Diesel cycle, designs have been got out and, we believe, experimental engines built by Professor Junkers. There can, therefore, be no doubt that the question is being very seriously considered, and it will be interesting to see which country will be the first to get an engine of this type into the air. Needless to say, the requirements are very different from those obtaining in ground installations, and the chief problem so far has been that of weight. In the Garuffa engine, as we have already said, the weight is, if anything, lighter than that of the petrol engine, but this is an ideal which may not be attained in practice for a considerable time. Nevertheless, the type has undoubtedly possibilities, and success may very well be considerably nearer at hand than most people imagine.

It might be asked, what are the advantages expected from this type of engine. In the first place, the type need have no valves, in the ordinary sense of the word, and no electric ignition, relying on the compression temperature for the ignition of the fuel, which is not injected until the piston has almost reached the top of its stroke. The fuel used is heavier and less inflammable than petrol, which should add to the security from danger of fire. Also the heavy oil used is considerably cheaper than petrol. The fuel consumption per horse power developed is low, so that for flights of long duration the engine can be somewhat heavier than the petrol engine and still leave as great a margin for useful load. Another advantage is that, as the air is forced to the cylinders under pressure, the blowers can be so arranged as to have, as in the Garuffa, a two-speed gear, which allows of developing maximum power for getting off the ground, and for flying at great altitudes.

Against these advantages must be placed several drawbacks. For instance, there is the question of weight. This, however, it appears is not so serious as generally thought, and may possibly be overcome to a great extent. Then there is the problem of fuel pumps. We have heard from the Director of Research recently that petrol pumps as used for transferring petrol from one tank to another are still liable to give trouble, and possibly the fuel feed pumps of a Diesel type of engine would be subject to the same difficulties. Finally, in addition to the question of adequate cooling, the needle valves which admit the fuel, under a pressure which must necessarily be greater than the compression pressure in the cylinder, may prove a source of trouble as regards the proper amount of fuel admitted to each cylinder. If the fuel is unevenly admitted, the smoothness of running will be affected. However, the difficulties do not appear insuperable, and it is gratifying to know that the problems are being attacked vigorously.

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The Really Large Machine of the Future

If we look back through the history of the development of the ship, we find that the general tendency, for craft intended for long-distance work at any rate, has been towards a constant increase in size. There came a time when it was thought that the limit had been reached, but this does not appear to be the case, and the development goes on, although more slowly. It may be admitted that, so far as can now be seen, there is little more to be gained in speed by surface craft, and it will be to aircraft that future generations will look for high speed of travel. It may not, therefore, be without interest to attempt to form a picture of the manner in which aircraft, and especially heavier-than-air craft, may be expected to develop. Here, as in the case of the ship, it is fairly certain that for long-distance work the tendency will be towards greatly increased size.

If we imagine a machine of about 50 tons total weight (and such a design has already been got out in Germany by Professor Junkers), with a thick, high-lift wing section, and assume a wing loading of 10 lbs/sq. ft., we arrive at a wing area of about 11,000 sq. ft. This high-lift wing will have a maximum thickness of about 18 per cent. of the chord. If, now, we assume a maximum chord of about 40 ft. in the centre, we arrive at a wing depth of about 7 ft. This means that there will be sufficient depth to place the engines, passenger cabins, tanks, etc., inside the wings, and it would therefore appear that it might be possible to suppress the *fuselage* altogether, or at any rate to reduce it to a couple of enclosed girders carrying the tail. If we imagine a folding undercarriage which disappears into the wings during flight, we arrive at the conclusion that the L/D of the whole machine might be as high as 15 or so. As that of the average machine of today is only about 7 or 8, the gain in efficiency would be very great indeed, reducing the power required by between one-half and one-third. The effect of this on the cost of air transport would be considerable, and the whole subject of the "giant" is one of extreme fascination. Its day is not yet, but it is coming.

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A Matter for the S.B.A.C.

It might have been thought that, with the relatively few machines now being built, there would be no difficulty about procuring timber of the very highest quality. Yet this does not, from what we gather, appear to be the case. Wherever we go we are met with a general complaint regarding the practical impossibility of procuring good silver spruce. Even with the most careful selection of the planks there is a tremendous waste—on an average 50 or 60 per cent., and sometimes more. This means that not only is there the difficulty of making spars which are up to the standard required, but the expense is quite disproportionate. One is at a loss to account for this state of affairs. The slopes of the Pacific coast are surely not stripped of all the good silver spruce trees? That seems impossible. The explanation, it is alleged, is that the timber merchants have large stocks of timber still left over from the War, and this not of a very good quality, and refuse to import any more until present stocks are used up.

If this explanation is the right one, it points to a serious state of affairs, and it appears to us to be eminently a matter for the Society of British Aircraft Constructors to take up. If the timber merchants really do take this attitude, there would appear to be nothing for it but for the S.B.A.C. to charter their own vessels and to import the timber direct.

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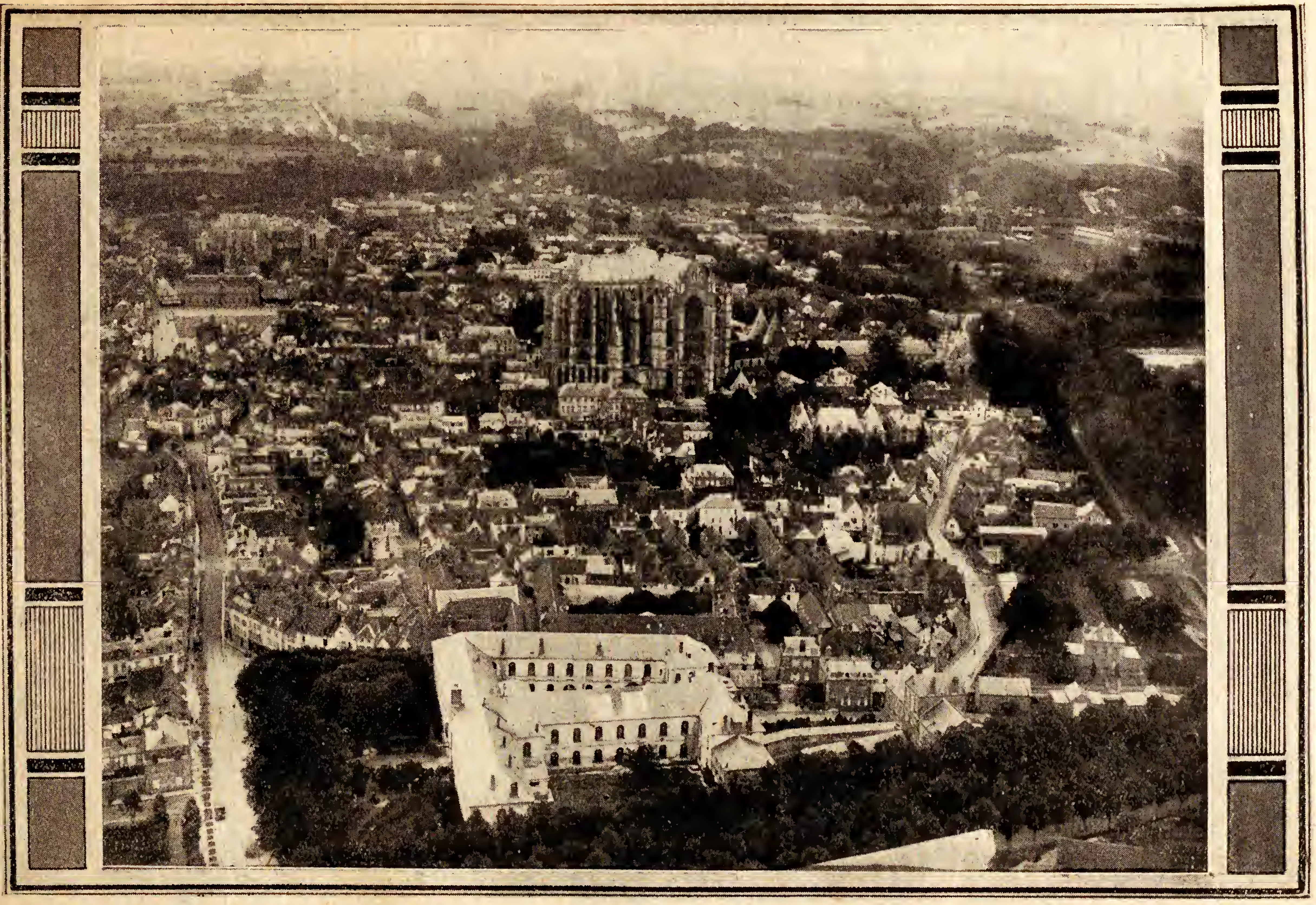
Kingsnorth for Sale

Following the Government decision to "scrap the lot," the various airship stations are gradually being entirely evacuated, or the personnel reduced to care and maintenance parties. Among the latest airship stations, although described by the Disposal Board as a Kite Balloon Station, to be advertised for sale, is Kingsnorth, near Chatham. This station comprises about 600 acres, and already has a number of buildings and one large airship shed. In view of its location, and with the existing facilities of railway connection to Sharnall Street Station on the S.E. & C.R. and its jetty on the Medway, it would appear that Kingsnorth is admirably suited as a terminus for airship services when and if such are started. It therefore appears a somewhat doubtful policy on the part of the Government to offer this site for sale just now, as it could quickly and with but small outlay be got ready for serving as the London "port" for airship services. The erection of a mooring mast and a few other additions to the existing equipment would be all that was required, the ships, of course, going to a suitable base, such as Pulham, for repairs and overhaul, much as a steamer now goes into dry dock. Kingsnorth would appear to be much more suited for the purpose than is, for instance, Croydon aerodrome, and we would urge upon those in authority to consider the advisability of retaining Kingsnorth for a time at any rate, so that if, as does not seem improbable, airships are to be given a chance, the station is available as a small beginning during the experimental stages. Later, if it be found that the services grow to such an extent as to require other arrangements, the authorities would be no worse off through having retained the station.



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LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE:

No. 25.—Beauvais. A close-up view of the Cathedral as seen from the side.

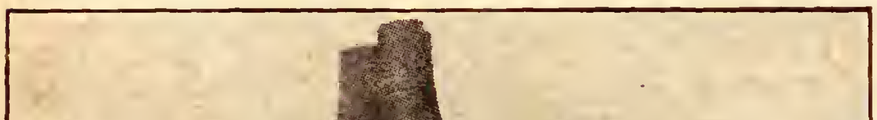
ENGINES AT THE PARIS AERO SHOW

Some Novel Features, but Few New Designs

If there was little to be seen at the Paris Aero Show in the matter of new types of machines, there was still less as regards new types of engines. This is, perhaps, not to be wondered at, as it costs infinitely more and takes very much longer to develop a new type of engine than it does to produce and perfect a new aeroplane. One had, however, hoped that more progress would have been made than was the case, and possibly the million francs prize may be instrumental in arousing engine designers to greater effort. Not but what the engine section was a very representative one, and vastly greater than we could have mustered in this country. But the majority of the engines were of types that are already well known and have, for the most part, been in service for years. A few notable exceptions there were, and one or two designers had attempted to break away from usual practice and to strike out along entirely new lines. Generally, however, one found the usual collection of rotaries, radials, verticals, Vees, "Broad Arrows" and X's, with here and there a new feature for the engine in question, although not new in itself.

Anzani was showing the usual series of air-cooled engines, but one missed the radial water-cooled 20-cyl. engine exhibited at the 1919 Show. Whether or not this engine has proved a success we cannot say, but so far as we are aware the engine has not been used on actual machines. As regards the air-cooled Anzanis, these included all the well-known types and appeared to have undergone no changes, with the exception that the lower-powered types, which formerly had automatic inlet valves, are now provided with mechanically-operated inlets as well as exhausts. This should have a considerable effect on the power output, as well as on the possibility of running them throttled down. It may be recalled that the Austin "Whippet" was fitted with a 40 h.p. Anzani on which the Austin firm had incorporated the mechanically-operated inlet valves. It was, we believe, found that this resulted in considerable improvement in the running of the engine.

In addition to the various aeroplanes exhibited, Louis Breguet exhibited the usual Breguet-Bugatti "Bi-Moteurs," which are, as regards the 450 CV, two vertical in-line engines placed side by side. The 900 CV consists of two of these groups placed end to end, driving a common propeller shaft *via* a series of automatic clutches. With the exception of being fitted in Show aeroplanes, we are not aware that the Breguet-Bugatti engines have been used to any extent on actual aeroplanes. It is somewhat curious that two of the French constructors who also make engines have up till now always fitted engines manufactured by another firm. Possibly in the future we may see Farman aeroplanes with Farman engines and Breguet machines with Breguet-Bugatti engines. It would inspire more confidence in the engines in question, unless, like Mr. Ford, it is a question of the demand being so great that the proprietary article is not available, and so they have to use "the next best thing."



The Breguet-Bugatti CV.450 consists virtually of two vertical engines placed side by side and driving a common propeller.

Among discerning visitors to the Show the Bristol "Jupiter" caused a very good impression owing to its excellent power-weight ratio, and because of its recent successful passing of the Air Ministry type test. To the ordinary public, however, the engine probably looked much like any other radial, and unless one knows what the A.M. type test means, the fact of passing it cannot be properly appreciated. The "Jupiter" has already been described in our columns, and we do not therefore propose to describe it in detail here. It is of interest to mention, however, that the engine is in all probability being fitted to several types of commercial aeroplanes during the coming spring, so that it should soon have an opportunity of proving itself under actual working conditions. The standard swivelling mount with which the "Jupiter" is provided should be a great point in its favour, apart from the excellence of the engine itself, as it enables the engineers to get at the back of the engine very easily for inspection and adjustment of magnetos, etc. Even with the additional weight of the new Bristol gas starter, the "Jupiter" is so light per horse-power that, counting the weight of the starter in with that of the engine as a complete unit, it compares favourably with other engines. The absence of a radiator, with piping and joints, should be another point in its favour for commercial work.

The Darracq firm exhibited a very complete set of Darracq-Coatalen engines, ranging in power from a little over 100 h.p. to the 800 h.p. of the "Sikh." As, however, these engines are identical with Sunbeam-Coatalens, they are already well known to FLIGHT readers, and it becomes unnecessary to do more than record their presence at the Show.

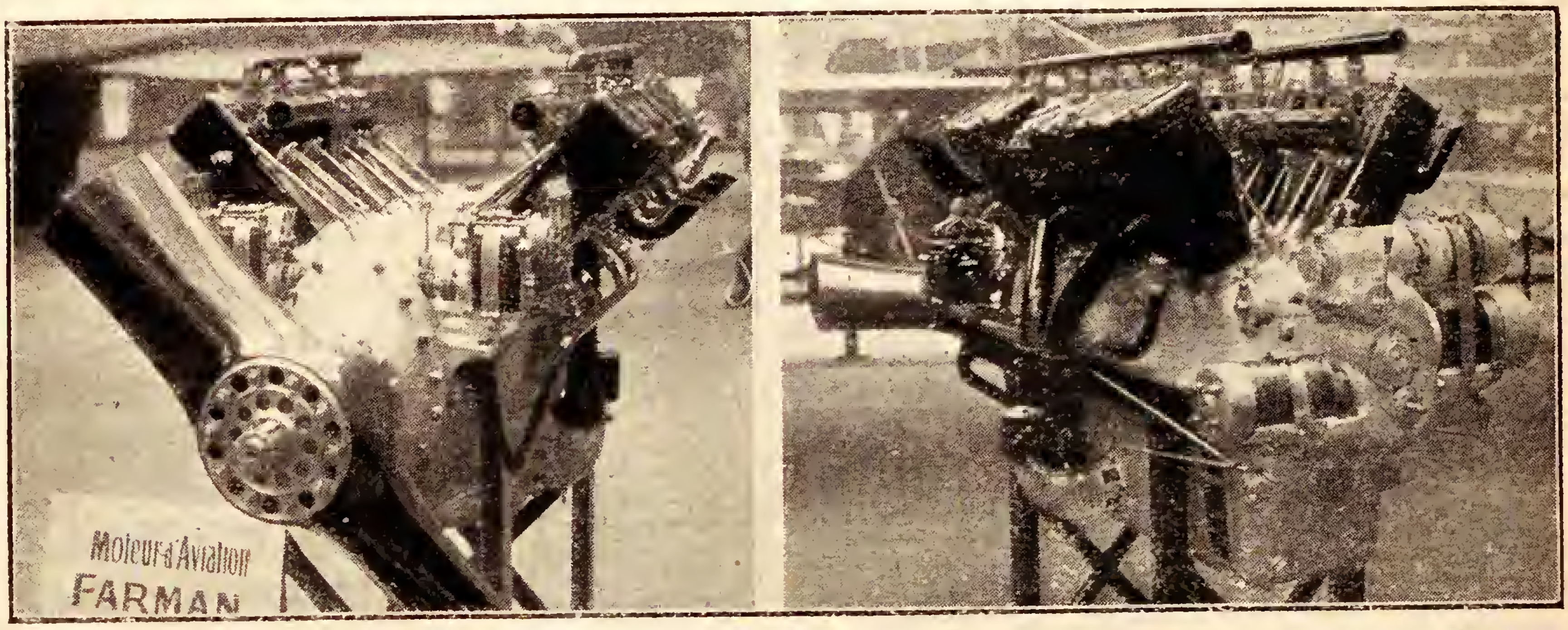
Although merely a side show on the huge Farman stand, and quite obscured in the shadows under the wings of the large four-engined "B.N.4," one might find, if one looked carefully, two examples of Farman engines. It may be remembered that at the 1919 Show Farman exhibited, for the first time, engines of his own make. That he has not, up to the present, installed them in his machines may be explained by the fact that it necessarily takes very much longer to develop an engine than it does to perfect a new aeroplane type. It was stated on a large placard on the stand, however, that one of the Farman engines was at the time undergoing its tests at the *Section Technique*, and presumably the engines are therefore now at a stage of development where one may expect them to be practical propositions.

The three types of engines listed by the Farman firm are very similar in general lay-out, although differing in number and arrangement of cylinders. They are rated as follows: 160-200 h.p., 380-400 h.p., 550-600 h.p. The smallest is a Vee type with eight cylinders. The medium-power engine is a twelve-cylindered Vee, and the high-power one has 18 cylinders arranged in a "broad arrow" or W formation. Apart from these differences, and minor ones of bore and stroke, the three are of similar general detail design. The bores and strokes are 110 by 160, 120 by 160 and 120 by 180 respectively.

The cylinders, which are of steel, are arranged in pairs, each pair being enclosed in sheet-steel water jackets welded on. The crankshaft is carried in large bearings in the aluminium crank-case, and the connecting rods, of special steel, carry aluminium pistons fitted with four piston rings. The valves are placed in the head of the cylinders, and are actuated by push rods and rockers from the camshaft, which is placed in the angle between the cylinders. The valve rockers, valve stem and top of push rods are covered in by flat square aluminium covers, which help to give the engine its neat appearance.

The crankshaft carries on its forward end a plate to which can be bolted the propeller shaft for direct drive, or, if a reduction gear is required, this is also quickly attached to the plate. It is stated that the change from direct drive to reduction gear can be very quickly effected.

The carburettors are mounted on the outside, and provision has been made for heating by the air having passed across the oil in the sump and by circulating hot water around the induction pipes. An altitude adjustment is provided.

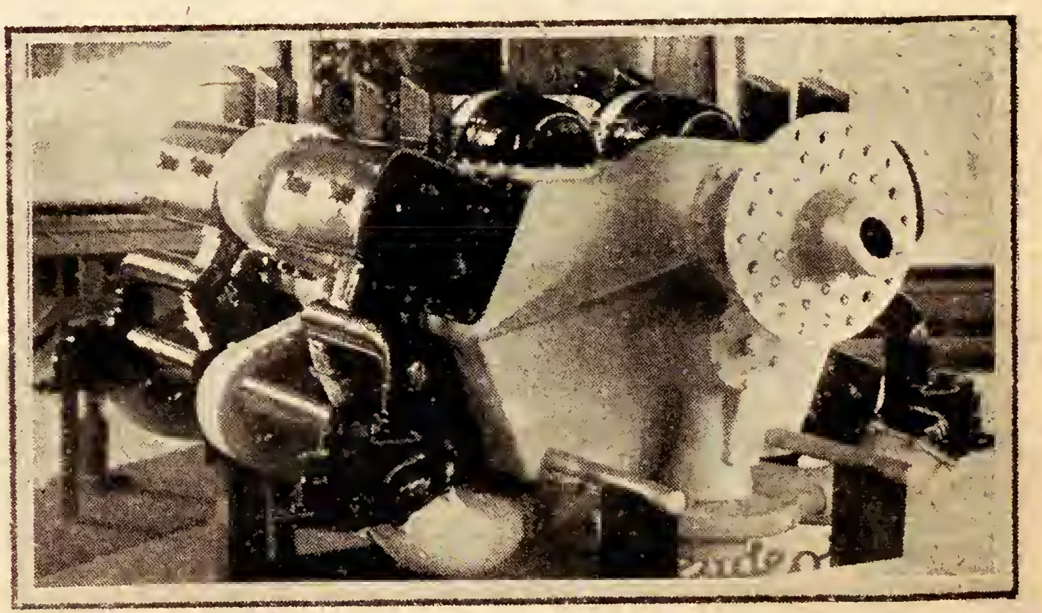


TWO OF THE FARMAN ENGINES : On the left the 200 h.p. type, and on the right the 400 h.p. engine.

Dual ignition is provided. This does not, as usual, consist of two magnetos and two plugs per cylinder, but of one magneto and one distributor for accumulator ignition. A short transverse shaft on the front end of the engine, driven from the camshaft, engages at one end with the magneto drive and at the other with the distributor. The two systems are therefore entirely independent, although synchronised by the common shaft.

As already mentioned, all three types are water cooled, and circulation of the water is effected by a centrifugal pump, which has an arrangement for varying the amount of water that is passed through the radiator. Pipe unions are provided for the attachment of pipes for heating the cabin should it be desired to do so.

The electrical equipment is very complete, and includes a dynamo mounted on the rear end of the engine. This dynamo can be used for charging the accumulators and for starting the engine. The accumulators are of sufficient capacity to furnish the current necessary for starting the engine, for lighting up the machine, for ignition, and for wireless. For use when no accumulators are carried there is the "cartridge" starter, originated and, we believe, patented by Farmans. By the use of this it is said to be very easy to start the engine, and a starting handle is provided for hand starting, so that the starting problem appears to have received due consideration by the designer.



The Peugeot 1922 model will be of the "flat X" type, and of 450 h.p. The photograph shows the dummy engine exhibited.

We might add that provision has been made for the attachment of a turbo-compressor for use at great altitudes.

On the Gnôme and Rhône Stand there was the usual array of types. That is to say, the whole series of Rhônes was exhibited, although there was not, so far as we could see, a single Gnôme. Perhaps the Rhône which attracted greatest attention was the little 9-cyl. 60 h.p. engine. This engine was also shown in 1919, but we understand that the first of the type did not give very satisfactory results, and that the present engine, although to outward appearances similar to that of 1919, has been very greatly improved. It is certainly a very neat-looking engine, and with nine cylinders for this low power should run, as someone put it, "like a sewing machine." This fact, combined with light weight, might overcome the prejudice against rotary engines and make this type suitable for use in small single-seater and two-seater machines. The delicacy of the engine and the necessity of having all parts most carefully balanced would, however, be against it for use by any but fairly experienced engineers.

As usual, Hispano-Suiza engines were greatly in evidence, but as all the types are already well known to readers of this journal, and there was not, as far as we could discover, any new type shown, we do not propose to do more than mention their presence. The 300 h.p. is, perhaps, the most popular type, and has to its credit all the fast flights of the last few years, made on French machines.

Lorraine-Dietrich et Cie. exhibited their usual types, ranging from the 12-cyl. 400 h.p. W or "broad arrow" type to the 1,000 h.p. 24-cyl. engine of the same type.

Of the engines exhibited by Panhard-Levassor, perhaps the most interesting was the type V 12 M, which is *surcomprimé et sous-alimenté*—in other words, a high-compression engine in which automatic regulators prevent a full charge being drawn in until a certain altitude is reached. No details of the automatic regulators are available, but it is stated that provision is made for enabling the pilot to throw them out of action in emergency. The engine is of the Vee type, with 12 steel cylinders having water jackets of sheet steel welded on. The overhead camshafts are neatly enclosed with their rockers in aluminium casings. There are four valves per cylinder, two inlets on the outside and two exhausts on the inside. The bore and stroke are 165 and 170 respectively, and the engine is rated at 500 h.p. No data are available relating to compression ratio, number of revolutions, etc., but probably the rated power is approximately attained at the altitude at which full power is developed.

In addition to their well-known type L 41 600 h.p. 12-cyl. Vee type, the Peugeot firm exhibited the 500 h.p. type 16 X, which is now no longer, we understand, to be manufactured, and a wooden dummy of its successor, the type 16 MX, which is, as will be seen from the accompanying photograph, of very unusual design. Although the dummy was extraordinarily well made, and gave an excellent idea of the general appearance of the type, it did not, of course, convey a great deal of information relating to the internal economy. As the photograph will show, the type 16 MX has its four rows of cylinders arranged in the shape of an X lying on its side. That is to say, there is an angle of 45° between the cylinder blocks of top and bottom rows, while the upper and lower angles are 135° each.

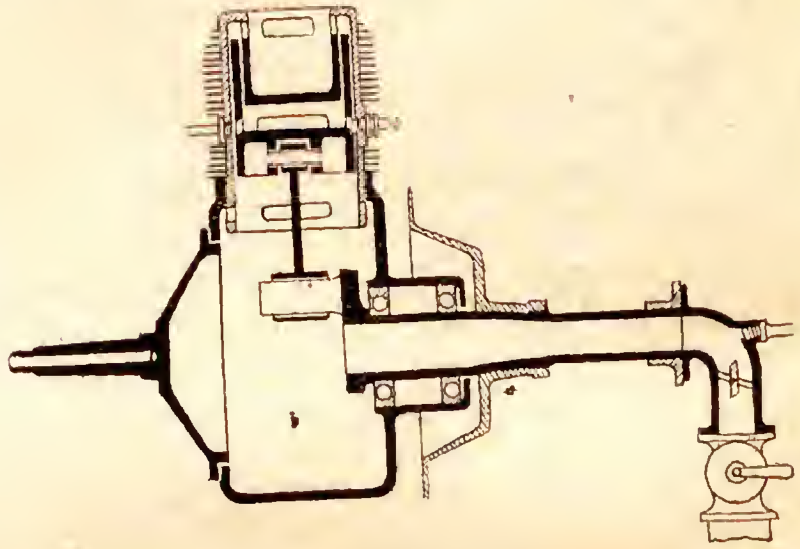
It is understood that the engine will be rated at 450 h.p. (120 by 130 bore and stroke), and will be of the high-compression type. Also that a reduction gear will enable the airscrew to be run at 1,000 to 1,200 r.p.m. But beyond these facts no information as regards details is available.

The Renault engines are already well known to our readers, and it will suffice to mention that the types on which this firm is now concentrating are the 300 h.p., the 450 h.p. and the 550 h.p. A 400 h.p. geared-down engine was also shown. The weights and powers of the three types are as follows: 320 h.p. at 1,600 r.p.m. 380 kgs., 460 h.p. at 1,600 r.p.m. 430 kgs., 575 h.p. at 1,600 r.p.m. 650 kgs. The consumption per h.p. is the same in the three types, *i.e.*, 260 grammes of petrol and 25 grammes of oil per h.p./hour.

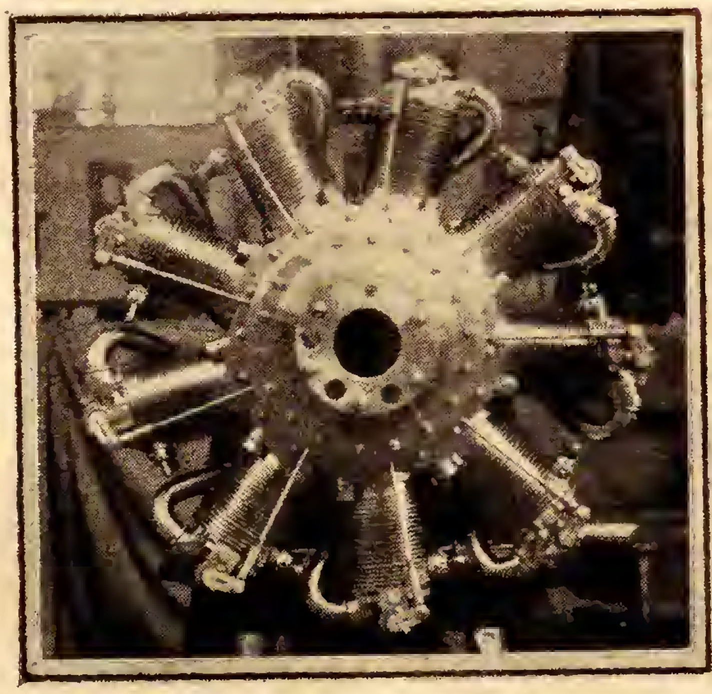
Among the sturdiest and most successful French engines for civil aviation are the Salmson, System Canton Unne, radials, of which several types are produced, some being air-cooled and some water-cooled. The best known is, perhaps, the type 9—300 h.p. which has been used extensively in the Farman "Goliaths" and Spad-Herbemonts on the London-Paris air route. The types are all well known, and it is unnecessary to refer to them in detail.

The Novelties

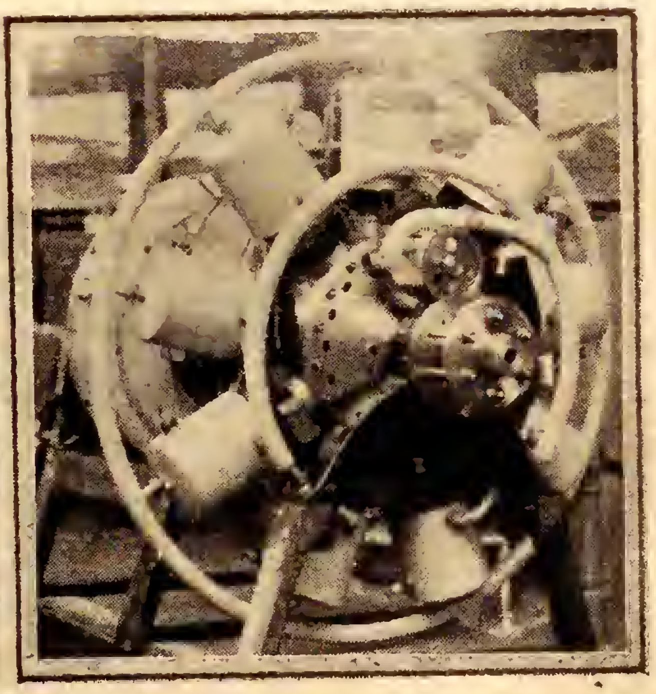
ALTHOUGH among the old-established engine firms one failed to discover any radically new types, the same could not be said regarding two firms whose names are unknown in the industry. One of these was Moreux et Cie., whose ordinary business one gathered to be furniture making. On their stand, however, was a small two-stroke rotary, about which nobody appeared to know anything. The attendant on the stand seemed to know less about the engine than many of the visitors after a brief inspection, and as for taking photographs, our photographer was nearly lynched when he was discovered pointing his camera towards the stand. An external examination of the engine indicated that it was a two-stroke, with the cylinder head dished-in or cupped, and having exhaust ports in this cupped head. The inference, therefore, was that the engine had some form of sleeve valve inside, but actual details could not be discovered. Now, however, by the courtesy of our contemporary, *L'Air*, we are able to publish a diagrammatic representation of the principles upon which the engine works (or is expected to work).



Diagrammatic representation of the Petit two-stroke rotary engine.



THE 9-CYL. 60 H.P. LE RHONE, TYPE "Z9."



THE 9-CYL. TWO-STROKE, HEAVY-OIL GARUFFA ENGINE

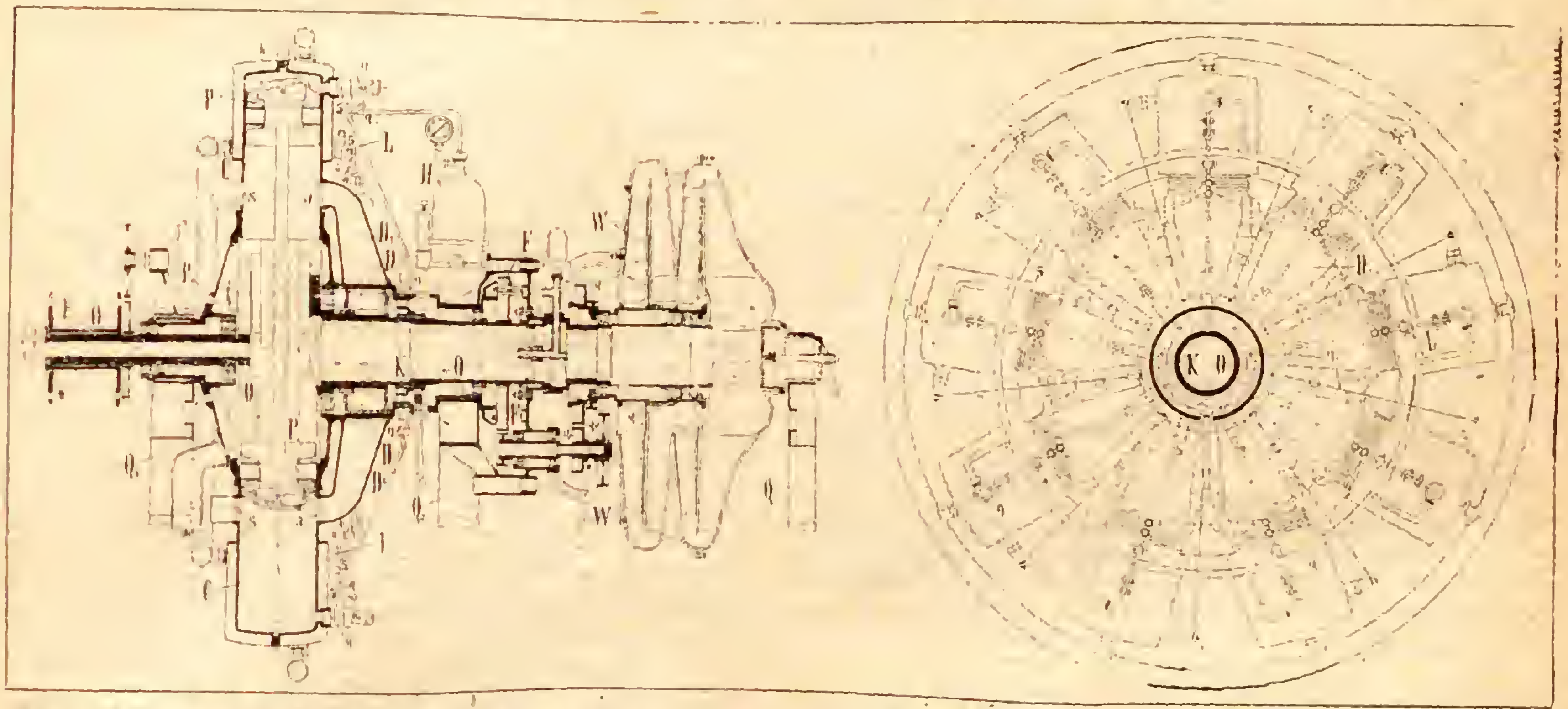
This two-stroke rotary engine is, one gathers, designed by Monsieur Paul Petit, and the objects which he has attempted to attain are suppression of valves and valve mechanism, and light weight. From the diagram it will be seen that the sleeve valve is in reality formed by the skirt of the piston, which is turned around the opposite way to normal practice, *i.e.*, it has its skirt pointing outwards towards the cylinder head instead of inwards. The action of the engine is very simple. As shown in the diagram, the charge is ready to be fired by the plug which is opposite one of the openings in the skirt of the piston. The engine rotates and the piston descends until the top of its skirt clears the edge of the cupped cylinder head. The burnt gases then rush up through the annular space and out through the openings near the top of the cylinder, centrifugal force assisting them to escape. When the piston is near the inner end of its stroke, the openings just above the crown coincide with similar openings near the lower end of the cylinder and a fresh charge may be flung into the combustion chamber. We say may, as there will be a small tendency to do so on account of centrifugal force and also to fill the partial vacuum which the exhaust gases may have created in rushing out. The designer, however, does not apparently rely on centrifugal force alone, as it is stated that a turbine or blower may be employed for maintaining a certain pressure in the crankcase. If it be found that it is dangerous to compress an explosive mixture in the crankcase the designer has provided for compressing air only, and admitting the fuel by way of a pipe on the front of the cylinder, somewhat on the Diesel principle. This will probably be found necessary, as it seems to us that there is considerable risk of getting the burning mixture blowing past the relatively shallow piston crown and into the crankcase. The chief advantage of the design, to our way of thinking, lies in the placing of the exhaust ports near the top of the cylinders, where centrifugal force will assist instead of opposing the discharge of the gases. This arrangement should give better scavenging and consequently better efficiency than in the ordinary design of two-stroke. If it were not for this fact one would like to see the engine built as a radial instead of rotary.

Of engines of novel design, perhaps the most interesting at the Salon was the Garuffa-Gargiulo, which was stated to work somewhat on the Diesel principle, and which, in spite of this fact, was claimed to work out at about 800 grammes (1¾ lbs.) per h.p. This is so much below the figures usually associated with heavy-oil high-compression engines that one felt somewhat sceptical until it was pointed out that heavy oil, in this instance, meant fairly heavy oil such as naphtha, and not the heavier oils used in the Diesel engines proper. Even so, the figure for weight appears optimistic, and as several of the external engine parts appeared distinctly on the light side, one fears that the rest of the engine may suffer from the same reduction of material. However, that does not in itself detract greatly from the interest of the design, as there is a very large margin of weight left before the engine becomes too heavy for aircraft work. The engine was shown on the stand of Vaugean and Gargiulo, with a model of an airship of novel type, relying for its lift on rarefied air instead of gas in the envelope. This airship—a sort of glorified vacuum flask—necessitated the use of blowers or turbines for exhausting the air from its balloonettes, and the Garuffa engine was thus provided. It is to be feared that visitors, seeing the airship model, may have gone away with the impression that the engine was as much of a freak as was the airship model. This, however, does not appear to be the case, and as the Diesel type of aero engine is in the air (not literally, unfortunately) at the moment, we will give a description of the Garuffa-Gargiulo engine. Before doing so, it should be pointed out that the system employed is claimed to be also applicable to engines of the vertical and Vee types, although the designer considers the radial particularly suitable owing to its light weight.

In a descriptive booklet dealing with the Garuffa engines it is claimed that the most frequent causes of engine failure are due to (1) the ignition, (2) the valves, and (3) the carburettors. Consequently, these have all been abandoned in the Garuffa engine, with the exception of the ignition system, which is used for starting only.

Briefly the operation of the Garuffa engine is as follows: The two-stroke cycle is employed, and air only is compressed by the pistons, the fuel not being injected until just before the piston reaches the top of its stroke. The pressure necessary to force air to the cylinders is provided by the double blower W, the shaft of which, although in line with the crankshaft of the engine, does not revolve, the air being compressed by rotating the blades around the fixed shaft. A two-speed gear ($p_1\ p_2\ p_3$) is provided for the blower, so that for taking off or for flying at great heights the maximum compression can be used, while the lower gear is used for normal power. A rotary distributor, D, conducts the air through the induction pipes D_1 to the inlet ports *a* of all the cylinders in turn. The exhaust ports are on the front of the cylinders, opposite the inlet ports. As the exhaust gases rush out through the exhaust ports fresh air is admitted, and it is claimed that by suitably shaping and placing the inlet ports the cylinders are completely swept free from any residue of burnt gases. Furthermore, it will be seen that as pure air only, and not a combustible mixture, is admitted, the inlet ports can be placed, if desired, slightly above the exhaust ports so long as the pressure of the incoming air exceeds that of the charge at the time the port is opened. In this manner, it is claimed, not only is the scavenging complete, but the pressure of the air is slightly above atmospheric when both valves are closed.

The fuel, as already stated, is not admitted to the cylinders until the piston has almost reached the top of its stroke. It then enters the cylinders through atomisers *q*, and it is stated that the combustion is of a double nature, the first instant being in the nature of an explosion, while the latter part, until the fuel supply is cut off, is by way of being a steady burning. As regards the supply of the fuel, this is provided by a pump connected to the main gear wheel F. The pump is of the plunger type and delivers the fuel under a pressure of approximately 30 atmospheres to a reservoir or dash-pot, H, in which the fuel is allowed to rise to a certain height, the remainder of the space in the top of the dash-pot being filled with air or inert gas under, of course, the same pressure. The fuel is conducted from the reservoir to a tubular ring having branch pipes leading to each of the atomisers, and there is thus a constant pressure in this ring and in the atomisers behind the needle valves. The opening of the needle valves of the atomisers is effected by a cam mounted on and turning with the crankshaft. This cam, K, is so mounted that by means of a lever it can be moved along parallel with the crankshaft, and as the face of the cam is bevelled it opens the needle valves to a greater or smaller extent, thus controlling the amount of fuel admitted to the cylinders and consequently the power developed by



THE GARUFFA-GARGIULO HIGH-COMPRESSION ENGINE: This engine works on the Diesel principle, air only being compressed in the cylinders, and the fuel admitted when the piston is near the top of its stroke.

the engine. The valves are, of course, operated by the push rods and cranks q' and q''.

So far the question of running on heavy oil only has been considered. For starting, however, some other method is obviously necessary. This part of the outfit is not shown in detail in the illustrations, but briefly it is to consist of injecting, by means of a hand pump, for instance, a lighter fuel such as petrol into the circular tube 5, and then, when the engine is started, by hand or other means, the magneto ignites the charge and the engine starts like any other petrol engine. As the normal compression of the engine would be far too great to allow of starting in this manner, half-compression valves are provided some distance above the inlet ports. These valves, L, are all opened together by a lever, and as the piston ascends the air is expelled through the valves until the piston has reached the desired position, when the valves are closed and compression begins at this point. When the engine has been running on petrol for a short time the half-compression valves are closed, the petrol is turned off and the heavy oil from the reservoir H turned on, when the engine begins to function normally.

From the top of the dash-pot a tube leads to the head of one of the cylinders. An automatic valve (opening outwards) is placed in the head of this cylinder, and, being so adjusted that it opens at a high pressure (approximately the explosion pressure in the cylinder), it ensures that if the pressure in the dash-pot falls below a certain minimum, burnt gases are forced from the cylinder into the top of the dash-pot above the fuel, thus helping to maintain a constant pressure there. From the lower part of the dash-pot one tube runs to the circular fuel distribution tube 5, and another, having a spring-loaded automatic valve, runs to the fuel tank, so that in case of excessive pressure in the dash-pot the fuel is allowed to overflow through this pipe back into the tank.

For the rest the engine is of fairly orthodox design, and does not require any detailed description, especially as it is still to be regarded as experimental and therefore subject to alterations. Sufficient has, we think, been said to indicate the general principles upon which the Garuffa engine works. Only the future can show whether the theories which it represents will be successful in practice.

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The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING

A MEETING of the Committee was held on Wednesday, January 25, 1922, when there were present:—Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair, Major-Gen. Sir Sefton Brancker, K.C.B., Mr. Ernest C. Bucknall, Col. F. Lindsay Lloyd, C.M.G., C.B.E., Lieut.-Col. M. O'Gorman, C.B., and the Secretary.

Election of Members.—The following new Members were elected:—

Geoffrey Dorman.
John S. Charlton.
John Herbert James.
Alfred George Lamplugh.
Hugo Nemo Pantolini.
Nevill Vintcent.

Meeting of the Committee of the Fédération Aéronautique Internationale, Paris, January 9, 1922.—Countries represented: France, Great Britain, Holland, Italy, Spain, Switzerland, United States. Lieut-Col. O'Gorman presented a report of the Meeting of the Committee of the F.A.I. held in Paris on January 9, 1922.

The principal items in the report were:—

Schneider Race, 1922

It was decided to adhere to the same regulations as last year. The date was fixed for the last fortnight in August, and the contest would be held at Naples.

Gordon Bennett Balloon Race, 1922

It was decided to hold the Race at Geneva on Sunday, August 6, 1922.

Tryptique.

The proposal of the Royal Aero Club to introduce the Tryptique for Sporting and Touring machines entering foreign countries was considered. The Aero Club de France had already approached the French Customs Authorities on the subject, and reported that the Director of Customs in France had expressed willingness to accept the guarantee of the Aero Club de France in relation to the Customs. The draft form of Tryptique prepared by the Aero Club de France was to be sent to the Clubs of the Federation for their approval.

Introduction of Slow Speed Tests

The Royal Aero Club asked for the introduction of Slow Speed Tests in International Speed Races. This was agreed to, and the Clubs were requested to send in suggestions for the carrying out of these tests for the consideration of the F.A.I. at its meeting in Rome.

The other subjects under consideration were International Maps, Permanent Commissions, and Records.

The report was adopted, and a unanimous vote of thanks was passed to Lieut.-Col. O'Gorman for attending the Meeting on behalf of the Club.

Joint Standing Committee of the S.B.A.C. and R.Ae.C.—The report of the Meeting of the Joint Standing Committee of the S.B.A.C. and R.Ae.C., held on January 5, 1922, was received.

Racing Committee.—The report of the Meeting of the Racing Committee held on January 24, 1922, was received.

Annual General Meeting.—It was decided to hold the Annual General Meeting on Wednesday, March 29, 1922.

Portraits of the late Mr. H. G. Hawker and Lieut.-Com. K. Mackenzie Grieve.—A unanimous vote of thanks was passed to the Directors of Messrs. Rolls-Royce, Ltd., for presenting to the Club portraits of the late Mr. H. G. Hawker and Lieut.-Com. K. Mackenzie Grieve, painted by Mr. Ambrose McEvoy.

These portraits are now hanging in the Club.

Aviator's Certificate.—The following Aviator's Certificate was granted:—

7920. Walter Henry Westgate. December 9, 1918.

RACING COMMITTEE

A Meeting of the Racing Committee was held on Tuesday, January 24, 1922, when there were present:—Major-General Sir Sefton Brancker, K.C.B., in the Chair, Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., Col. F. Lindsay Lloyd, C.M.G., C.B.E., Lieut.-Col. F. K. McClean, and the Secretary.

The Committee decided, subject to the consent of the Air Council, to hold Aviation Race Meetings at Waddon Aerodrome, Croydon, on the following dates:—

Easter Monday	April 17, 1922.
Whit Monday	June 5, 1922.
August Bank Holiday	August 7, 1922.

A further Race Meeting will be held in September or October, and will be announced later.

The Race Meeting on Easter Monday will be similar to the First Croydon Meeting in September last, and particulars will be available shortly.

JACQUES SCHNEIDER CUP

Special Regulations for 1922. (Translated from the French.)

1. Clubs entering machines must deposit in addition to the entry fee laid down in the General Regulations, a sum of 5,000 francs for each machine, as a guarantee of its being present for the Contest.

This sum will be returned in respect of each machine that is present.

Water-Tightness and Navigability Tests

2. *Water-Tightness Test.*—The Contest will begin with a test of the water-tightness of the floats, which will precede the Navigability Test.

For this test, the machine must be afloat for six hours, and during this time the floats must remain water-tight.

The machines must be in flying order, with or without the crew, and ready to start.

3. *Navigability Test.*—The Navigability Test will follow the Water-Tightness Test. It will take place for all competitors on the same day or during the two days preceding the Contest for the Cup, in the order drawn by lot.

The Commissaires Sportifs may allow competitors who have not passed the Navigability Test to make a second and final attempt immediately.

4. Each machine, in flying order, will cover in a closed circuit over the sea a distance of 5 to 10 sea miles. The exact distance will be fixed by the Commissaires Sportifs.

After taxying over the starting line, the machine must rise and continue the course in flight; during this flight the machine must be taxied over two distances of ½ mile, the limits of which will be indicated by two buoys; it must then rise and complete the circuit, alighting again before the starting line, and taxying over.

Machines taking part in the Speed Contest must be in the same condition as for the Navigability Test.

Machines must not undergo any modification between the Navigability Test and the completion of the Contest. Machines will be stamped to ensure this.

In the event of damage during the latter test, the necessary repairs may be carried out at sea, but these must not alter the original condition in which the machine was presented.

Speed Test

The Jacques Schneider Cup in 1922 will be contested over a distance of 200 sea miles.

The Contest will take place between June 15 and September 30.

The order of starting will be drawn by lot.

Starts will be made at intervals fixed by the Commissaires.

The Contest will take place over the sea in a closed circuit of at least 5 sea miles.

The course may, if necessary, be taken over the coast, the controls being on land, care being taken to avoid all arrangements likely to impede the competitors.

Alightings are allowed. The start and finish will be in flight.

The Contest will close at the time fixed by the Commissaires Sportifs.

Place of Contest.—The Aero Club of Italy, the present holders of the Cup, have decided to hold the Race at Naples in the last fortnight of August.

Date of Entry.—The final date of receiving entries is Saturday, February 25, 1922. Entries should be made to the Royal Aero Club, 3, Clifford Street, London, W. 1, accompanied by a remittance of £10 to cover the entry fee.

GORDON BENNETT BALLOON RACE

The Aero Club of Switzerland, the present holders of the Cup, have decided to hold the Gordon Bennett Balloon Race at Geneva on Sunday, August 6, 1922.

Gas will be supplied free of charge by the Town of Geneva.

The final date for receiving entries is Saturday, February 25, 1922. Entries should be made to the Royal Aero Club, 3, Clifford Street, London, W. 1, accompanied by a remittance of £10 to cover the entry fee.

WORLD'S AVIATION RECORDS, UP TO DECEMBER 31, 1921.

Issued by the Royal Aero Club as representing the British Empire on the Fédération Aéronautique Internationale.

Duration

America.—*Pilots.*—E. Stinson and L. Bertaud. *Date.*—December 29 and 30, 1921. *Machine.*—"J.L.6" Monoplane. *Motor.*—B. M. E. 185 h.p.

Duration of flight, 26 hrs. 19 mins. 35 secs.

Distance (Returning to point of Departure Without Alighting)

France.—*Pilots.*—Lucien Boussoutrot and Jean Bernard. *Date.*—June 3 and 4, 1920. *Machine.*—Farman Goliath. *Motor.*—Two Salmson 260 h.p.

1,915·2 kiloms. (1,190 miles).

Altitude

America.—*Pilot.*—Major Rudolph W. Schroeder. *Date.*—February, 27th, 1920. *Machine.*—Lepere. *Motor.*—Liberty 400 h.p.

10,093 metres (33,114 ft.).

Speed over a Distance of 100 Kiloms.

Italy.—*Pilot.*—Brack Papa. *Date.*—October 1, 1921. *Machine.*—Fiat. *Motor.*—Fiat 700 h.p. *Time.*—20 mins. 5⅗ secs.

298·66 kiloms. per hour (185·58 m.p.h.).

Speed over a Distance of 200 Kiloms.

France.—*Pilot.*—Georges Kirsch. *Date.*—October 1, 1921. *Machine.*—Nieuport-Delage. *Motor.*—Hispano-Suiza 300 h.p. *Time.*—42 mins. 39⅕ secs.

281.272 kiloms. per hour (174.77 m.p.h.).

Speed over a Distance of 1,000 Kiloms.

France.—*Pilot.*—Lucien Boussoutrot and Jean Bernard *Date.*—June 3 and 4, 1920. *Machine.*—Farman Goliath. *Motor.*—Two Salmson 260 h.p. *Time.*—10 hrs. 19 mins. 46 secs.

96.81 kiloms. per hour (60.155 m.p.h.).

Speed over a Distance of 1,500 Kiloms.

France.—*Pilot.*—Lucien Boussoutrot and Jean Bernard. *Date.*—June 3 and 4, 1920. *Machine.*—Farman Goliath. *Motor.*—Two Salmson 260 h.p. *Time.*—16 hrs. 42 mins. 8 secs.

89.808 kiloms. per hour (55.804 m.p.h.).

Greatest Speed over a Distance of One Kilom.

France.—*Pilot.*—Sadi Lecointe. *Date.*—September 26, 1921. *Machine.*—Nieuport-Delage. *Motor.*—Hispano-Suiza 300 h.p.

330.375 kiloms. per hour (205.223 m.p.h.).

Useful Load Transported (Altitude)

France.—*Pilot.*—Thierry. *Date.*—October 10, 1920. *Machine.*—Breguet.

Useful load 250 kilogs. (551 lbs.).

Altitude 6,965 metres (22,851 ft.).

Useful Load Transported (Altitude)

England.—*Pilot.*—Capt. C. T. R. Hill. *Date.*—May 4, 1920. *Machine.*—Handley Page. *Motor.*—Two Napier "Lion" 450 h.p.

Useful load, 1,674 kilogs. (3,691 lbs.).

Altitude, 4,267 metres (13,999 ft.).

Useful Load Transported (Duration)

England.—*Pilot.*—Capt. C. T. R. Hill. *Date.*—May 4, 1920. *Machine.*—Handley Page. *Motor.*—Two Napier "Lion" 450 h.p.

Useful load, 1,674 kilogs. (3,691 lbs.).

Duration, 1 hr. 20 mins.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

THE SECOND AIR CONFERENCE, 1922

List of Lecturers and Papers

As announced in FLIGHT some weeks ago, the Second Air Conference, called by the Air Council, will be held at the Guildhall on February 7 and 8 next. The morning session of the first day will be devoted to papers on civil aviation, and the afternoon session to papers of a technical nature. On February 6 those attending the Air Conference will be able to visit Waddon aerodrome by special train leaving Victoria at 9.55 a.m. and returning at 1 p.m. Facilities will be given for inspecting the working of civil air traffic, including wireless, meteorological, signal and Customs services.

On the first day of the Air Conference at the Guildhall (February 7) the Rt. Hon. Capt. F. E. Guest, C.B.E., D.S.O., M.P., Secretary of State for Air, will take the chair during the morning session, and the Rt. Hon. Lord Weir of Eastwood will be chairman during the afternoon session. The first paper will be read (at 10.30 a.m.) by the Rt. Hon. Lord Gorell, C.B.E., M.C., Under-Secretary of State for Air, and will be entitled "Civil Aviation." This will be followed by "Aerial Transport of Today and Tomorrow," by Lieut.-Col. W. A. Bristow, M.I.E.E., M.I.A.E., F.R.Ae.S.

During the afternoon session, which will start at 2.45 p.m., Maj. F. M. Green, O.B.E., M.I.C.E., F.R.Ae.S., will read a paper on "Research Work from the Designer's, Constructor's and User's Point of View." The Director of Research, Brig.-Gen. R. K. Bagnall-Wild, C.M.G., C.B.E., F.R.Ae.S., will read a paper entitled "The Progress of Research," and the afternoon session of the first day will conclude with a paper on "Airships" by Maj. G. H. Scott, C.B.E., A.F.C., A.M.I.M.E.

The second day (February 8) of the Air Conference will be devoted to a discussion of the papers read on the previous day. Capt. Guest will be in the chair during the morning session, when the papers on civil aviation will be discussed, commencing 10.30 a.m. Lord Weir of Eastwood will be chairman during the afternoon's discussion, commencing at 2.45 p.m., of the technical papers.

AERODYNAMICAL REPORT AND TESTS ON THE EGGLESTON AIR-CELL GIANT BIPLANE[*]

THIS test was carried out on October 12 and 13, 1921, in the Curtiss 7-ft. wind tunnel, and was conducted by the Cox-Klemin Aircraft Corp., College Point, Long Island, N.Y., Consulting and Designing Engineers. The test followed standard methods, and was carried out on a model of scale 1 to 72 (1 in. = 6 ft.) at a wind speed of 30 m.p.h. The stabiliser was set at 3° to the wing chord. The tests included: (1) Lift, drift and pitching moment, with the Eggleston Air Cells in position; (2) Lift and drift, with the Eggleston Air Cells replaced by standard type streamline struts.

Stability.—In the vector diagram (Fig. 1) the results of the pitching moment tests are shown. This vector diagram indicates that, with the stabiliser at 3° to the wing chord, a very large degree of stability is secured. The vectors are well separated. Balance at cruising speed is secured if the load is arranged to bring the centre of gravity three-tenths of the chord length aft of the leading edge. The position of the vectors is such that, if the aeroplane tends to dive down, the aerodynamical forces will return it to its normal flight attitude. If the aeroplane tends to stall or go up by the nose, the aerodynamical forces will return it to its normal flight attitude. The longitudinal stability of the plane may be, therefore, regarded as perfectly satisfactory.

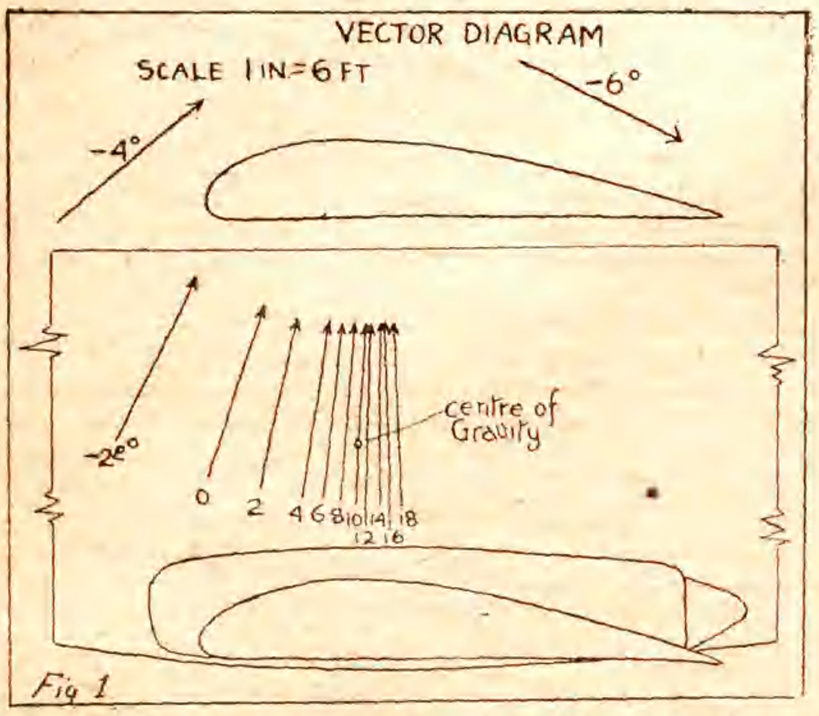


Fig. 1. Vector diagram for the Eggleston Air-Cell biplane test.

Results of Test for Lift and Drag.—The results of the test for lift and drag, with and without the Air Cells, are plotted in Fig. 2. These indicate that by replacing struts of standard form disposed in the manner of a Warren truss by the Eggleston Air Cell:

1. The maximum lift is increased from 6·25 to 7·07 lbs. on the model, or approximately 13 per cent.

2. The maximum Lift/Drag ratio of the plane, which is a very fair measure of efficiency, is increased from 6·66 to 6·86, and the Lift/Drag at almost all angles is increased.

3. The general efficiency of the plane is high, particularly for a plane having two engine *nacelles* on either side, and short spans, with a larger number of interplane supports.

Landing Speed.—(*a*) With Eggleston Air Cells (eight in number). The maximum lift force on the model with the Eggleston Air Cells in position is 7·07 lbs. The landing speed is, therefore, given by the formula:—

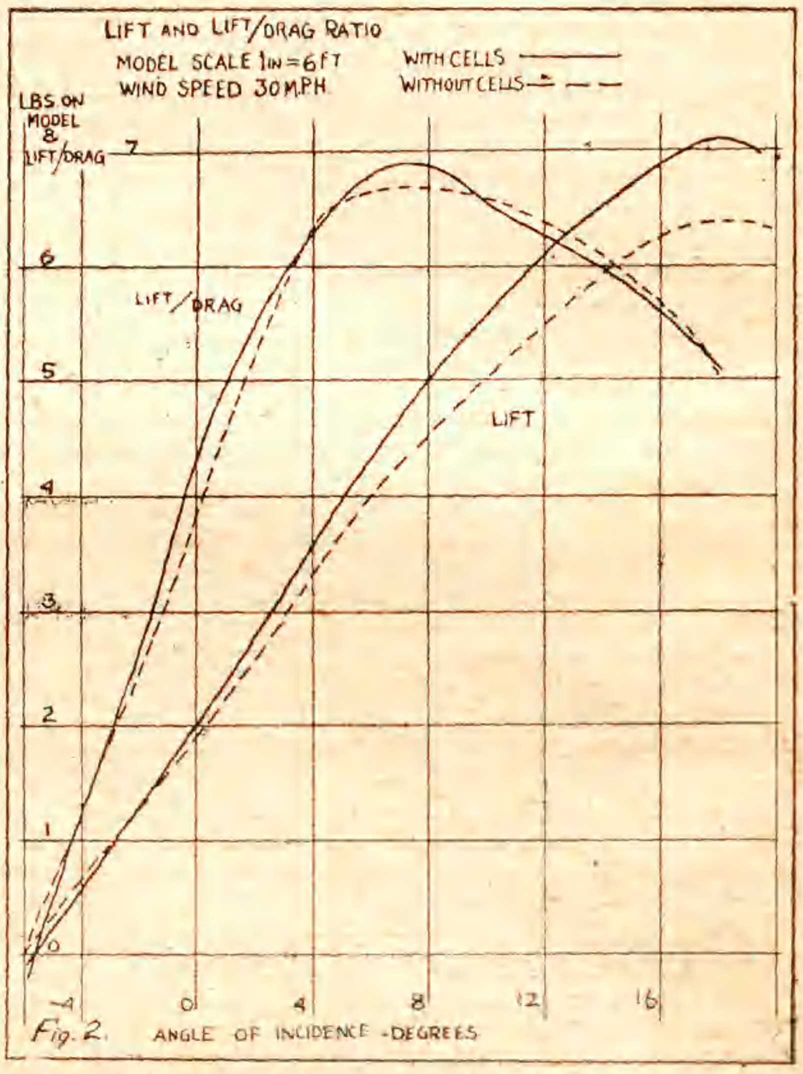


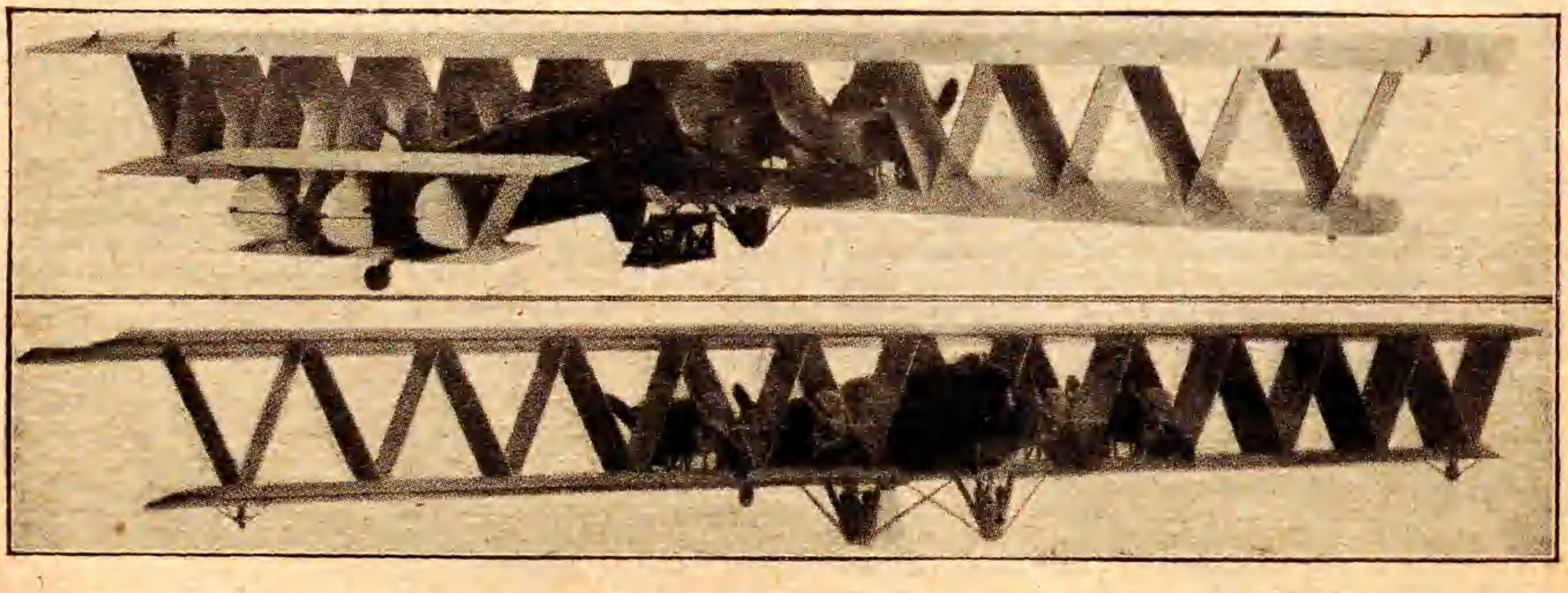
Fig. 2. Lift and Lift/Drag curves for the Eggleston Air-Cell Biplane.

$$\left(\frac{72x}{30}\right)^2 7\cdot07 = 113{,}000$$

$$x = \frac{30}{72}\sqrt{\frac{113{,}000}{7\cdot07}} = 52\cdot7 \text{ m.p.h.}$$

This is not allowing for scale effect. With scale effect and skilful piloting, it may be expected that the ship should land not much over 45 m.p.h.

(*b*) Without Eggleston Air Cells.—The maximum lift on



THE EGGLESTON AIR-CELL BIPLANE: Three-quarter rear and front views of the scale model.

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[*] *Aerial Age*, U.S.A.

the model, without the Eggleston Air Cells is 6·3 lbs., so that the landing speed is 56 m.p.h. From the point of view of carrying a heavy load for a given wing area, the Eggleston Air Cells give a decided advantage.

The designer of the plane, Col. Thomas L. Eggleston, states that a larger number of cells, namely, 12, were originally to be used in this plane. It is not improbable that this would further increase the lift and diminish the landing speed.

Maximum Speed.—The following calculations are based on the wind tunnel results for scale effect:

Thrust at 90 m.p.h. $= \frac{6{,}000 \times 0 \cdot 78}{90} \times 375 = 19{,}500$ lbs., assuming propeller efficiency of 78 per cent.

Lift/Drag ratio of aeroplane at 90 m.p.h. is $5 \cdot 1 \times 1 \cdot 14$, taking the scale correction as 14 per cent.

Drag of aeroplane at 90 m.p.h. $= \frac{113{,}000}{5 \cdot 1 \times 1 \cdot 14} = 19{,}400$ lbs., which is a trifle less than the thrust, and shows that the full speed will be 90 m.p.h., with full load.

Climb.—The best climbing speed is 63 m.p.h.; at this speed, the Lift/Drag ratio of the aeroplane (with scale correction of 14 per cent.) is 7·84. Therefore, the drag is 14,400, and the expenditure of $\frac{14{,}400 \times 63}{375} = 2{,}420$ h.p. is required to overcome this drag.

The total power available is 3,900 h.p., and the difference or excess of power of 1,480 h.p., which may be used in causing the aeroplane to climb. The rate of climb will be $\frac{1{,}480 \times 33{,}000}{113{,}000} = 430$ ft. per minute. At 6,500 ft. elevation, the rate of climb will be 100 ft. per minute.

Range.—The maximum range is attained at an average speed of 65 m.p.h. The power required from the motors is

$$\frac{113{,}000 \times 65}{7 \cdot 4 \times 375 \times 0 \cdot 75} = 3{,}530 \text{ h.p.}$$

The fuel consumption of the motors will be 1,800 lbs. per hour. With a fuel load of 28,800 lbs., the range will be:—

$$\frac{28{,}800}{1{,}800} \times 65 = 1{,}040 \text{ miles.}$$

Useful Load and Pay Load.—The preliminary weight estimate—which should be later checked by stress analysis and weight estimates—indicates a useful load of 47,800 lbs. If a fuel load of 28,000 lbs. is carried, a pay load of 19,000 lbs. will be left over, or the equivalent of 100 passengers, with allowance for their baggage.

General Conclusions.—The general conclusions to be drawn from the test and general consideration of the plane are:—

1. Perfect longitudinal stability is secured.
2. The Eggleston Air Cells improve the lift of a biplane.
3. The Eggleston Air Cells improve the efficiency of a biplane as compared with a Warren truss strut bracing of the usual type.
4. With the employment of the Air Cells the number of interplane struts can be increased. This has the effect of decreasing the structural weight, since short spans thus become possible. With ordinary construction, short unsupported spans increase the aerodynamic resistance. In the Eggleston Air Cells, the extra aerodynamic resistance would be compensated for by the extra lift. There is, therefore, a possibility of keeping down wing weight for large spans.
5. If the structural weight estimated above can be met, the machine should have a maximum speed of 90 m.p.h., a climb of 430 ft. per minute, a landing speed of 45 m.p.h., a useful load of 47,800 lbs., and a cruising range of 1,040 miles. The consideration of paragraph 4 would indicate that the structural weight of the wings can be kept down. The stability is good.
6. The fuel load allowed for gives the machine a cruising range of over 1,000 miles, which is more than ample for any overland travelling; with a pay load of 19,000 lbs., the machine should be a most practical aeroplane of undoubted possibilities in commercial transportation.

Eggleston Model Test with Cells
Curtiss 7-ft. Tunnel
October 12, 1921

i	D_{30}	D_0	D_{-30}	D_{50}	L_{30}	L_0
—6	1·268	0·448	0·646	0·384	0·341	0·490
—4	1·185	0·441	0·636	0·380	1·031	0·490
—3	1·158	0·439	0·633	0·337	1·34	0·485
—2	1·143	0·437	0·633	0·376	1·70	0·485
—1	1·135	0·434	0·633	0·375	2·042	0·480
0	1·138	0·431	0·633	0·373	2·43	0·480
1	1·159	0·429	0·635	0·370	2·72	0·480
2	1·178	0·425	0·635	0·367	3·16	0·480
3	1·206	0·422	0·630	0·362	3·52	0·480
4	1·240	0·419	0·630	0·358	3·90	0·475
6	1·295	0·414	0·625	0·354	4·61	0·470
8	1·375	0·408	0·610	0·350	5·33	0·470
10	1·488	0·401	0·605	0·340	5·81	0·470
12	1·593	0·393	0·595	0·330	6·35	0·480
14	1·700	0·387	0·590	0·324	6·65	0·480
16	1·837	0·380	0·585	0·317	7·10	0·470
18	1·979	0·373	0·580	0·310	7·30	0·470
20	—	0·367	0·575	0·304	7·10	0·470

i	M_{30}	M_0	M_{-30}	M_{50}
—6	—1·60	—0·32	1·26	—0·32
—4	—1·45		1·20	
—2	—1·33		1·20	
0	—1·21	—0·32	1·32	—0·32
2	—1·04		1·30	
4	—0·60		1·30	
6	—0·33		1·35	
8	0·22		1·50	
10	0·69		1·52	
12	1·09		1·52	
14	1·72		1·53	
16	2·12	—0·32	1·55	—0·32
18	2·80		1·56	

i	D_{30}	D_0	L_{30}	L_0
—6	1·286	0·450	0·49	0·50
—4	1·218	0·445	1·15	0·51
—2	1·190	0·440	1·69	0·50
0	1·177	0·435	2·32	0·50
2	1·180	0·430	2·98	0·49
4	1·205	0·423	3·71	0·49
8	1·325	0·410	4·85	0·48
12	1·490	0·396	5·77	0·48
16	1·706	0·382	6·48	0·47
18	1·855	0·375	6·60	0·47
20	2·080	0·369	6·55	0·47

Main Dimensions and Characteristics

Span of upper wing	255 ft.
Span of lower wing	223 ft.
Chord of both wings	25 ft.
Gap	25 ft.
Length over all	137 ft.
Total wing area	11,200 sq. ft.
Gross weight—loaded	113,000 lbs.
Total power (8 750 h.p. "W" motors)	6,000 h.p.
Wing loading	10·1 lbs. per sq. ft.
Power loading	18.8 lbs. per h.p.

First Rough Weight Estimate

Structural weight—37·4 per cent.	42,200 lbs.
	113,000 lbs.
Power plant	23,000 lbs.
Useful load	47,800 lbs.

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Aerial Service for Queensland

MANY of the railways of Queensland lead to "dead ends," which are but imperfectly linked-up, if at all, by road traction. But that, according to the *North Queensland Register*, will soon be altered by the Queensland and Northern Territory Aerial Service, Ltd. The ultimate idea is to establish an aerial service from either Bourke or Mungindi, in New South Wales, to Darwin, in the Northern Territory, linking up with the heads of the Queensland railways at Charleville, Blackhall, Longreach, Winton, and Cloncurry; but the immediate object is to get the company floated so as to tender for an aerial mail from Charleville to Cloncurry, which is to be subsidised by the Commonwealth Government. The subsidy will pay for the running cost of the service, provision having to be made for carrying 100 lb. of mail matter. On this Charleville-Cloncurry service, representing a distance of 570 miles, the estimated revenue from subsidy and passengers' fares is £20,700 a year, while the expenditure, including depreciation, is estimated at £12,175, leaving a balance of profit of £8,500.

Portuguese Award for Two British Seamen

The Portuguese Government *Gazette* contains a decree, signed by the President of the Republic and the Minister for Marine, awarding a silver medal for courage and humanity to Frank Ellis and Charles St. Clair, master and first mate respectively of the British steamer "Gambia River," for saving the lives of Captain Brito Pais and Lieutenant Jose Beires when their aeroplane fell into the sea near Madeira on October 18, 1920.

THE GALE INDICATOR

Our readers must not, as we did at first, jump to the conclusion that the Gale Indicator is an instrument for measuring the strength of the wind. As a matter of fact, it is an instrument for producing indicator diagrams of high-speed engines, and is the patented invention of Mr. C. H. Gale, whilst Messrs. The British Oil and Turpentine Corporation, Ltd., of 55, Chancery Lane, London, W.C., are the sole concessionaires for this instrument.

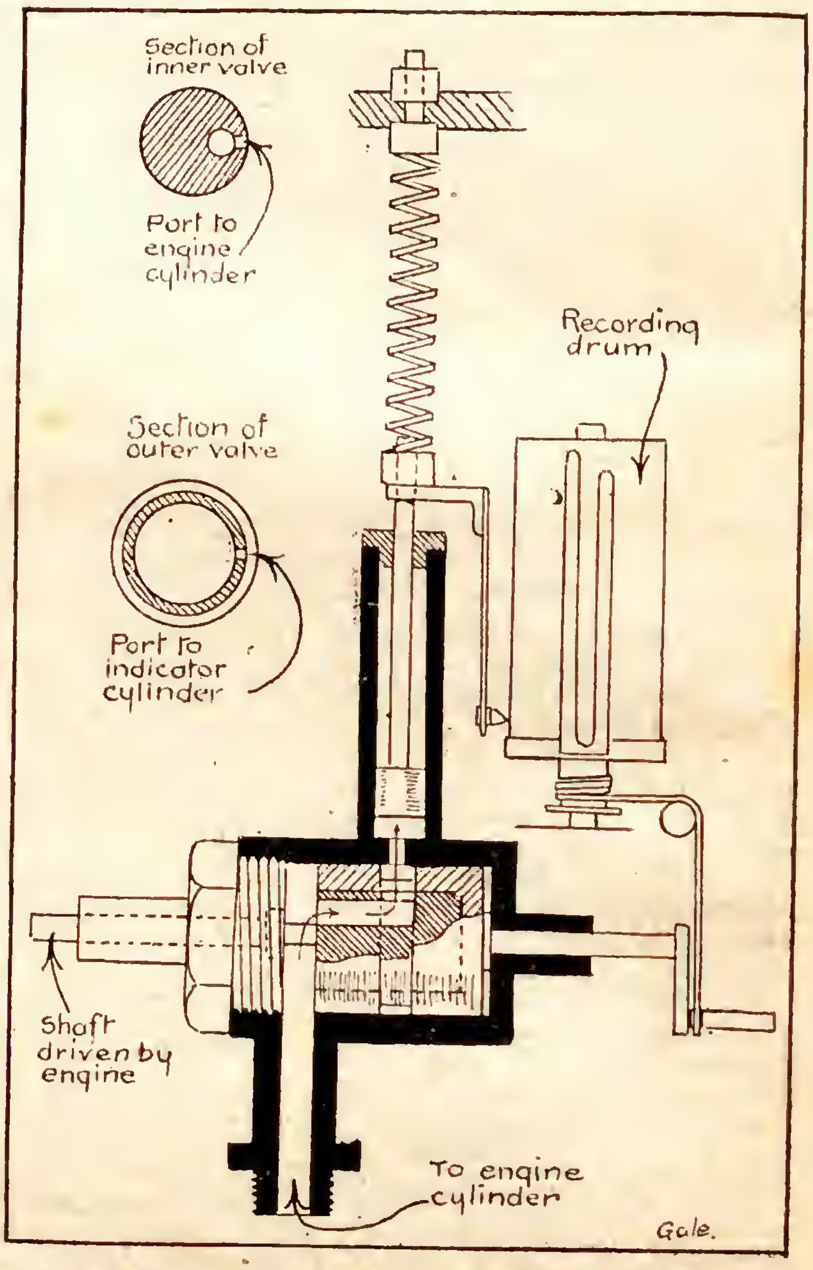
It is, of course, well known that considerable difficulty has been experienced in obtaining a reliable engine indicator for showing exactly what is happening within a high speed engine, such as an internal combustion motor—or even certain high-speed steam engines, as the ordinary indicator is practically useless for speeds of over 800-900 r.p.m. Most of the high-speed engine indicators in use are, at best, what might be termed "Laboratory" instruments, and have more or less delicate mechanism and many rapidly moving parts likely to give trouble. The Gale Indicator, however, is simplicity itself, with but few moving parts, and is capable of drawing a diagram irrespective of the speed. Furthermore, it can be operated from the seat of the motor-car, motor-cycle, or aeroplane, as the case may be, during actual progress by road or air.

From the accompanying illustration it will be seen that the main body of the Gale Indicator contains two valves, one within the other. The inner valve is rotated by the engine, and is the only rapidly moving part of the instrument. In this valve is a small port which is always in communication with the engine cylinder, *via* a passage leading from the port to one end of the valve, thence by way of the connection to the engine cylinder in the body of the instrument. The outer valve, which embraces the inner valve, also contains a small port, which is in constant connection with the indicator cylinder by virtue of the annular groove formed on the outer wall of the valve, as shown. Thus it will be seen that when the inner valve is rotated, its port will coincide with the port of the outer valve during a very small period of each stroke of the engine, and at this particular moment the pressure in the engine cylinder will be communicated, through the ports, to the piston in the indicator cylinder, thereby causing the pencil—which is connected up with the piston—to record on the drum the pressure at that particular point in the engine stroke.

The outer valve can also be rotated by means of a crank, which may be turned by hand at any convenient speed, and which is connected by a cord to the recording drum to give the latter the necessary movement. On rotating the outer valve a short distance in the same direction as the inner valve, the ports will coincide at a later period of the stroke of the engine, and the pencil will record the pressure existing in the cylinder during that period. Thus, as the handle is slowly turned the pressures at different periods of the stroke are successively recorded until the diagram is complete.

In the case of four-stroke engines, the inner valve is driven off the half time shaft, and the outer valve handle is geared to the recording drum by a two-to-one gearing, giving a double reciprocating motion to the drum to one revolution of the outer valve. The diagram thus extends over two revolutions of the engine.

In conclusion, the advantages of the Gale Indicator may be summarised as follows :—(1) It is capable of giving a correct diagram of an engine running at the highest speed ; (2) one diagram only may be taken on the recording card, and thus the difficulty of picking out a correct diagram from a multiplicity of superimposed records is obviated ; (3) the recording drum being normally stationary the paper may be changed without disconnecting any part of the indicator from the engine ; (4) rapidly reciprocating parts are entirely superseded ; (5) the rotating valves being subject to end pressure only, run with the minimum of friction and wear ; (6) the recording apparatus having a slow motion only, no parallel motion with its loose joints is necessary ; (7) the spring having the full amplitude of movement of the vertical ordinate of the diagram is easy to calibrate. In fact the spring having about six times the amplitude of the ordinary indicator spring, and the usual parallel motion, multiplying the motion by six, being absent, the errors of the calibration of the spring are reduced to 1/36.



Diagrammatic sketch of the Gale Indicator for High-speed Engines.

We understand from The British Oil and Turpentine Corporation, Ltd.—who, by the way, are the makers of the well-known "Speedwell" Oils—that the Gale Indicator will be placed on the market in about six weeks' time, and that a test is to be carried out shortly with one of these instruments on a very high-speed motor-cycle engine.

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R.I.B.A. Grissell Prize

It is announced by the Royal Institute of British Architects in connection with their annual award of prizes and studentships that the Grissell Gold Medal and £50 for Construction has not been awarded. The subject was "A Mooring Mast for an Airship." The Air Ministry, it is stated, have shown interest in this competition, and Major G. H. Scott was detailed to assist the jury in assessing the award. Some interesting designs were submitted, but it was decided not to award the prize. It was found that a competitor who had a grasp of his subject from an architectural point of view had failed to satisfy the demands of modern aviation, and *vice versa*.

R.A.F. Memorial Orphanage

At Maze Hill, Blackheath, on January 26, the Vanbrugh Castle School was opened by Lady Trenchard for the orphan sons of airmen. This orphanage is the first of the good works of this type for which, amongst other objects, the R.A.F. Memorial Fund was started.

Air Vice-Marshal Sir John Salmond, who received Air-Marshal Sir Hugh Trenchard and Lady Trenchard, explained that the building was the gift of Mr. and Mrs. Duckham to the Royal Air Force, and that it had been subsidised by the Royal Air Force Memorial Fund. At present the school held 16 boys, but it was hoped to add extensively to the present building, which might come to be regarded in the future as the cradle of an aerial race. Any boy who exhibited an instinct for flying would be trained with a view to entering the Air Force.

Lady Trenchard declared the school open, and speeches were made by Sir Hugh Trenchard and Lord Hugh Cecil (Chairman of the Executive Committee), the latter of whom spoke warmly of the gallantry of British airmen in the War.

THE "J.L.-12" ATTACK 'PLANE

AN all-metal, armoured attack monoplane has just been built in America by the J.L. (John Larsen) Aircraft Corp., of New York. This machine is known as the " J.L.-12," and, as will be seen from the accompanying illustration, bears a strong resemblance to the Junker all-metal monoplane. It is reported that a " J.L.-12 " made a remarkable flight on October 21 last, when, piloted by Capt. B. H. Pearson, it left the J.L. aerodrome at Central Park, Long Island, at 9.15 a.m., and flying against a 60 m.p.h. head-wind at 2,500 ft., arrived at Washington at 11.45 a.m., thus covering the distance of about 200 miles in 2½ hours, or at a speed of 80 m.p.h.

The principal feature of the " J.L.-12 " consists of its armament of 30 Thompson machine guns. These are arranged in a main battery of 28 guns in two sections. The first section is of 12 guns, located directly behind the pilot's seat, and the second, of 16 guns, is mounted at the rear. Firing is operated by three levers, one firing the 12-battery, the other firing the 16-battery, whilst the third lever puts all 28 guns into action. The two remaining guns are operated independently by the pilot, or gunner, from the cockpit.

The main battery is located in the floor of the *fuselage*, the first section of 12 being set at a slight forward angle, and six of the second section fire directly downwards, the remainder being trained slightly aft. The circular drums for the guns contain 100 cartridges, and the ammunition equipment for the machine in battle trim consists of three drums for each of the thirty guns. The replacement of fresh magazines for all the guns requires only four minutes.

It is claimed that by operating the *ailerons* so as to rock the machine laterally, an effective side rake fire is obtained. The proposed functions of the " J.L.-12 " are to provide a machine having high speed, quick climb and controllability, which can be used against infantry, convoys, etc. It will dive down on the enemy, and flying low over him, open fire and then climb rapidly to a safer altitude in order to give the gunner an opportunity to renew the magazines before another similar attack.

As regards the construction of the machine, this is, we believe, a modification of the Junker, already described in FLIGHT. American-made aluminium alloy is employed in its construction, the metal sheets being $\frac{25}{1000}$ of an inch thick. The armour, presumably on the lower portion of the *fuselage*, is $\frac{9}{64}$ in. armour-plate. The machine is braced throughout with steel.

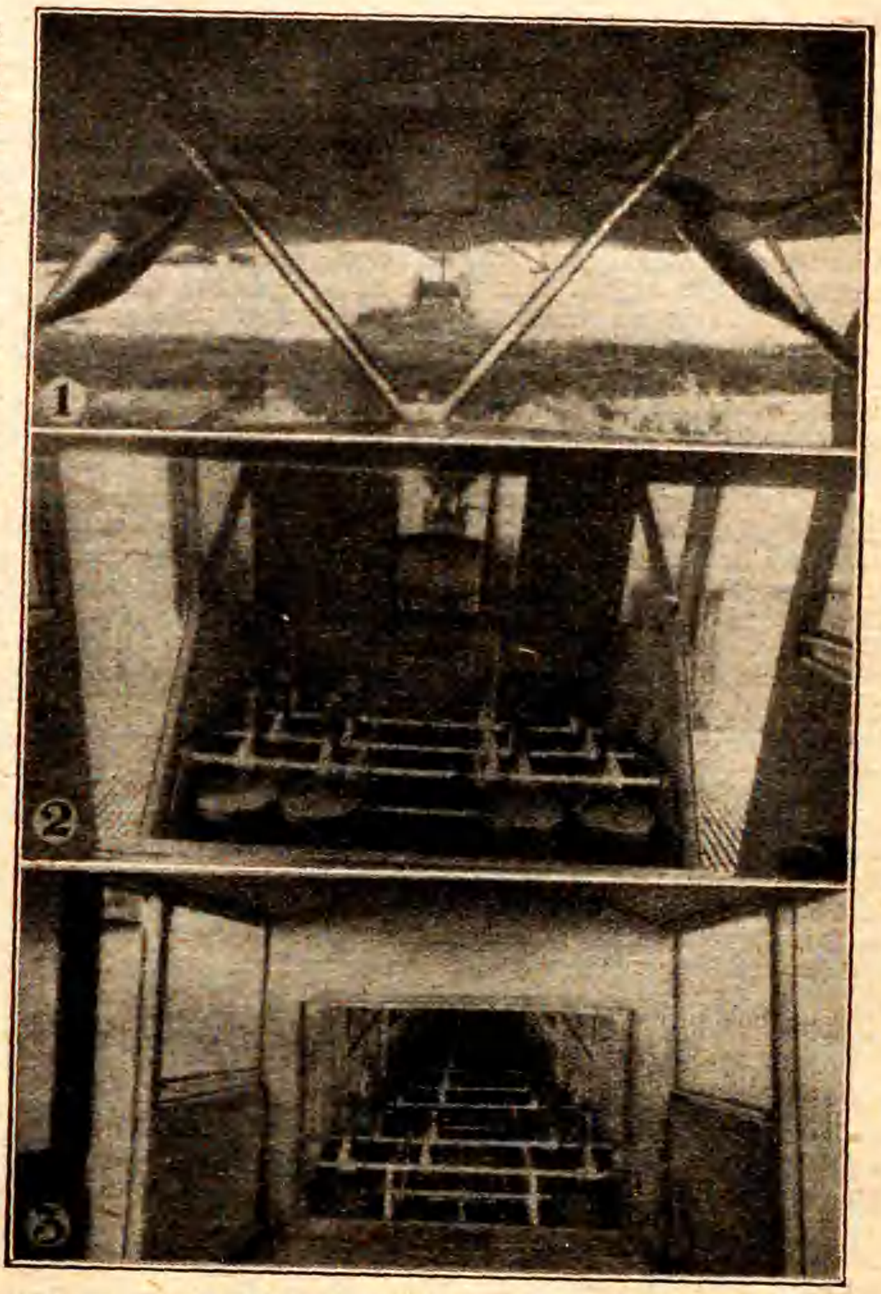
The principal characteristics of the " J.L.-12 " are :—

Span	49 ft.
Over-all length ..	32 ft.
Engine	400 h.p. Liberty
Weight (empty) ..	2,900 lbs.
Weight (fully loaded)	5,000 lbs.
Weight of armour, armament and magazines	3,848 lbs.
Weight of fuel (5 hrs.)	800 lbs.
Weight of pilot and gunner	352 lbs.
Speed range	55-145 m.p.h.
Climb	1,000 ft./45 s., 10,000 ft./11 mins.
Range of action ..	400 miles.

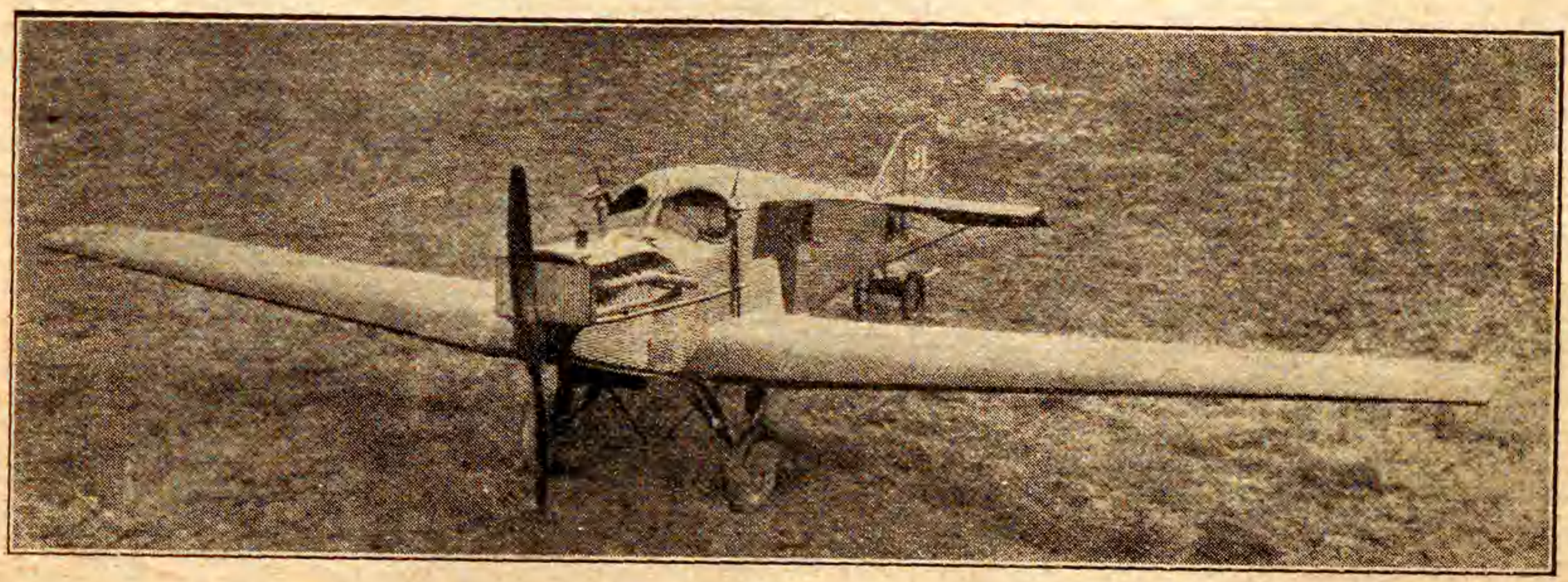
In discussing the machine Mr. Larsen stated that " It has been put through the most severe tests already, and the flying and the battery performance have been perfect.

" One marked feature of the machine is its climbing ability. During a recent test it climbed the first 1,000 feet in forty-five seconds, and rose to 10,000 feet in less than twelve minutes. It is as fast as a scout 'plane, and has high qualities of manœuvring at speed."

It was a similar but smaller machine to the J.L.-12—the J.L.-6—that created an endurance record (26 hrs. 19 mins. 35 secs.) recently.



THE " J.L.-12 " ALL-METAL ATTACK MONOPLANE : Three detail views. 1. Looking aft below *fuselage*, showing gun-posts. 2. Interior view looking forward, showing a battery of 12 guns. 3. Interior view looking aft, showing the rear battery.



THE " J.L.-12 " ALL-METAL ATTACK MONOPLANE : Three-quarter front view.

LONDON TERMINAL AERODROME

Monday evening, January 30.

This has been one of the worst weeks from a weather point of view for some time. Up to Saturday no machine had got through in either direction; in fact very little flying was attempted. The weather has been extremely bad in northern France, the district round Beauvais, in particular, having been very thick throughout the week.

On Saturday, however, the weather was much brighter, and quite an array of machines left for both Paris and Brussels. The activity was, indeed, almost as great as in the summertime. There were a number of passengers; in fact such bookings have made a sudden spurt, and are now quite good. On Sunday, for instance, the Instone Air Line had a full load for the D.H.18 to Paris, and only one short of a full load on the trip from Paris to London.

Four crates of live chickens, which had made the journey from Yorkshire to Croydon by train, were included in the cargo of the Handley Page, while the Instone machine from Paris, the "City of London," carried a large consignment of French wines.

The new Marconi Renault-Avro is now fully equipped with its wireless gear, and has already made several experimental wireless flights. Mr. Shaw is very pleased with the machine. It is an endless source of amusement to the personnel of the aerodrome, by the way, to see Mr. Shaw—who is one of the best pilots the "airway" has yet seen—floating about in the atmosphere, piloting a machine which is a cross between an Avro and a D.H.6.

The Lighting of the Airway

Mr. Leysmith is back on the aerodrome running over his searchlights, but tells me that he is returning to Lympne to continue the work of illuminating that aerodrome in about a week. There appears to be a peculiar fascination about Lympne which attracts all who have had occasion to visit the place. Once anyone gets down there for a short time it is difficult to induce him to leave. Mr. Leysmith says "it grows on you" during the second week. Perhaps the welcome extended by Messrs. Davies and Deacon has something to do with it.

The lighthouse ceased to function on Friday and is already being dismantled prior to being removed to Titsey Hill. In anticipation of extra demands upon it, the "cone-light" is being overhauled, and the outside paint is having a good wash.

Saturday was a day full of incident. The sudden clearance of the weather, after a week of fog and gloom, evidently attracted people to the aerodrome. Mr. Larry Carter, who has completed his contract in connection with the delivery of Bristols to Spain, was back on the aerodrome, looking hopefully around for other fields to conquer.

Mr. Herne is also back from the land of bull-fights, and flew off to Brussels in one of the Disposal Company's machines.

An Aerial Chapter of Accidents

No fewer than six machines started out from the Disposal Company's factory for Brussels, and out of these six, four came to grief. Mr. Forestier-Walker had barely risen from the aerodrome when his engine cut out, and his machine crashed on its nose perilously near the corrugated iron fence which the powers-that-be have erected—so some pilots say—in order to make things more difficult. His machine was a total wreck, but Mr. Forestier-Walker escaped injury.

Mr. Haynes, who was, it will be remembered, at one time pilot for the Leatherhead Aviation Services, got as far as Lympne with his machine, and then news arrived that he was unable to proceed owing to a broken propeller. How this came about is not as yet known.

Two other machines, flown by Messrs. Stocken and Elton, were reported to have crashed in France or Belgium, but full details are not as yet available. The remaining two—one piloted by Mr. Herne and the other by Captain Muir—were compelled to descend before reaching their destination, probably on account of weather. The machine which Captain Muir was piloting was the one presented by the Aircraft Disposal Company to the Queen of the Belgians.

The four new hangars being erected near the public enclosures are rapidly approaching completion, workmen being engaged this morning in putting on the canvas covers. They are to be provided with concrete floors; which will be a great improvement on the old hangars, simply erected on virgin soil. Enlargements are also being made to the enclosure which contains the various notice boards and the traffic-movement board. It is probable that some new boards, including the large weather-map, will be erected there shortly.

Arrangements are in being for a race between M. Sadi Lecointe, piloting his Nieuport-Delage, and Mr. J. James on the Napier-engined Gloucestershire Mars, to take place on Easter Monday. M. Lecointe is expected at the aerodrome shortly to decide whether it is big enough to land his machine in. If his decision is satisfactory there is little doubt but that the race will take place.

ROYAL AERONAUTICAL SOCIETY

Lectures.—Dr. Pullin's lecture having been postponed from February 2 to March 16, the next meeting will take place on February 16 at 5.30 p.m. at the Royal Society of Arts, when Sqdn.-Ldr. C. F. Portal will read a paper on "Methods of Instruction in Aeroplane Flying."

Examinations.—It would greatly assist the Council in making the necessary arrangements if intending candidates for the Society's Associate Fellowship examinations to be held in April next would send in their names provisionally as early as possible.

Library.—The following books have been received and placed in the Library: "Structural Analysis and Design of Airplanes," by Maj. T. H. Bane; "Five Years in the Royal Flying Corps," by Maj. J. T. B. McCudden; "The Red Air Fighter," by M. Freiherrn von Richthoven.

W. LOCKWOOD MARSH,
Secretary

PERSONALS

Married

John Mecredy McAlery, R.A.F., only son of the late Rev. John McAlery, co. Antrim, and Mrs. J. O. Campbell, Moyallon, Annadale, Belfast, was married on January 27, at St. George's Registry Office, to Cecily Mary, elder daughter of Mr. and Mrs. Scott-Holmes, of Norwich, and granddaughter of the late Major H. T. Holmes, of Wacton House, Norfolk.

The marriage took place on December 21, 1921, at Christ Church, Cawnpore, India, of Flight-Lieut. Frederick James Watts, 31st Squadron, R.A.F., eldest son of Mr. and Mrs. F. Watts, Wanstead, Essex, to Miss Edith Vernon, B.Sc., elder daughter of Mr. and Mrs. W. Vernon, of "Chorley Wood," Cawnpore, and "Pahargarh," Matley, Cheshire.

To be Married

The engagement is announced between Flight-Lieut. R. E. Nicoll, R.A.F., youngest son of the Rev. C. A. S. and Mrs. Nicoll, of St. Leonards-on-Sea, and Dulcie, daughter of Colonel F. G. Langham, C.M.G., and Mrs. Langham, of Hastings.

Death

Cyril Fenton, late Lieut., R.F.C., eldest son of George Fenton, of Carlton, Victoria, died on January 21 of a malady contracted while a prisoner of war in Germany.

"R.38" MEMORIAL RESEARCH FUND

Third List of Donations received, January 27, 1922.—Lord Invernairn, £105; Viscount Cowdray, £52 10*s.*; 12th Squadron, Royal Air Force, Germany, £43 7*s.* 3*d.*; Proprietors of the *Daily Telegraph*, £25; Sir John Hunter, £20; Sir J. Maclay, £10 10*s.*; Lord Glentanar, £10; V. Stefanson, £10; Griffith Brewer, £10; 2nd Squadron, Royal Air Force, Fermoy, £9; 47th Squadron, Royal Air Force, Hewlan, Egypt, £7 11*s.* 7*d.*; Sir Mortimer Singer, £5; Flight-Lieut. A. S. Booth, £5; Mrs. Lockwood Marsh, £3; Anon., £3; H. B. Wyn-Evans, A. H. Ashbolt, A. P. Cole, Mrs. N. G. H. Hodgson, G. Reid, S. Payne, A. E. L. Chorlton, Squadron-Leader D. Harries, Maj.-Gen. W. Gwatkin, Canadian Air Force, £2 2*s.* each; Anon., £2; Flying Officer J. S. G. Wrathall, £1 10*s.*; Flight-Lieut. H. C. Irwin, Rev. Basil Phillips, E. H. Lewitt, Maj. C. F. Abell, Col. Ivan Davson, £1 1*s.* each; Flight-Lieut. J. Barron, £1; Maj. G. H. Abell (second donation), 10*s.* 6*d.*; A. E. Marsland, 10*s.* 6*d.*; Capt. J. B. Walker, 5*s.* Previous lists published, £851 3*s.* Total, £1,200 0*s.* 10*d.*

The Council of the Royal Aeronautical Society have appointed a committee consisting of Prof. L. Bairstow, Wing-Cmdr. T. R. Cave-Browne-Cave, Maj. R. V. Southwell and Maj. H. E. Wimperis to consider the administration of the fund.

THE ROYAL AIR FORCE

London Gazette, January 24, 1922

General Duties Branch

The following Flt. Cadets having successfully passed out of R.A.F. (Cadet) College, are granted perm. commns. as Plt. Offrs., effect from Dec. 20: G. H. Mills, J. B. Barrett, R. N. Waite, W. J. M. Akerman, A. P. Revington, N. C. Hayter-Hames, M. B. Mackay, R. D. Whelan, R. A. R. Mangles, J. R. Brown, G. C. B. Bernard-Smith, F. C. T. Rowe, D. W. F. Bonham Carter, F. G. S. Mitchell, W. A. D. Brook, C. W. Gore, R. A. B. Stone, C. L. Falconer, G. Combe, T. J. Desmond, G. W. Gay, E. V. S. Lacey, C. M. O. O. Springfield, C. J. Stone, R. W. Poutifex, M. H. Garnons-Williams, J. G. Hawtrey.

Lieut. F. J. C. Rybot, R.G.A., is granted a tempy. commn. as a Flying Offr., on seconding for four years' duty with the R.A.F.; Jan. 9. Flying Offr. L. C. Pharoah-Band resigns his short service commn., and is permitted to retain rank of Lieut.; Jan. 25.

Memoranda

Sec. Lieut. C. R. Southey to be Lieut. (Ad.); March 5, 1919. Lieut. C. R. Southey is transfd. to the Unemployed List; May 26, 1919 (substituted for *Gazette*, July 18, 1919).

London Gazette, January 27, 1922

General Duties Branch

The follg. Pilot Officers, on probation, are confirmed in rank:—P. W. Adams, E. B. Addison, I. P. Anderson, E. J. Dashwood, A. D. Drysdale, A. M. Glover, A. L. Harris, G. P. F. Hill, E. C. N. Jeffries, L. G. A. Kirchener, R. P. Mollard, G. C. Sclater, J. A. R. Stevenson; Dec. 28, 1921. S. H. Cooper, C. Douglas, B. J. O'Connor Hanstock, R. C. Wansbrough; Jan. 4. T. J. Shaw; Jan. 5. D. R. Sharman, M.C.; Jan. 7. F. G. Whitmore; Jan. 8.

The follg. are placed on half-pay Scale B:—Flying Offr. C. C. Bazell; Jan. 23. Observer Offr. L. T. Kerry; Jan, 25.

Memorandum

The notification in the *Gazette* of March 25, 1919, concerning Sec. Lieut. J. Miller, is cancelled.

Erratum

Gazette of March 22, 1921, for D. MacLaren, read D. Maclaren.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Group Captains.—A. M. Longmore, D.S.O., to R.A.F. Depôt (Inland Area). (Supernumerary.) Whilst attending Army Staff College, Camberley. 23.1.22. J. G. Hearson, C.B., D.S.O., from R.A.F. Depôt (Inland Area) to British Delegation, Paris. As British Air Representative, *vice* Group Captain P. R. C. Groves, C.B., C.M.G., D.S..O 3.2.22.

Wing Commanders.—L. A. Pattinson, D.S.O., M.C., D.F.C., to R.A.F. Depôt (Inland Area). (Supernumerary.) Whilst attending Army Staff College, Camberley, on ceasing to be attached to School of Army Co-operation. 23.1.22. G. B. Hynes, D.S.O., from R.A.F. Depôt (Inland Area) to Royal Aircraft Establishment, S. Farnborough. For Experimental duties. 19.1.22. F. H. Kirby, V.C., O.B.E., D.C.M., from Headquarters, Inland Area, to No. 4 Stores Depôt. Attached for course of instruction. 28.1.22. A. D. Cunningham, C.B.E., from R.A.F. Depôt (Inland Area) to Iraq Group Headquarters (Middle East Area). For Personnel Staff duties at Area Headquarters (on formation). 19.1.22.

Squadron Leaders.—A. A. B. Thomson, M.C., A.F.C., from R.A.F. Depôt (Inland Area). To command No. 39 Squadron (Inland Area). 18.1.22. T. S. Impey, from No. 39 Squadron (Inland Area) to R.A.F., Depôt (Inland Area). (Supernumerary.) 21.1.22. J. T. Whittaker, M.C. from Inter-Allied Aeronautical Commission of Control (Germany). To command No. 100 Squadron (No. 11 (Irish) Wing). 1.2.22. B. E. Smythies, D.F.C., from R.A.F. Depôt (Inland Area). To command No. 3 Flying Training School (Inland Area). 28.1.22. W. B. Cushion, from Inland Area Aircraft Depôt (Inland Area) to No. 29 Group Headquarters (Coastal Area). 23.1.22. W. W. Shorten, F.R.C.S. (E.), from Central Medical Board (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). For duty as Medical Officer at R.A.F. Hospital, Halton. 16.1.22. F. A. Baldwin, from Air Ministry (Directorate of Equipment) to Iraq Group Headquarters (Middle East Area). For Stores duties at Aircraft Depôt (on formation). 19.1.22. A. J. Currie, from Record Office (Inland Area) to No. 216 Squadron (Middle East Area). (Supernumerary.) 12.1.22.

Flight Lieutenants.—R. B. Munday, D.S.C., from Inter-Allied Aeronautical Commission of Control (Germany) to R.A.F. Depôt (Inland Area). (Supernumerary.) 16.1.22. W. L. Shaw, M.B.E., from School of Army Co-operation (Inland Area) to Inland Area Aircraft Depôt (Inland Area). 16.2.22. E. Drudge, M.B.E., from Instrument Design Establishment (Inland Area) to Half-pay List, pending embarkation overseas. 31.1.22. R. J. O. Compston, D.S.C., D.F.C., to R.A.F. Depôt (Inland Area). (Supernumerary.) 29.11.21. H. S. C. Starkey, O.B.E., M.D., M.A., from Research Laboratory and Medical Officers' School of Instruction (Inland Area) to Central Medical Board (Inland Area). 16.1.22. A. S. Maskell, to R.A.F. Recruiting Depôt, Portsmouth, on completion of duty at R.A.F. Recruiting Depôt, Plymouth. 18.1.22. D. Cloete, M.C., A.F.C., from Half-pay List to South African Air Force. (On secondment.) 21.7.21. C. R. Cox, A.F.C., from No. 5 Squadron (India) to R.A.F. Depôt (Inland Area). (Supernumerary.) 27.12.21. R. B. Munday, D.S.C., from R.A.F. Depôt (Inland Area) to Headquarters, Coastal Area. 1.2.22. A. J. Briddon, from Egyptian Group Headquarters (Middle East Area) to R.A.F. Depôt)Inland Area). (Supernumerary.) 9.1.22. F. Tedman, M.B.E., from Aircraft Depôt, Egypt (Middle East Area) to R.A.F. Depôt)Inland Area). (Supernumerary.) 9.1.22. J. L. L. Dufius, from Headquarters, Middle East Area, to R.A.F. Depôt (Inland Area). (Supernumerary.) 9.1.22. A. C. Randall, D.F.C., from R.A.F. Base, Gosport (No. 210 Squadron) (Coastal Area) to No. 203 Squadron (Coastal Area). 30.1.22. F. W. Walker, D.S.C., A.F.C., from R.A.F. Base, Gosport (No. 210 Squadron) (Coastal Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22. F. G. M. Williams, from R.A.F. Depôt (Inland Area) to No. 4 Stores Depôt. For course of instruction. 28.1.22. V. J. B. Jacobs, from Headquarters, Coastal Area, to, No. 4 Stores Depôt. For course of instruction. 28.1.22. F. J. Cooke, from No. 1 Stores Depôt to No. 4 Stores Depôt. For course of instruction, on ceasing to be attached to Port Detachment. 28.1.22. T. E. Drowley, from Air Ministry (Directorate of Equipment) to No. 4 Stores Depôt. For course of instruction. 28.1.22. E. W. Crosbie, from School of Technical Training (men) (Inland Area) to No. 4 Stores Depôt. For course of instruction. 28.1.22. C. R. Richardson, from No. 6 Flying Training School (Inland Area) to No. 70 Squadron (Middle East Area). 19.1.22. T. G. Skeats, from R.A.F. Depôt (Inland Area) to Iraq Group Headquarters (Middle East Area). On ceasing to be attached to Air Ministry (Directorate of Equipment). 19.1.22. J. W. Woodhouse, D.S.O., M.C., from R.A.F. Depôt (Inland Area) to No. 1 Flying Training School (Inland Area). 1.2.22. J. S. T. Fall, D.S.C., A.F.C., from No. 203 Squadron (Coastal Area) to Marine and Armament Experimental Establishment (Coastal Area). (Supernumerary.) For training as Experimental Pilot. 7.2.22. T. P. Y. Moore, from School of Naval Co-operation and Aerial Navigation (Coastal Area) to No. 216 Squadron (Middle East Area). (Supernumerary.) 21.1.22. A. R. Mackenzie, from No. 1 School of Technical Training (Boys) (Halton) to No. 216 Squadron (Middle East Area). (Supernumerary.) 21.1.22. J. E. M. Atherley, from No. 1 Wing Headquarters (India) to R.A.F. Depôt (Inland Area). To join 24.3.22. (Supernumerary.) 28.12.21. A. S. Goodwin, from Headquarters R.A.F., India, to R.A.F. Depôt (Inland Area). (Supernumerary.) 28.12.21. E. N. H. Gray, D.P.H., from Headquarters, R.A.F., India, to No. 27 Squadron (India). For duty as Medical Officer. 2.1.22.

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R.A.F. Commissions

It is announced in the *London Gazette* of January 24 that the following Flight Cadets, having successfully passed out of the R.A.F. (Cadet) College, are granted permanent commissions as Pilot Officers, with effect from December 20, 1921:—

G. H. Mills.
J. B. Barrett.
R. N. Waite.
W. J. M. Akerman.
A. P. Revington.
N. C. Hayter-Hames.
M. B. Mackay.
R. D. Whelan.
R. A. R. Mangles.
J. R. Brown.
G. C. B. Bernard-Smith.
F. C. T. Rowe.
D. W. F. Bonham Carter.
F. G. S. Mitchell.
W. A. D. Brook.
C. W. Gore.
R. A. B. Stone.
C. L. Falconer.
G. Combe.
T. J. Desmond.
G. W. Gay.
E. V. S. Lacey.
C. M. O. O. Springfield.
C. J. Stone.
R. W. Pontifex.
M. H. Garnons-Williams.
J. G. Hawtrey.

R.A.F. in the Mediterranean

Fleet orders state that the new system of pay accounting to be introduced in the Mediterranean group of the Royal Air Force on April 1 next will be extended to include officers of the Royal Air Force borne on H.M. ships in the Mediterranean as from that date. All R.A.F. officers and men serving in these ships will be borne for pay on the ledgers of the R.A.F. Accountant Officer, Malta.

R.A.F. Sports Board

Fixture List for February, 1922.—February 4, Rugby, R.A.F. *v.* Royal Navy at Queen's Club (R.A.F. Rugby Union General Meeting at 1 p.m.). February 10, Fencing, R.A.F. *v.* Birmingham Athletic Club at Uxbridge. February 10, Association, Semi-Finals, Cup Competition at Uxbridge. February 15, Fencing, R.A.F. *v.* Cambridge University at Cambridge. February 15, Association, Final, Cup Competition at Uxbridge. February 18, Rugby, R.A.F. *v.* United Services, Devonport, at Devonport. February 22, Hockey, R.A.F. *v.* Army at Aldershot. February 22 and 23, Boxing, Team Boxing Championships at Cranwell. February 27, Hockey, R.A.F. *v.* Cambridge at Cambridge.

R.A.F. Team Boxing Championships.—The Annual Team Boxing Championships of the Royal Air Force are being held this year at Cranwell on February 22 and 23. This is actually the first time the Team Championships have been held, as the meeting arranged last year had to be cancelled at the last minute owing to industrial trouble.

The Air Force at home has been split up into "Groups" for purposes of entering teams, and each group may enter a team of officers and a team of airmen, each team entering one competitor in each weight.

Boxing is becoming increasingly popular in the Air Force, particularly among the airmen, and all the competitions are well supported.

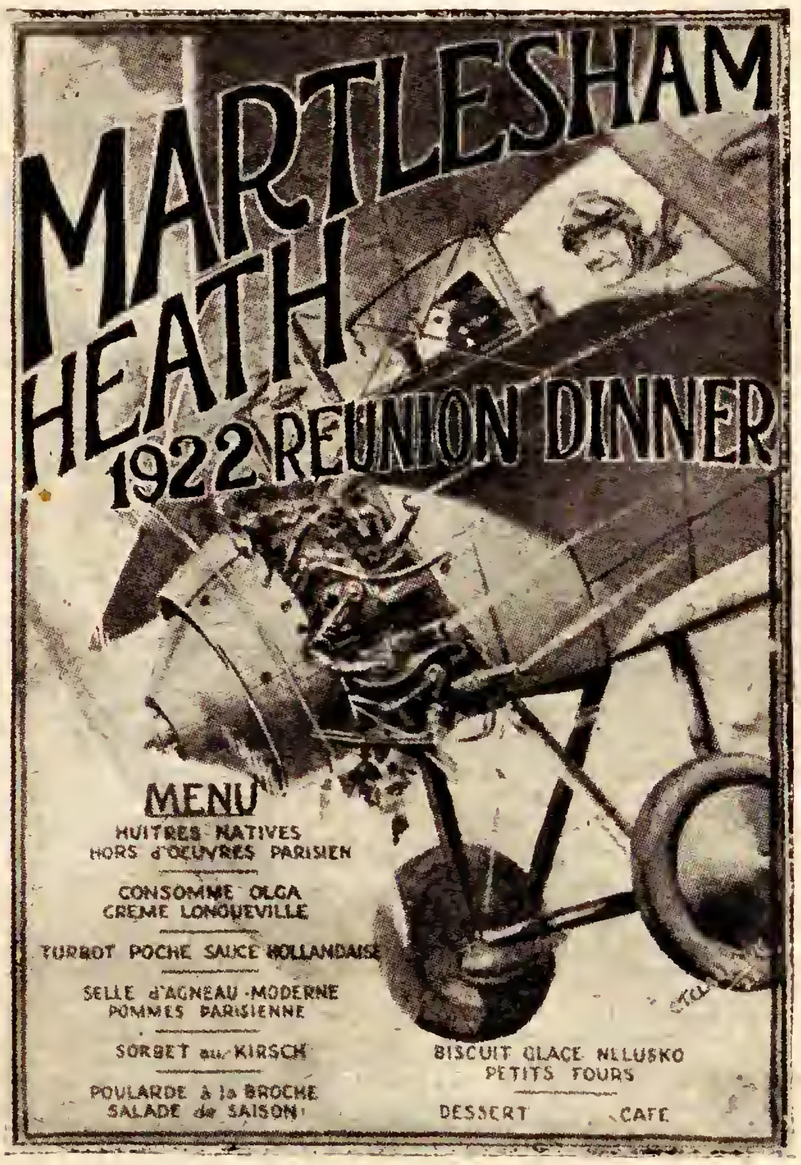
With the approach of the Imperial Services Boxing meeting at Halton Camp, a careful watch is being kept for any new talent, as the Air Force has recently lost the services of Flight Lieut. P. W. Smith, who won the Light Weights (Officers) at the I.S.B.A. Meeting in 1920 and 1921, and also of A/C. Mills, who won the Light Weights (Other Ranks) in 1921

MARTLESHAM HEATH RE-UNION DINNER.

MARTLESHAM'S second annual re-union dinner was held on January 20 at the Café Royal, Regent Street, Brig.-Gen. R. K. Bagnall-Wild, C.M.G., C.B.E. (Director of Research), presiding.

After the Chairman had proposed the King and the Royal Air Force, Maj. Barlow proposed "Past Members," to which Maj. Geddes briefly replied. Squadron-Leader Vernon Brown then proposed "Present Members," to which Squadron-Leader Maund replied.

Maj. R. H. Mayo, who had come over from Paris for the dinner, proposed "The Director of Research," and in his speech compared the British and French methods of testing, and pointed out that any Martlesham figures which get to France are always accepted. Gen. Bagnall-Wild, in his reply, spoke hopefully of the future as regards experimental and research work, and finished his speech with some interesting and amusing stories.



The Martlesham Heath Dinner Menu.

The rest of the evening was taken up with a short musical programme, the two artists being Squadron-Leader Vernon Brown, who sang, and Flying Officer Wallwork, who played some lively tunes and popular choruses.

It was agreed, at the close of the evening, that the dinner was a great success, more so even than the first. Therefore it is hoped that the third dinner, which will be held in January, 1923, and subsequent re-unions, will be so supported that each will make a record advance in enjoyment upon the last.

Airship Officers' Club Dinner

THIS re-union dinner in February will be held at the Connaught Rooms at 7.45 p.m. Mr. Ashbolt, Agent-General for Tasmania, is amongst others who will be present.

* * * *

PUBLICATIONS RECEIVED

Rendiconti dell' Istituto Sperimentale Aeronautico. Series 2a, No. 4. "Rendiconti" Libreria di Scienze e Lettere, Piazza Madama 19-20, Rome, Italy. Price L.15.

Rapports, Premier-Congres International de la Navigation Aérienne, Paris, 15-25 Novembre, 1921. *Vols. I and II.* Ed. Blondel la Rougery, 7, Rue Saint-Lazare, Paris.

Lexique Technique Anglais-Français. By G. Malgorn. Paris : Gauthier-Villars et Cie., 55, Quai des Grands-Augustins. Price 10 francs.

The London Aero Models Association

ANNUAL general meeting held on January 19, 1922. The following members were elected to office for the ensuing 12 months : Vice-President, Mr. C. J. Lane ; Chairman and Hon. Secretary, Mr. A. E. Jones ; Treasurer, Mr. E. Coleman ; Technical Secretary, Mr. A. B. Clark ; Assistant Secretaries, (1) Mr. A. Rippon, (2) Mr. H. Best, and (3) Mr. L. Hatfull. Auditors, Mr. F. de P. Green and Mr. W. G. Evans.

Grand Committee : Mr. F. J. Camm, Mr. F. de P. Green, and Mr. C. J. Lane.

General Purposes Committee : Messrs. G. A. Brown, C. J. Burchell, L. Grey, G. Hayden, F. Kelly, M. Levy, J. Louch, F. Plummer, D. A. Paveley, H. Waghorn, C. H. Whelpton, A. Wilson.

Revision of general rules : a copy will be sent to all members in due course.

January 26 Mr. F. J. Camm gave the first part of his lecture on Model Aeronautical Research, which was very much appreciated by all present. The lecture will be continued on Thursday, February 16, 1922.

Thursday, February 2, a General Purposes Committee Meeting will be held. The agenda will be Status of Country Members.

On February 9, 1922, a Smoker will be held.

Meetings are held at 20, Great Windmill Street, Piccadilly, W. 1, at 7.30 p.m. every Thursday. Hon. Secretary, Mr. A. E. Jones, 48, Narcissus Road, West Hampstead, London, N.W. 6.

* * * *

SIDE-WIND

WITH regard to the very pretty aeroplane presented to the Queen of Belgium by the Aircraft Disposal Co., it is interesting to learn that this machine was doped with Titanine and finished in the Titanine aluminium doping scheme.

* * * *

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Abbreviations : cyl. = cylinder ; I.C. = internal combustion ; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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(*Continued from* p. xii.)

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The AIRCRAFT ENGINEER & AIRSHIPS

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EDITORIAL COMMENT

The Air Conference

OWING to the fact that these comments are being written on the first day of the Air Conference, the interesting remarks which will no doubt be made during the discussions taking place on the second day cannot be included in this week's issue of FLIGHT. As the discussion of papers is often more interesting and instructive than the paper itself, this is unfortunate but unavoidable. Next week we hope to deal with more of the papers, and also with the discussions following them and the reading of the paper on "Civil Aviation" by Lord Gorell, Under-Secretary of State for Air, a *résumé* of which is published elsewhere in this issue of FLIGHT.

As regards the Conference itself, it is too early yet to express an opinion on whether or not it has proved a success, and likely to attain the object for which it has been called, which is, presumably, to afford an opportunity for bringing together those who are interested in the art and science of aviation, and those to whom we must look for that general utilisation of flying which alone can establish that prosperous aircraft industry which is an essential to the future safety of the Empire. The discussions will no doubt go a long way towards establishing whether or not this aim has been attained. In the meantine, one judges from the attendance at Waddon aerodrome on Monday and at the Guildhall on Tuesday that considerably greater interest is being taken in the Conference this year than was the case in 1920. Representatives of a number of foreign powers were seen at Croydon and also at the Guildhall, and especially was Japan well represented. In view of the fact that the Air Conference is not, unfortunately we think, of an international character, this is all to the good, and is an indication that these conferences, which are looked upon as mere "stunts" in several quarters, are regarded by a good many foreign nations, at any rate, as something more, and something from which valuable information may be gathered. Next year it is to be hoped that it will be found possible to make the Air Conference international, so as to afford an opportunity of discussing in public a matter which is of the very greatest importance to all civilised nations, and which must of necessity be greatly of an international character, the more so as air traffic increases and more and more countries are linked togther by the airways.

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Lord Gorell on Civil Aviation

The paper on "Civil Aviation" read by Lord Gorell, Under-Secretary of State for Air, had been looked forward to with a considerable amount of expectancy, as it was generally supposed that the paper would contain an explanation and defence of the past policy of the Government, and an indication of future developments. To a certain extent these anticipations proved correct, as will be gathered by a perusal of the *résumé* of the Under-Secretary's paper published elsewhere in this issue. However, there was probably less of apology in it than many had expected, and the noble Lord stated—in quite a dignified and statesmanlike way, we think—the reasons which have led to the policy adopted and those which have caused so many of the suggested schemes to be abandoned. On the whole we do not think there is a great deal wherewith to find fault. If the country is unwilling to spend more money on the development of an industry upon which vastly more depends than is dreamt of by the vast majority of the general public, well it cannot expect to see very rapid progress being made. In the meantime, however, other countries are taking a different view of the matter, and, although there is a great deal in Lord Gorell's contention that what suits, for instance France, would not necessarily suit us, we cannot help thinking that a great deal more might have been done than has been done to render assistance to civil aviation. Presently we will indicate one way in which Government action could assist, without entailing any, or at any rate but a very minute, sacrifice on the part of the taxpayer. In the meanwhile, there are one or two points in the Under-Secretary's paper which call, we think, for comment.

For instance, Lord Gorell expresses the opinion that " in the future the main air lines of the British Empire will be primarily airship lines with branch aeroplane lines running off from them." With whose airships are these lines to be operated? Surely we do not contemplate the acquisition of flying stock from our late enemies, while our own technical staffs are being allowed to disperse and the few existing ships allowed to " rot " in their sheds? It is true that Lord Gorell followed up the expression of his hopes for future airship lines by stating that " suspension of activities, being based solely upon financial considerations at the present time, can have no finality about it." If Lord Gorell, and the Government which he represents, does not make up his mind very soon, we venture to say that there *will* be finality about it, for the simple reason that we shall neither have the technical staff nor the requisite works for the production of anything larger than a kite balloon.

Lord Gorell complains of the relatively small interest taken by the general public in air mails. We would respectfully point out that this lack of interest although admittedly to a certain extent due to the present inability of aeroplanes to make regular night flights, is to a far greater extent due to the indifferent way in which the majority of post offices deal with the question of air mails. Not only do the majority of the officials know precious little about times of posting, fees, saving in time, etc., but as often as not the little blue labels are out of stock, or someone has mislaid them, or some other equally futile excuse for indolence. Furthermore, the inconspicuous notices put up in post offices are certainly not calculated to attract a great deal of attention. Something of a much more striking nature is required if public attention is to be called to the use of the air mail. During the War the Government made good use of advertising in its various forms, and if the G.P.O. is so anxious to help as Lord Gorell would have us believe, it might prove a good business investment to spend a little more on advertising the air mail.

We might also add that the relative failure of the air mail on the London-Paris route is in a great measure due to the fact that the terminal arrangements for dealing with the mail are too prehistoric compared with the aeroplanes themselves. It is of little use hurrying mails across from Croydon to Le Bourget in a couple of hours if three or four hours are wasted at each end in getting the mails to and from the aerodrome and distributed.

That, under these conditions, the public response has been small is scarcely to be wondered at, but the fault does not lie with aviation. The terminal arrangements could be improved to such an extent that, even without flying at night, the use of air mails to Paris would be well worth while. Lord Gorell further says that if aviation can prove capable of carrying mails as reliably, as cheaply and faster than existing methods, then the G.P.O. would use the air mail. And small thanks to it. So would anyone but an imbecile. The trouble has been all the time that the whole thing has been run on such an absurdly small scale that it was impossible to make it cheap. Only by running air services on a large scale could they be made to pay, and that scale has not yet been attained, nor, it seems, is it likely to be, if we depend upon the Government to see to it.

In spite of the fact that it was suggested over and over again in the past, and very specifically by Mr. Holt Thomas more than two years ago, nothing has been done yet, and we could have wished that Lord Gorell would have quoted Holt Thomas on this subject as he has quoted him towards the end of his paper. We are referring to the resolution passed at the previous Air Conference to send all first-class mail by air. This was proposed by Mr. Holt Thomas, and the resolution was passed unanimously. There is not the slightest doubt that if this were done mails could be carried at rates very little, if any, higher than existing ones. It would thus not impose any hardships upon the users of the air mail, and in any case, with proper terminal arrangements, the saving in time which could be effected would not make it a great hardship on users of the air mail to pay a little higher for the privilege of the improved communications. If night flying were rendered possible—as Lord Gorell seems to think this essential—the position would be even more in favour of air mails, and, with all due respect, we would humbly point out that night air mails have been perfectly possible for the last three years. It would only require a few small non-rigid or semi-rigid airships to maintain a regular night service between London and Paris. With the wireless and meteorological facilities now available, this would entail no difficulties, and as Lord Gorell has expressly stated that he believes one type of aircraft to be complementary to the other, he has here an opportunity of demonstrating the courage of his convictions.

If all first-class mail matter to France and the East were compulsorily sent by air mail, aeroplanes being used for the day mails and small airships for the night mails, the safety and regularity of running should be sufficient to satisfy even the G.P.O., and would have the advantages of assisting civil aviation, and through that the Empire generally, very materially, and at the same time need not entail any great expenditure of money over and above what is already being spent. A minor re-adjustment of the subsidies might be necessary, but, practically speaking, that would be all.

These comments more or less apply also to Lord Gorell's statement that we must concentrate on the Channel services, and must learn how to make one service, a commercial service, a success. If the mails were sent by air as a matter of course, this would

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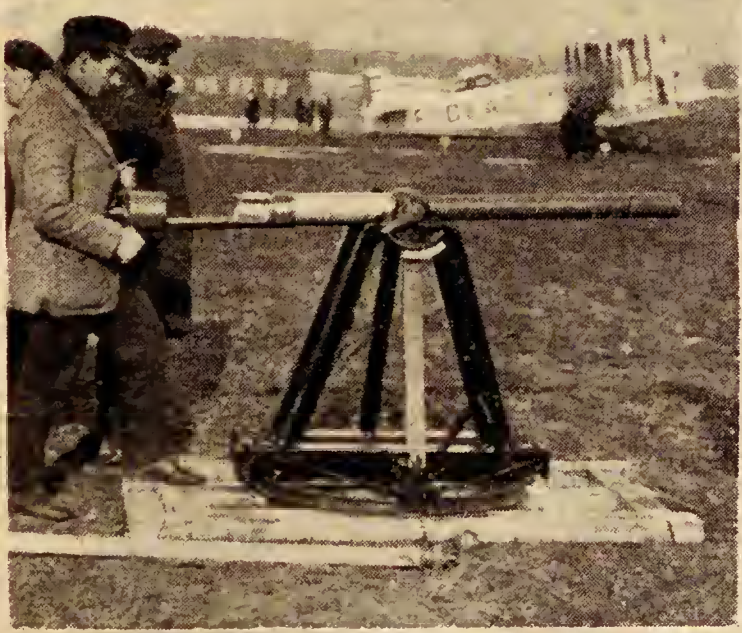

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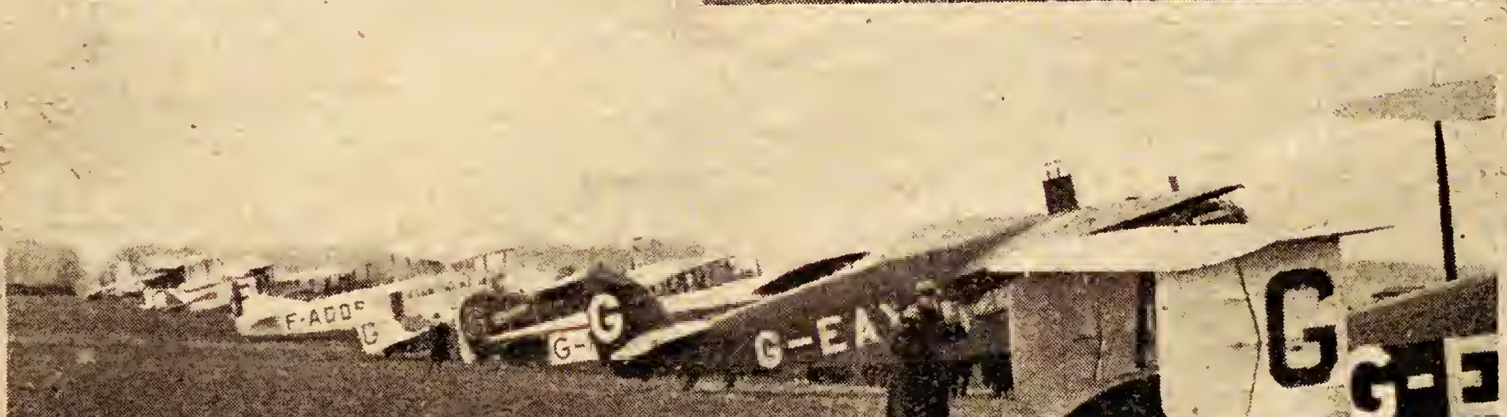

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FROM THE AIR CONFERENCE VISIT TO WADDON : The upper picture shows visitors inspecting the machines lined upon the aerodrome. The lower photograph gives a good idea of the different types of machines on view. Vickers "Vimys," "D.H." monoplane, and several types of "D.H." biplanes, Bristol Ten-seater, Farman Goliaths, etc. Fig. 2 shows the gun used for firing signals into the air, and in Fig. 3 is seen a row of flares of the type used for assisting pilots to land at night.

mean a certain fairly fixed income for the companies operating, and would go a long way towards minimising the losses which are now incurred owing to the failure of the Government to guarantee a certain load—which has resulted in the necessity for heavy subsidies.

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What of the Sea?

With regard to Lord Gorell's views upon Imperial air services, and his opinion that it is best to let these be established by the R.A.F. for linking up its various centres, we are not inclined to quarrel with this. As things are at present, this is probably the best policy, and, as the Under-Secretary stated, the time may be nearer than one is inclined to think when the establishment of Imperial air services, with aerodromes adjoining, or forming part of, R.A.F. stations will enable such services to be operated with some prospect of commercial success. We should like to point out, however, that this day might be brought appreciably nearer if we paid more attention to the aircraft which should be to us, as essentially a maritime nation, the most natural, indeed the most obvious, type of aircraft of all, *i.e.*, the seaplane with its latest development the amphibian. By utilising seaplanes Imperial air services could be, in many instances, established with a very small outlay of money, as no prepared aerodromes are required, and floating repair and fuel depôts could be established and maintained at relatively low cost. If the country cannot, or is unwilling to, find the money for Imperial airship services, we would urge that the possibility of employing seaplanes in conjunction, possibly, with existing routes now covered fairly regularly by the R.A.F. be given full consideration.

The seaplane offers many advantages over the land type of machine in many respects, although it may be admitted to be inferior in certain others. For instance, it does not, as we have already mentioned, require specially prepared aerodromes costing a lot of money to establish and maintain. The problems of flying at night or in a fog are far less serious where the seaplane is concerned than they are to land machines. It is quite a simple matter to provide instruments which will indicate to the pilot of a seaplane when he is 30 or 40 feet above the sea, and as he has only altitude and wind direction to worry about—and is not faced with the further problem of finding a comparatively small piece of specially prepared ground on which to land—his problems are greatly simplified.

It is generally alleged that the seaplane, and by this we mean both twin-float machines and flying boats, is inferior to the aeroplane in speed and load carrying capacity. If we compare the two for any given route, there may be a certain amount of truth in this allegation, although not, we are certain, nearly as much as generally imagined. But it should be borne in mind, and this fact is, we fear, universally overlooked by the advocates of the aeroplane as against the seaplane, that whereas the aeroplane has to compete against fast trains and, possibly, motor road transport, the seaplane has nothing worse to beat than a speed of, say, 20 m.p.h. Thus if a seaplane will do 70 m.p.h. cruising speed it is in an excellent position to compete for speed with any surface craft, while her useful load can then, owing to the relatively low speed required, be increased to exceed that of the aeroplane of the same power. Thus the main, indeed the only, objection raised against the seaplane falls to the ground, and we frankly confess that we are very greatly disappointed at the way in which the seaplane has been practically ignored at the Air Conference. Not a word is mentioned about it in Lord Gorell's paper, and it remains to be seen whether this subject is brought up during the discussions. We sincerely hope it is. The valuable pioneer work done by such firms as Shorts, Supermarines, Avros, Faireys, Vickers, etc., surely merits some mention. Even apart from commercial air lines, the seaplane is capable of very great services. This statement is not based upon conjecture, but on accomplished facts. For assisting out fisheries, for sealing, whaling, etc., for forest patrol and for surveying tracts or otherwise inaccessible land the seaplane can do and has done extremely valuable work, and it has done it in districts where the aeroplane would have been useless, owing to the absence of suitable landing grounds. Why, at a conference which is generally supposed to have been called to bring the various business interests into contact with the aviation industry and to show them the advantages which aviation can offer them, has the seaplane been left so severely alone? We hope that it is merely due to an oversight and not to any failure on the part of the Air Ministry to realise its possibilities.

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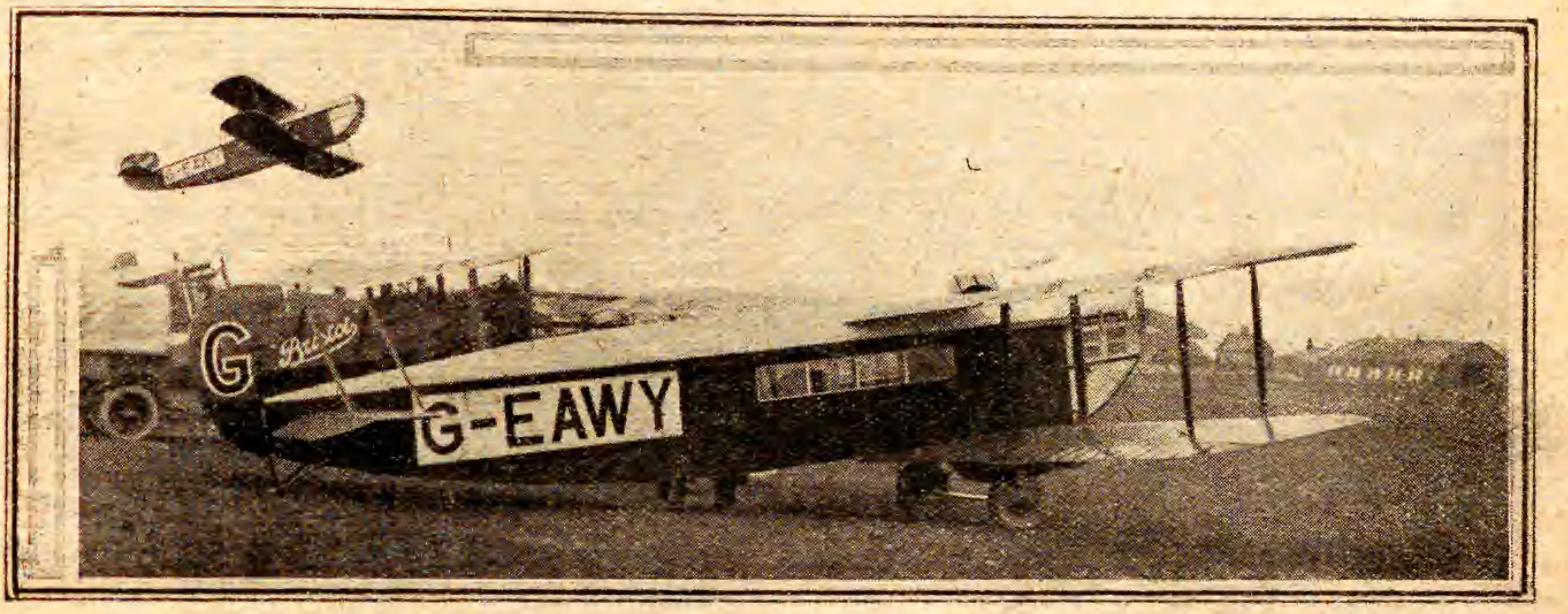
The Civil Aviation Advisory Board

Lord Gorell's announcement of the establishment of a body to be known as the Civil Aviation Advisory Board, and including representatives of the Air Ministry, the Controller of Civil Aviation, the D. of R., the G.P.O., the Associated Chambers of Commerce, Lloyd's, the Royal Aeronautical Society, the Air League, the Royal Aero Club, and the S.B.A.C., will, we feel sure, cause immense satisfaction. The greatest difficulty at the present time is not so much one of technical problems as it is one of bringing together the various institutions upon whose collaboration the rate of progress will mainly depend. If properly administered such a body as the new C.A.A.B. cannot fail to be of the greatest assistance to the industry, and, we think, through that to the country and Empire in general. We recommend to the C.A.A.B. in dealing with the first subject to be referred to them, to give due consideration to our remarks relating to the sending of all first-class mails by air, and the use of airships and seaplanes in addition to that of aeroplanes.

Finally, the opening pessimistic views of Capt. Guest at the Conference, as to home and European aerial routes, are not very re-assuring as to his being the right man in the right place as Secretary of State for Air, although his optimism upon the possibilities and necessities of Imperial air communications in a measure redeems the value of his opinions. But for the sake of our industry and aircraft generally there is one fact in the position which he and a good many are inclined to either ignore or wilfully to forget, and that is that the pace in aviation progress will not be confined to the pace set by our "ostriches"—our pace, presently, will *have* to be a bit better than that of some very lively nations who have very firm and advanced ideas of the future of aircraft. And thank God for it!

THE AIR CONFERENCE VISIT TO WADDON

EITHER the Air Council is especially favoured by Aeolus, or the Air Ministry Meteorological Service is better than generally thought. When visitors to the Air Conference made a tour of inspection of the London Terminal Aerodrome at Waddon on Monday, February 6, the weather was far and away better than one had any right to expect at this time of the year. There was practically no wind, and what little there was enabled the machines to take off and alight along the aerodrome instead of across it. There was blue sky and bright sunshine throughout the time of the visit, and altogether it would have been impossible to improve upon Nature's side of the ground organisation.



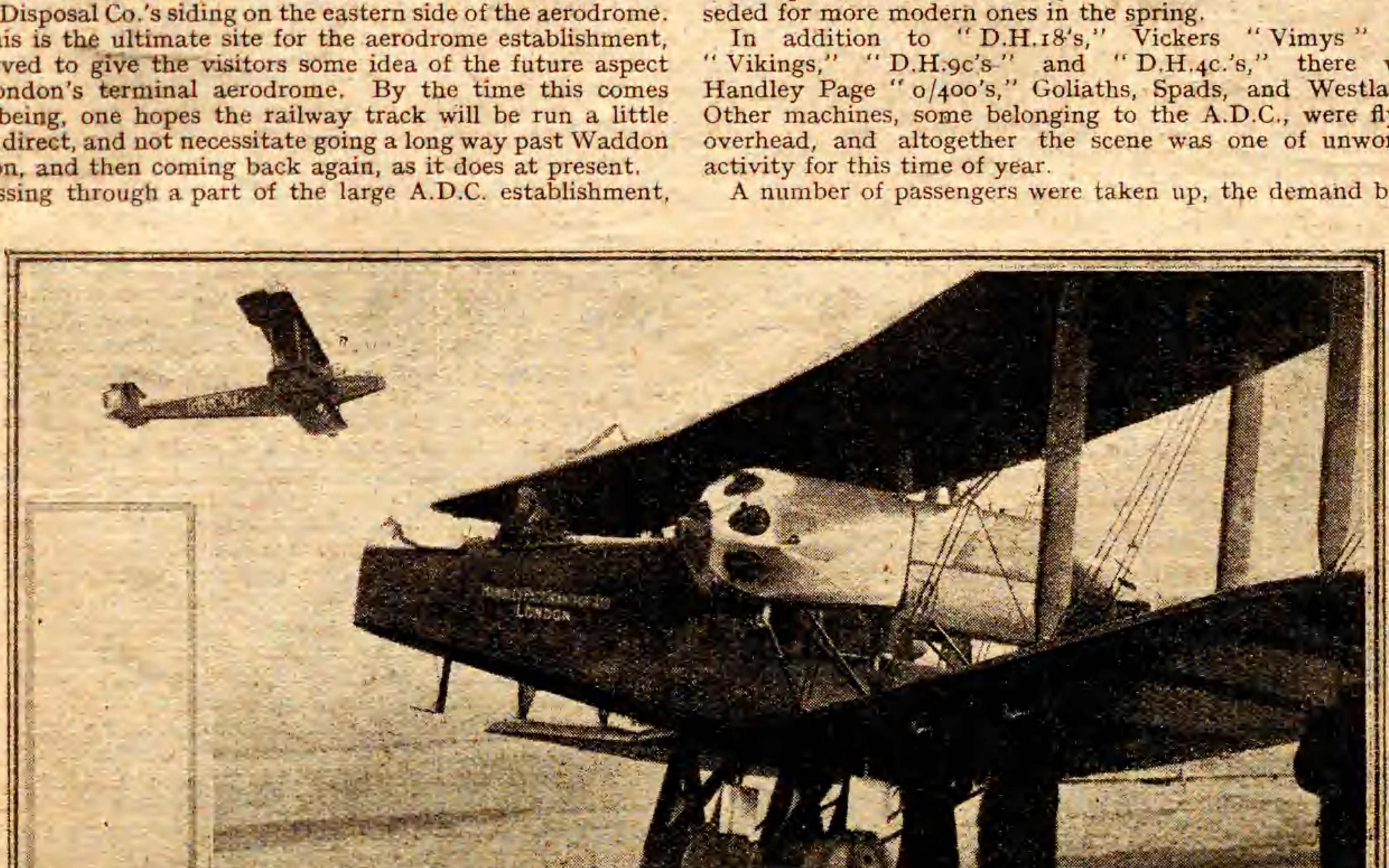
The Bristol 10-Seater. Inset, the machine in flight.

The visitors left Victoria by special train at 10 a.m., and, instead of being ferried across from Waddon station to the aerodrome in motor vehicles, the train was run into the Aircraft Disposal Co.'s siding on the eastern side of the aerodrome. As this is the ultimate site for the aerodrome establishment, it served to give the visitors some idea of the future aspect of London's terminal aerodrome. By the time this comes into being, one hopes the railway track will be run a little more direct, and not necessitate going a long way past Waddon station, and then coming back again, as it does at present.

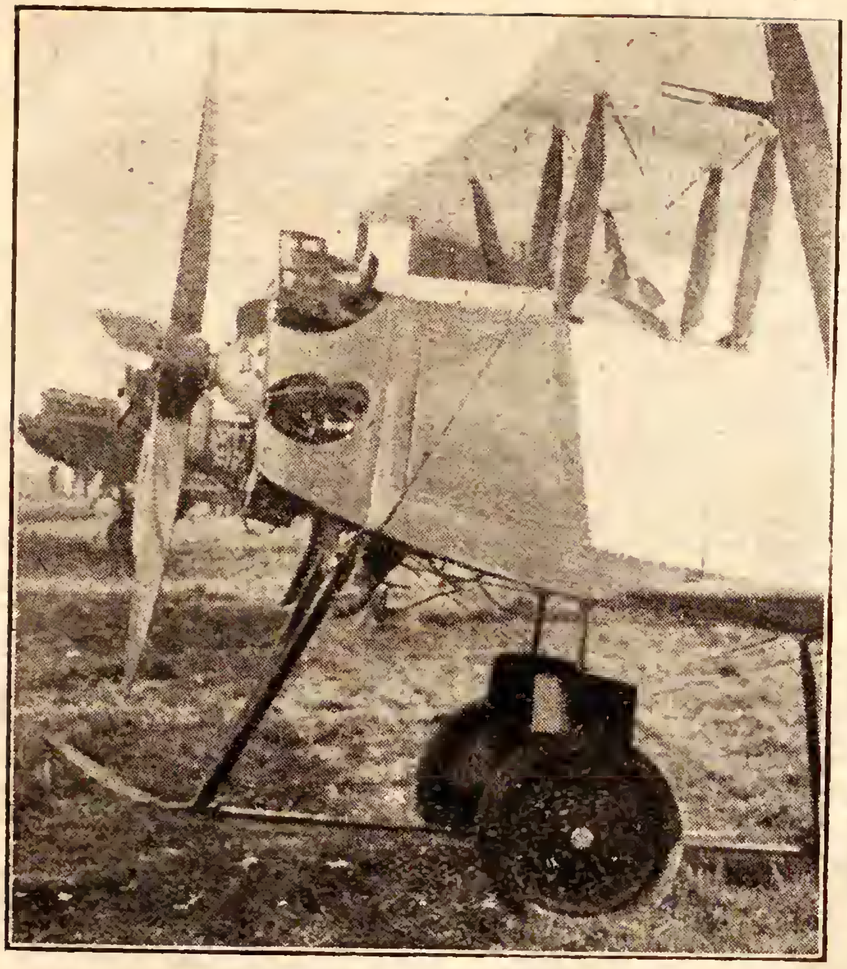
Passing through a part of the large A.D.C. establishment, the visitors were met by Sir Frederick Sykes, C.G.C.A., and General Festing, who informed them that this was the site on which, in the future, the machines would be stored, and the various offices situated, and that the buildings over by Plough Lane were temporary only. The party then divided into smaller groups, each under a guide, who conducted them over the aerodrome, and explained the various organisations, services, etc. A number of machines were drawn up for inspection, among which were some of the latest types such as the de Havilland monoplane, type 29, the Bristol Ten-seater, etc., while, by way of showing a racing aeroplane the Gloucestershire Aircraft Co.'s "Mars I" was also on view. There was a very good representation of older types, which, after all, are the machines that have done the pioneer work up till now, even if they will, most of them, be superseded for more modern ones in the spring.

In addition to "D.H.18's," Vickers "Vimys" and "Vikings," "D.H.9c's" and "D.H.4c.'s," there were Handley Page "0/400's," Goliaths, Spads, and Westlands. Other machines, some belonging to the A.D.C., were flying overhead, and altogether the scene was one of unwonted activity for this time of year.

A number of passengers were taken up, the demand being



The Handley Page 0-400 (2-400 "Jupiters"). Inset, in flight.



An Avro Biplane fitted with Armstrong-Siddeley radial engine.

especially brisk for the Bristol Ten-seater, whose very comfortably appointed cabin appeared to be a great attraction. The machine certainly flies very well, getting off quickly, and landing very smoothly. The Vickers "Vimys" belonging to the Instone Air Line did a lot of flying also with full loads, and, as usual, were extremely well handled by their pilots, doing banked turns at very steep angles, steep climbs, and other evolutions. The manner in which they were landed by their pilots, without a trace of a jolt, was the subject of appreciative comment by many visitors.

A Handley Page "0/400," fitted with two Bristol "Jupiter" engines, showed a most remarkable improvement in performance, getting off quite rapidly, and altogether handling much more "lively" than before the "Jupiters" were installed. We understand that, in its new form, the machine carries 900 lbs. more load, besides being a good deal faster, so that the "Jupiters" appear to have effected a very considerable improvement in this type of machine. One awaits with interest the arrival of one of the Bristol ten-seaters, fitted with this engine. By the way, the new Bristol gas engine starter is fitted to this Handley Page, being placed in the *fuselage*, and starting both engines in turn. The weight of some 50 lbs. or so of the starter is, of course, quite a negligible quantity in so large a machine.

An Avro fitted with Siddeley radial engine was on the ground, but was not flown. We understand that Mr. Hinkler, accompanied by his wife, flew the machine up from Hamble on Saturday in very thick weather. This machine is said to fly very well, and this makes yet one more type of engine to be fitted in the Avro. We still have hopes of seeing one fitted with a Napier "Cub" before we die.

A Vickers "Viking III" was also on view, but did not fly. The "Viking IV" was expected to be there, but was not seen. It is to be regretted that some of the other seaplane firms were not represented, many of whom have done extremely valuable work. At the previous Air Conference several amphibian machines were on view and flying, and the reduction to one representative (and that an old type) is greatly to be deplored, the more so as the British Empire offers an enormous field for seaplanes and amphibian machines.

After spending a couple of hours or so on the aerodrome, the visitors returned to Town, many extremely pleased with their flights, and who will do useful propaganda work in the future. Others take a more serious view of the situation, lamenting the small amount of progress, especially as regards really efficient commercial types, which the visit revealed. That several new types are coming along in about one or two months' time does not greatly help matters as regards the present visit, and, frankly, with the exception of two machines, there was no aeroplane at Waddon on Monday last which could not have been seen there also on the occasion of the last Air Conference in 1920. But perhaps we are making haste slowly.

On Tuesday morning, the Lord Mayor, Sir John Baddeley, welcomed the delegates to the Conference at the Guildhall, Capt. F. E. Guest, Secretary of State for Air, who presided at the morning session, following with some opening remarks. Lord Weir occupied the Chair during the afternoon Session. Capt. Guest said the object of the Conference as it appeared to him, was mainly to encourage civil aviation. It was eighteen months since they held their last Conference, and, during the interval, the Government had not been inactive. By its research programme, certain landmarks had been placed on record, which, though developed under the Service side of the Ministry, would be of permanent value to civil aviation as well. Although our development had been slow, yet it had been sure, and the best test of that was that our safety line was the highest in Europe.

There were remarkable figures to prove the high level of our safety line. During the past year, nearly 50,000 people had been carried in the air. There were 25,000 flights, and only two fatal accidents had been recorded. That, he submitted, showed that the safety line had reached a high standard. In regard to airships, in his view, the outlook was not hopeful. One of our great Dominions had shown a desire to join in an Imperial scheme, but he regretted that the Dominions of New Zealand and South Africa, owing to the stringency from which the world was suffering, did not so far see their way to co-operate. Complaints had been made that we were losing our premiership in this connection and surrendering our lead to other countries. He submitted that the information that had been available regarding the developments in other countries had been largely exaggerated, and we need not have any fears on that score. Another complaint was that the closing down of the airship branch of aviation would have the effect of dissipating and perhaps permanently losing all the staffs and designers, without whom it never could have been created. He thought that was true if the outlook were limited to a few years.

His belief, however, was that the period of depression would be longer, and that it might be many more years than two or three before there was sufficient spare cash to undertake this commercial venture. If the period of, say, ten years, were considered, and if the recommendation from some of them was that during that period a very heavy subsidy should be found from the Government to keep it going, he submitted that they could start it all again at the end of that period *de novo*, without its costing any more money. In his belief, taking the long view of aircraft traffic in general, there was little or no prospect of a real commercial success being obtained in Europe. England in the last few years had shown itself to be so well railway-loaded as to render it unattractive and unprofitable to develop aircraft from a commercial point of view. He was almost of opinion that that was true of Europe generally, and that the prospects of real commercial success in Europe were not very great, and would not be for many more years to come. He believed that to be true to a lesser extent in America also. Nor should they expect too much from the cross-Channel service from the commercial point of view.

But to counterbalance all this, there was an extremely bright outlook, so far as the British Empire was concerned, abroad. We were the one great Empire which had great spaces and distances unbridgeable except by sea, and it was to that aspect that our future attention should be directed. He could see in his mind's eye the possibilities of Imperial air communications on lines which might have struck many of them already. The transportation of both a mail and passenger service from London to India was, in a way, when accomplished, going to be of far greater value to the Empire, and, probably, of greater commercial success to those engaged in it, than that between Paris and London. He was rather hopeful that the far-flung Dominions would perceive that a sum of, say, £250,000, which was suggested in the Australian Parliament, might be available to join in the Imperial scheme, and that it would be many times more productive if linked up from the last portion of the route in the heavier-than-air service, from, say, Singapore to Australia. The tone for them to adopt during the present period was one of sure, simple, but not extravagant, optimism. The time should be spent, as he thought it had been in the last two years, in strengthening the liaison and co-operation between the Air Ministry and the aircraft industry, and they should have as their motto for the next year, "Sit tight, work hard, don't stunt, and be ready for better times."

The De Havilland "29" Monoplane paid a flying visit to Croydon on Monday.

THE AIR CONFERENCE

Résumé of Lord Gorell's Paper

The Second Air Conference, called by the Air Council, opened on Tuesday, February 7, at the Guildhall. The chairman, during the morning session, was the Rt. Hon. Capt. F. E. Guest, C.B.E., D.S.O., M.P., Secretary of State for Air, while the Rt. Hon. Lord Weir of Eastwood took the chair during the afternoon session. During the morning, papers were read by the Rt. Hon. Lord Gorell, C.B.E., M.C., Under-Secretary of State for Air, and by Lieut.-Col. W. A. Bristow, M.I.E.E., M.I.A.E., F.R.Ae.S. The afternoon session opened with a paper by Major F. M. Green, O.B.E., M.I.C.E., F.R.Ae.S., followed by papers by the Director of Research, Brig.-Gen. R. K. Bagnall-Wild, C.M.G., C.B.E. F.R.Ae.S. and by Major G. H. Scott, C.B.E., A.F.C., A.M.I.M.E.

Space does not permit of publishing all the papers this week, and we have had to content ourselves with publishing a *résumé* of the paper read by Lord Gorell, entitled "Civil Aviation." The subject is a large one, and the paper was, of necessity, a somewhat lengthy one. As, however, the Under-Secretary of State for Air dealt at some length with subjects with which readers of FLIGHT are already well acquainted, we have been able to condense portions of the paper very considerably, while in the case of others it is hoped that the main points made have been incorporated in the following *résumé*. In our Editorial Comments columns will be found certain comments on such portions of Lord Gorell's paper as seemed to us to call for special mention. As will be seen, our comments are in the nature of criticisms of certain omissions, rather than of anything stated by the Under-Secretary.

Factors of Successful Development

In his introductory remarks Lord Gorell reminded his audience of the paper read by Sir F. Sykes, C.G.C.A., at the last conference, and stated that it has now become important to approach the subject of Civil Aviation as a matter of broad policy with which the Government are concerned. Lord Gorell pointed out that there is a decided increase in the interest now taken in the subject of civil aviation by the Press, and, consequently, by the general public, but that it yet falls far short of the interest which this country ought to take in aviation matters, and that we have not yet shown the same general interest as a nation as has, for instance, France. He pointed out, however, that although a Government can do a great deal to assist development of civil aviation, still, in the long run, the real factor of successful development must be the amount of public interest put into it. "Until there comes to the British public," he said, "a real and substantial realisation of the potentialities of aerial transport and the opportunities afforded by it—a realisation, not in mind only, but in pocket also—I do not see how it will be possible for this new industry to develop on the broad basis on which all who have considered it realise that it should, and could, be developed."

The Service and Civil Sides.

Although confining his remarks chiefly to civil aviation, Lord Gorell mentioned briefly that he did not agree with the view that Service and Civil sides of flying are conflicting, but that, in his opinion, they are complementary one to the other. By way of a parallel, he mentioned the relation of the Mercantile Marine and the Navy. He thought there was one difference, and did not wish to press the parallel too far, namely that for many years to come success in the air, whether Service or Civil, must depend primarily upon constant scientific research, and he expressed the belief that research is the essential link between Service and Civil flying. Lord Gorell expressed the opinion that the experience gained with machines designed for troop transport must be taken into account by designers of commercial machines, and that these improvements, in certain types of Service machines, will be of direct service to civil aviation. He believed that the suggested organisation of an Auxiliary Air Force would make a further and valuable link between the R.A.F. and civil aviation, and would have the effect of diffusing among the general population the sense of the air, which he deemed of paramount importance in the development of all aerial activities.

On the subject of airships, the Under-Secretary had several things to say, chiefly in the nature of an explanation

The "Mars I" of the Gloucestershire Aircraft Co. was greatly admired by visitors to Croydon.

of the Government's reasons for abandoning airships. The cry for economy which was used as the reason for this fatal decision is already too well known to readers of this journal to need stating afresh, as are also the various plans put before the special Committee of the Imperial Conference, and the almost entire absence of tangible results up to the present.

Lord Gorell said that with regard to certain comments, alleging Government hostility or indifference to airships, his experience had been that the Air Ministry was anxious to discover, if possible, some practicable financial means by which the airship service could be maintained. He thought it was a mistake to concentrate solely on one type of aircraft and not on the other, as the functions of both airships and heavier-than-air craft, although different, are concerned with transport through the air, and the capabilities of each should supplement those of the other. He considered that the airship can be employed most economically over long distances and the aeroplanes over shorter distances. The Under-Secretary then referred to German airship activity, and mentioned that recently the Council of Ambassadors have agreed to allow Germany to build an airship for the United States. He then briefly referred to what is being done and contemplated by other nations, and concluded by expressing the conviction that the main air lines of the British Empire in the future, will be primarily airship lines, with branch aeroplane connections running off from them.

The Progress of Civil Aviation

Turning now his attention to the general progress of civil aviation, Lord Gorell quoted the facts and figures relating to the progress in the United States, the chief Continental powers, the Dominions, and this country. As many of them were included in the recent half-yearly report of the Controller-General, we do not propose to refer to them in detail here, but will confine ourselves to a brief reference to Lord Gorell's remarks on the relative progress made in France and in this country. The total French civil aviation vote for 1921 was, Lord Gorell said, about 184½ million francs, or about 55 million francs more than in the previous year, and amounted to about half the vote for Service aviation. Thirty-three million francs was allocated for subsidies to air transport companies, and about 25½ millions to the construction of two rigid airships, airship bases and supplementary equipment. Lord Gorell pointed out, however, that it is not possible to arrive correctly at a comparison between the French effort and our own, merely by dividing francs into pounds, as francs go further than the pounds for which they can be exchanged.

The Under-Secretary of State for Air then called attention to the progress made in the matter of regular services, and pointed out how these have been constantly increased from 1919 up to the present time. He gave the following statistics, which are of considerable interest. The total work carried out by French civil aircraft in the period from January 1 to September 30, 1921, was as follows:—Number of flights, 5,115. Number of machine hours flown 14,100. Average duration of each flight 2 hrs. 45 mins. Approximate machine mileage 1,145,500. Number of passengers carried 8,761. Weight of goods carried 126 tons.

Lord Gorell next turned his attention to civil aviation in the United Kingdom, pointing out that the attention of the Government and of transport companies has been largely concentrated on the maintenance of regular services to and from the Continent. The greatest activity, he said, was shown in the summer months. In August 155 flights between this country and the Continent were made by British machines, which carried 920 passengers. He pointed out that although the number of flights last summer was only about one-third of those during the summer of 1920, the number of passengers does not show any serious diminution, the numbers being 4,006 and 4,336 respectively, while about 500 more passengers were carried in British machines than in French. French companies, on the other hand, captured the largest portion of goods traffic, carrying between April and October, 1921, 53 tons, as opposed to 11 tons carried in British machines. The reliability and efficiency were good, about 93 per cent. of flights being completed within 4 hours during April to September, and the number of accidents has been encouragingly small.

Lord Gorrell also devoted portions of his paper to developments in wireless telegraphy and other signal work, and to the work of the Meteorological Office, as well as to mentioning two definite attempts on the part of the Air Ministry to encourage research. One of these dealt with the Air Ministry safety tank competition, and the other with the progress which has been made towards the successful solution of vertical flight by means of a helicopter.

Foundations of a Prosperous Industry

HAVING thus outlined some of the most material facts and figures relating to the progress of civil aviation, Lord Gorell admitted that it would be idle to pretend that a comparison between the respective positions of this country and such others as France, the United States, and Germany can be considered satisfactory, although he did not think that a true estimate of the position can, at this stage, of devlopment, be reached merely by comparison of facts and figures. He said that comparison has chiefly been made between the respective positions in France and in this country, and the question has been bluntly asked whether, when the figures of the two are set side by side, the French nation or we are right in the policy which each is pursuing. That, he said, is not a question which can be answered in a very few words. Many factors must be taken into account, and although it is true that much more flying is being done in France at the present time than in this country, that is not enough in itself to show that the French policy is right and ours is wrong. He thought that the recent Aero Show at Paris must have given those responsible for aviation in France serious thought for consideration, since, although the French have spent 33, and are about to spend 46, million francs on subsidies to civil aviation, he had found a fairly general agreement that in matters of design and construction the French have not advanced to the extent that might have been expected. Certain it is, Lord Gorell said, that a lavish policy of subsidies, though it must produce immediate and even striking results in the way of miles flown and lines opened, may not really be successful in producing the permanent results which those who believe in the development of aerial transport wish to see firmly established. Lord Gorell disclaimed any intention of criticising the policy which the French have adopted for themselves, and said he only questioned whether it is one which should be applied to this country. "We, in this country," Lord Gorell said, "should not be diverted by comparisons with other countries from what we conceive to be the best means to secure the object which best suits the interests of this country: and there is always a further difference with which we must reckon, namely, that national characteristics are by no means the same. It does not suit our temperament to advance far in any commercial enterprise, until we are satisfied as to the foundations. It seems to me, looking at it from the British point of view, that of all the necessary factors in the successful development of the civil aircraft industry, the first and greatest must be the bringing about in the public mind of a sense of safety: in other words, the first requisite of civil aeroplanes must be their trustworthiness, and, though I cannot claim to be able to pronounce technical judgments, nevertheless, from all the information which comes to me, I, personally, feel no doubt whatever that in this respect British machines at the present time lead the field."

The Under Secretary then called attention to the importance bearing in upon the public consciousness that travel by air is a normal means of journeying, and that this can only be done by ensuring before all else the trustworthiness of transport machines, and by maintaining this assurance over a long period of time. In this connection, Lord Gorell thought there will inevitably be, as competition grows, a tendency to get the most possible out of the pilots employed. It must never be forgotten, he said, that an overworked pilot may reduce the factor of trustworthiness to which he had referred as the first essential of commercial prosperity.

The Cross-Channel Services

TURNING his attention to the cross-Channel services, and stating that he, as Chairman of the Committee which investigated the question of subsidies and framed the conditions concerning them, carried a direct responsibility for the policy adopted, Lord Gorell briefly summarised the history of subsidies. As this is already well-known to our readers, we need not go into the matter here. Regarding the decision of the Air Ministry to approve one additional firm for the London-Paris route, this has, Lord Gorell said, been criticised in some quarters on the grounds that it will diminish the chances of commercial success for all three, and those who made this criticism at the same time put forward the view that it was a mistake to concentrate on the cross-Channel services alone the money available for subsidies.

The Committee, he said, based their approval of three firms upon a careful consideration of the volume of traffic that might reasonably be expected, and had to steer between limiting approval unduly and extending it too widely. The Committee came to the conclusion that the traffic on this route might reasonably be expected to be sufficient to make the operation of three firms successful.

The Committee, Lord Gorell stated, took the views that it would be a mistake to spread the subsidy over other routes, and that in order to ensure progress we must concentrate, and must learn how to make one service a commercial success. He thought that the moment this has been done every other route lies open for development. The cross-Channel route was chosen because it is, he said, unquestionably the most important, as it leads to the Continent and links up with the trans-Continental lines. He thought it would be generally admitted that the preservation of this service was an absolute necessity, and that we must look to routes across the sea for the adequate development of aerial transport. He pointed out that, owing to the situation of this country on the north-west of Europe, expansion of transit by aeroplane is restricted to the south and east, at any rate unless and until aeroplanes can safely negotiate the Atlantic. Lord Gorell thought that if it had done nothing else since March last, the maintenance of regular cross-Channel services has, at least, converted many people to a belief in the future of the air.

Regarding the more permanent scheme for the cross-Channel services, Lord Gorell brought up the question of the return to the Air Ministry of machines used by the firms. It has always, he said, been charged against any policy of subsidisation, that it might result in keeping obsolete or obsolescent machines in the air. He admitted that this was a real danger, but stated that the interests of the firms and the interests of the Government were identical, the object of the former being to have the use of the best machines available, and the Government's object being to expedite the evolution of the ideal type of civil aeroplane. He stated that the Government has now been able to agree, for the present year, at any rate, that machines, if returned in an air-worthy condition, will be taken back after only nine monthly payments of 2½ per cent. of their value, in order that they may be replaced by the latest types of machines, if the Air Ministry is satisfied that the change is desirable from the point of view of forwarding design and construction. Lord Gorell did not wish to pretend that the arrangements entered into are beyond criticism, and said that he was not so much concerned with the task of defending them as with that of explaining them, and that their wisdom, therefore, was open to discussion during the Conference. He said that he felt it his duty, however, to state that, in the view of all three members of the Committee, the arrangements, whether ideal or not, were the only ones which in actual practice could achieve their objects at the present time. The subsidies, Lord Gorell said, are necessary, because we are asking firms to compete with the French subsidies, and because we deem it essential that the British cross-Channel services shall be maintained. Regarding the suggestion of an air service across the Irish Channel, Lord Gorell stated that, personally, if it were in any way financially possible, he would like to see this established, but at the same time, it would, he said, be misleading to suggest that he saw any definite hope of its establishment in the immediate future.

Imperial Air Services

Passing on to broader aspects of aviation, Lord Gorell proceeded to deal with the question of Imperial Air Services. He pointed out that the aeroplane stages must necessarily be a good deal shorter than those on a route flown by airships. With the number of relay stations, emergency landing grounds, and other ground organisation necessary, such a route could not yet be a commercial proposition, and that, therefore, the establishment of such routes must be primarily undertaken by the Royal Air Force. From the point of view of the Government, he said, although the desirability of opening the routes to commercial services should be constantly borne in mind, the first necessity is to effect the linking up of the different areas of R.A.F. squadrons. When that has been effected we shall have stations established at convenient stages, in connection with which, or beside which, civilian stations can be successfully established and economically protected. Lord Gorell further stated that the process of linking up the stations established for service purposes is steadily continuing, and that therefore the time may not be so far distant when an Imperial route for civilian and commercial purposes can be established with a prospect of commercial success.

Air Mails

On the subject of air mails, Lord Gorell had a good deal to say. He prefaced his remarks on the question of air mails from and to this country by a brief statement of what has been done in the matter of air mails abroad. The United States Government was the first, and for some time the only, State which itself operated an air mail service. Nearly 45 million pieces of mail were carried in the year ended June 30, 1921, and this was in addition to large quantities carried on other routes by non-subsidised companies. In the United Kingdom, during the 12 months ended September 30 last, 102,240 letters were posted for outward transmission by the cross-Channel air services, and of these 63,340 were for Paris. The numbers carried in the opposite direction were rather less. The first necessity, Lord Gorell said, in any system of transit, must be the regularity of service, and although this regularity has to a great extent been gained in that 95 per cent. of the flights on the London-Paris mail service between April 1 and September 30, 1921, were completed in less than four hours from the scheduled time of starting, no very substantial advantage, he thought, was gained from the point of view of the General Post Office, by the more speedy transit of mails across the Channel by day flights.

For the cross-Channel air mails, Lord Gorell thought it would be necessary to develop night flying, as, if a business man could post his letters in the evening and be assured that they would reach his French correspondent early next morning, he would readily see the advantages of the cross-Channel air mail service.

Regarding the attitude of the General Post Office towards air mails, Lord Gorell stated that he had not found that the G.P.O. deserved some of the more harsh criticisms which have been passed upon its officials. He thought it obvious that if the regularity can be assured they will take advantage of the service, just in the same way as in the past they changed from sending mails by road when the railways provided a speedier and surer method. It seemed to him, he said, that there were two sides to be considered. As long as it costs more to send a letter by air, the G.P.O. must, in addition to the question of regularity, be assured that there are a sufficient number of people who are willing to pay that extra sum in order to obtain more rapid communication. The G.P.O. would not be justified in entering into new arrangements if the public response is inadequate. He thought it rather indicative of the lack of general public interest that far fewer letters are sent from London to Baghdad by air than are sent from Baghdad to London. He thought that if once it can be shown that mails can be borne by air at approximately the same charges as they can be borne by land and sea, and a good deal quicker, that will be the method which the G.P.O. will naturally adopt. Regularity and cheapness were the two pillars, Lord Gorell considered, upon which must rest any real development of the transit of mails by air.

Civil Aviation and Commerce

On the question of the relations between civil aviation and commerce, Lord Gorell thought it was hardly too much to say that at present these were distinctly poor. He thought that at present there is no real sign that business brains in this country have taken into serious consideration the degree to which the air may be utilised for the purpose of their business, and he mentioned as one example the great industry comprised by the word journalism. He expressed surprise at the fact that some of the great newspapers have not regularly employed the aeroplane in connection with their early editions. We shall, he said, really only begin to make decided progress when the business community begins to go seriously into the cost and practicability of meeting their constant need of the speediest means of transport by making use of the air.

The Policy of Subsidisation

On the general question of aerial development, Lord Gorell said that he had noticed that critics of the Government attitude had drawn a distinction between promise and performance. Probably, he said, the action of any Ministry falls short of what enthusiasts consider desirable, but he thought that the critics had wished the Government to do a great deal more in ways that would have cost the taxpayer a great deal more money, and he was sure that no degree of public support would be given to a proposal that we should spend a million pounds on this object. Lord Gorell stated that he had been much interested to read in a recent article by a French writer, written in defence of the results of the Paris Aero Show, against some of the criticisms which had been passed upon it, some striking admissions of the errors into which the earlier policy of subsidisation had led the French Government, and even of the present regulations this French writer had some significant things to say. For instance, of the petrol subsidy, he says, "the new subsidy stifles initiative in the firms concerned, since they are free from all anxiety in regard to the price of petrol." He further states, Lord Gorell said, that "the present regulations have been drawn up more with an eye to existing machines than to future construction." The Under-Secretary of State for Air, therefore, thought that the Government would require much greater justification than a mere comparison of figures before they engaged in a similar policy.

The Civil Aviation Advisory Board

Owing to the importance of the decision, we give the part of Lord Gorell's paper dealing with the establishment of the new Civil Aviation Advisory Board in full.

"It has been decided," Lord Gorell said, "that on the difficult problems in connection with the development of civil aviation, as a whole there is need for a body acting in close relations with the Air Ministry, and at the same time representative of the great interests concerned, to advise generally upon such development, or to report specifically upon any question which may be referred to it. The Advisory Committee on Civil Aviation, presided over by Lord Weir, gave very distinguished help in the past, and it has now been thought well to perpetuate the basic idea underlying the formation of that Committee. There will, therefore, be set up a body which will be known as the Civil Aviation Advisory Board, the Chairman of which will be the Under-Secretary of State for Air, and the membership of which will comprise the Controller-General of Civil Aviation, the Director-General of Supply and Research, together with, it is hoped, representatives of the General Post Office, the Associated Chambers of Commerce, Lloyd's, the Royal Aeronautical Society, the Air League of the British Empire, the Royal Aero Club, and the Society of British Aircraft Constructors; in addition, the most convenient way of securing representation of the Dominions and Crown Colonies is being considered, and they will, in any event, be consulted whenever the interests of any are concerned. I am further authorised to say that the Secretary of State has decided to refer to this Advisory Board, as the first subject upon which he desires its recommendations, the question of the cost and practicability of an Imperial Air Mail Service.

"There will be many other questions upon which it is believed that the recommendations of such a Board, which it is intended shall meet with some regularity, will be of the utmost value to the Air Ministry. Possibly, one direction in which it can give general assistance will be that to which I have referred more than once in this paper, and upon which I lay the greatest emphasis of all. I cannot express it better than by quoting the words used by Mr. Holt Thomas in a letter published in *The Times* on November 25 last, immediately after his experience of the first International Congress on the Navigation of the Air in Paris. He wrote:—'Convinced as I have been for the last fifteen years of the importance of aviation to this country, I return from France, with a still stronger conviction that this country must, by hook or by crook, be led to appreciate the enormous importance of aviation, and especially, at this time, of civil aviation, to the British Empire.' With that conviction I express myself in entire agreement; but the creation of this conviction, I must repeat, is a task in which a Government Ministry can to some extent assist, but which it cannot successfully itself undertake. That must be done by the recognition of the possibilities of the air by the business community. I am certain that passenger traffic, important as it is, is not so essential to the health of civil aviation as an industry as the transport of goods, and if we are to take advantage of the great exploits performed by British airmen in the War, and of our needs and opportunities as an island Empire, we do require first and foremost the establishment in the public mind of the realisation of aerial commercial possibilities."

NOTICES TO AIRMEN

Henlow Aerodrome: Obstructions

Two 70-ft. wireless masts have been erected approximately 150 yds. from the southern side of the landing ground at the Royal Air Force Aerodrome, Henlow (Lat. 52° 01′ N., Long. 0° 18′ W.).

A red streamer will be flown from the top section of each of the masts.

Pilots who may have to land at this aerodrome should, herefore, be careful to avoid these masts. (No. 10 of 1922.)

Wireless D.F. Stations: List and Borkum Re-opened

The Direction Finding stations at *List* and *Borkum*, which have been temporarily closed, are now open again for service. Paragraph 1 of Notice to Airmen No. 111 of 1921 is accordingly cancelled.

(No. 11 of 1922.)

Belgium: Obstruction at Haren Aerodrome; temporary Closing of Haren R/T Station

Certain work (levelling, etc.) is in progress on the surface of the southern half of Haren aerodrome (Lat. 50° 53′ N., Long. 4° 25′ E.). Pilots should, therefore, keep to the north of the white circle when landing. (*See* plan in Notice to Airmen No. 139 of 1920.)

(No. 12 of 1922.)

Croydon Aerodrome: Removal of Aerial Lighthouse

1. The Aerial Lighthouse at present situated in the S.W. corner of Croydon aerodrome will cease to operate as from 0800 on Friday, January 27, 1922, and will be removed from the aerodrome prior to its being installed on a fresh site at Tatsfield, Surrey.

A further Notice will be issued before the lighthouse is put into operation at Tatsfield.

2. The Aerial Pilotage Light will continue to operate as notified in Notice to Airmen No. 64 of 1921.

3. Cancellation.—Notice to Airmen No. 99 of 1920 is cancelled.

(No. 13 of 1922.)

Hourly Weather Messages on Civil Air Routes

1. The hourly meteorological reports for aviation issued by W/T from the Air Ministry are being sent in revised code forms adopted by the International Commissions for Weather Telegraphy and for the Application of Meteorology to Aerial Navigation at the meetings held in London in September, 1921. While the new code forms differ from the one formerly in use, the specifications of the code figures remain practically unchanged, the only important alterations being found in the specifications of visibility and of speed of low cloud.

2. Reports are issued daily, Sundays included. Particulars (No. 14 of 1922) should be obtained from the Air Ministry.

(No. 14 of 1922.)

Aerodromes for Civil Use: Amendments

Notice to Airmen No. 1 of 1922 (Consolidated List of Aerodromes) is amended as follows:—*List C.—Licensed Civil Aerodromes.*—Added:—Cobham, Tartar Hill.

The following should be deleted:—Chesterfield, Caushouse Farm; Weymouth, Lodmoor.

(No. 16 of 1922.)

R.A.F. Boy Mechanics

The Civil Service Commissioners announce that an open competitive examination for the entry of boy mechanics into the Royal Air Force will be held in London, Edinburgh, Birmingham, Chatham, Plymouth, and Portsmouth on May 12. The limits of age are 15–16½ on July 1, 1922. Regulations and forms of application will shortly be ready for issue, and will be sent in response to requests received by letter addressed to the Secretary, Civil Service Commission, Burlington Gardens, London, W.1, on or after February 8.

"Hopping Off the Cliff"

According to stories told by the natives of Hawaii of to-day, it is learned from Honolulu, so writes a contributor to *The Motor* (South Africa), that all the thrills of flying were enjoyed by Hawaiians centuries ago. Their ancestors secured their aerial excitement by jumping off cliffs into the sea in home-made aeroplanes. They made a regular game of it, known as "lele pali," or "jumping from the cliff." It was played up to a hundred years or so ago by natives who lived near groves of loulu palms, near high cliffs overlooking the sea. The game was played with large contrivances built of light but stout sticks and overwoven with loulu palm leaves. Several of these affairs were made ready, the Hawaiian "aviators" took their seats and were pushed over towering cliffs. The adventurer who remained longest in the air was the winner. Frequently an aeroplane, owing to the carelessness or over-excitement of its "pilot," executed a nose-dive after the fashion of the twentieth-century machines. The only damage was the loss of the game. Old Hawaiians say that their flying men were exceptionally skilful. The only means they had of guiding their crude appliances was to shift their weight to maintain balance as they zigzagged down toward the sea. A fleet of outrigger canoes was anchored off shore to pick up the sportsmen and retrieve the "'planes." Exceptionally daring Hawaiians, it is said, often hopped off thousand-foot cliffs on the mainland.

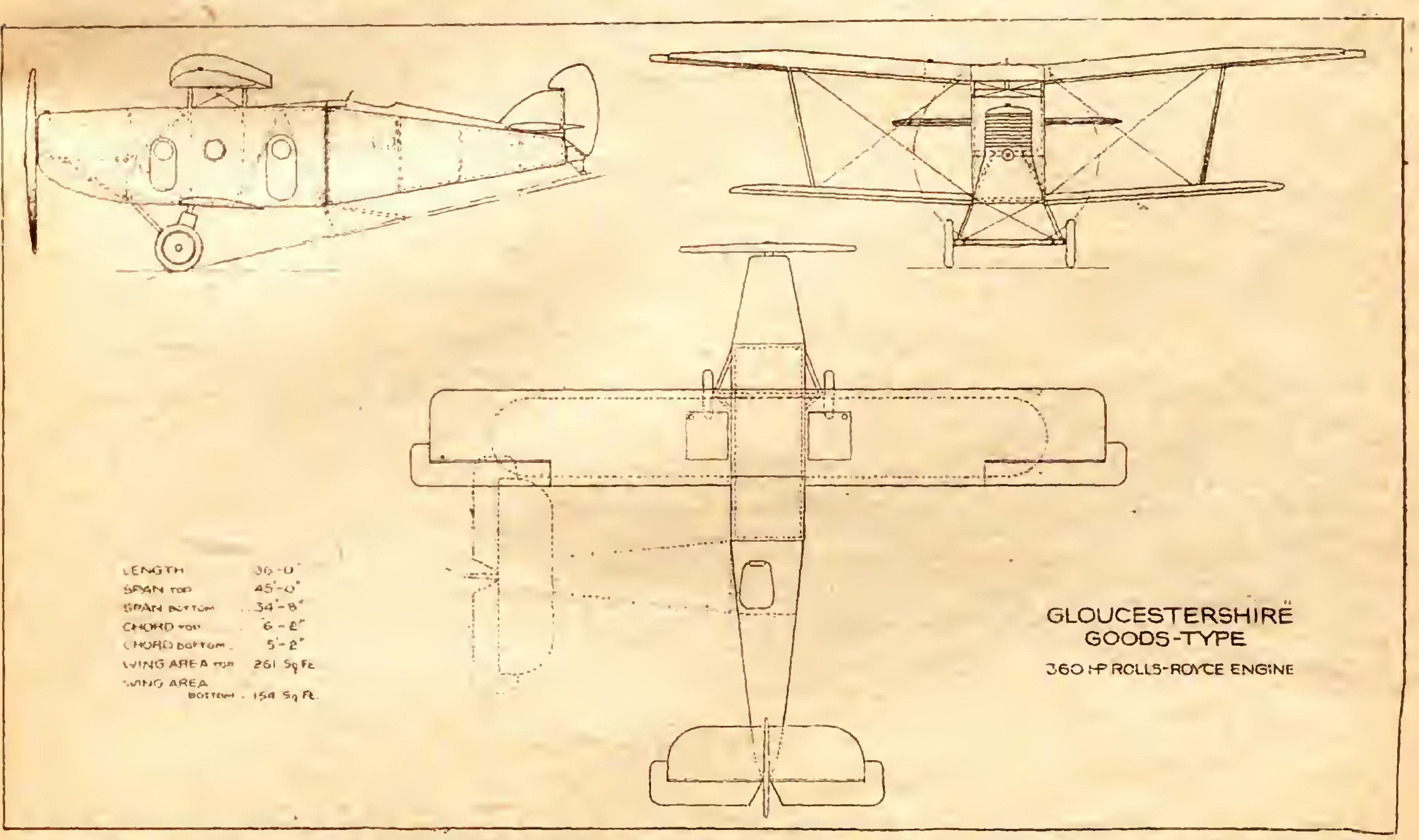
A GLOUCESTERSHIRE GOODS TYPE COMMERCIAL AEROPLANE

Rolls-Royce "Eagle" Engine

WHEN civil aviation was first attempted in 1919, the machines used were, without exception, War types which had been variously modified to meet, in some measure, the altered requirements. This they did to a limited extent only, and it is now becoming more and more evident as experience is gained that the "general utility" machine is not the solution of the problem, and that from now onwards the tendency will be more and more towards specialised aircraft. For a certain route, and a certain type of cargo, there will always be types which possess certain features that make them particularly suitable, although these features may, and probably will, have been attained at the expense of others which are not, however, so necessary for the particular purpose. Thus we shall see certain types developed for mail-carrying, others especially suitable for passenger work, and, let there be no mistake about it, certain types designed specially for carrying goods. At first the division into types may not be very marked, but it is already beginning to be noticeable, and will become more and more so as time goes on, and it will be the designer who is best able to anticipate the requirements of future types who will be in the most favourable position for meeting them.

It might have been thought that the day for the goods-carrying aeroplane is not yet, but we have the word of no less an authority on the subject than Sir Samuel Instone for it that goods machines specially designed for the work *are* required. That being the case, it is extremely interesting to learn that that progressive firm, the Gloucestershire Aircraft Co., Ltd., of Cheltenham, has actually completed the design for a machine of the goods-carrying type, which has several novel features, and which has been designed with commercial conditions in view the whole way through.

As the accompanying drawings will show, the new Gloucestershire machine is a tractor biplane, fitted with Rolls-Royce "Eagle" engine. The wings, it will be observed, are of unequal area, and an interesting innovation is found in the employment of different wing sections for top and bottom planes. The section of the top plane is that known as airscrew 4, which has a maximum lift coefficient of about 0·77 absolute, and a maximum top camber of 12·18 per cent. of the chord. Although of relatively high lift, this section has a good L/D ratio (nearly 18), and its thickness is such as to give ample room for spars of light construction. The lower plane will be of ordinary medium-lift section, and is of smaller area than the top one. The reasons for adopting this arrangement are various. The cantilever monoplane, with thick, high-lift wing, is necessarily of considerable span, so that, for the same landing speed, a biplane structure will be more compact. If both wings are of the high-lift type, the gap between them has to be fairly large to avoid too great biplane interference. Also, the L/D of high-lift sections is usually inferior to that of the medium-lift aerofoils, and by employing one plane of ordinary section and one of high-lift section, the overall L/D of the biplane is increased. It appears possible that such an arrangement might also be used for obtaining a certain amount of longitudinal stability, although in the Gloucestershire machine no attempt has, we understand, been made to attain stability in this way, the usual tail plane arrangement being relied upon for this purpose. Although a fairly large machine, there is to be only one set of struts on each side. No doubt, this reduction in bracing has been rendered possible largely as a result of the employment of a thick top plane. Another advantage of the biplane bracing over the cantilever monoplane is, Mr. Folland, the designer of the machine, points out, that the incidence bracing provides a duplication of bracing in case of fracture of one of the lift wires, whereas in the cantilever monoplane no such duplication exists.



THE GLOUCESTERSHIRE 1,600 LBS. GOODS-CARRYING AEROPLANE. General arrangement drawings.

Apart from the unusual wing arrangement, the new Gloucestershire machine is of interest on account of the provision made for easy loading and unloading of bulky goods. The *fuselage*, which is of rectangular section, is built in three separate units: the front unit is the engine housing, the middle unit forms the cabin, and the rear unit is the aft portion of the *fuselage*, carrying the tail and tail skid. At the rear end of the cabin, a hinged attachment is provided for the rear portion of the *fuselage*, so that this can be swung out laterally, thus giving access to the cabin through an opening of approximately the full size of the cross section of the *fuselage*. A partition hinged at the bottom, folds down to form a gangway up to the floor of the cabin, along which trolleys, with the goods to be loaded or unloaded, can be wheeled. Jacks under the rear corners of the cabin prevent the machine from tilting over backwards.

Although ample space for loading and unloading is thus provided by this rear door, the machine might be used for less bulky packages, which would not necessitate such a large opening. Ordinary doors have consequently been provided in the sides of the cabin, one in each side aft, and a third in one of the sides, forward of the wings. Through these smaller packages can be loaded, avoiding the necessity of "breaking" the *fuselage*. The cabin space available is large, 11 ft. 8 ins. long, by 5 ft. 6 ins. high, by 4 ft. 2 ins. wide.

Constructionally, the *fuselage* will be of the composite type. That is to say, the front portion (engine unit) will be largely of steel tubing, with aluminium covering. The cabin will have spruce *longerons*, and three-ply covering, no other bracing being employed, so as to leave a clear space inside the cabin. The rear portion of the *fuselage* will be of the ordinary brace girder type, but with steel tube *longerons* and struts.

Apart from other advantages, the employment of a thick top plane is useful in providing ample space for mounting of tanks inside the wings, thus obtaining the benefit of direct gravity feed to the engine without unsightly tanks projecting above the top surface of the wing. In the present machine, there are two tanks, one on each side, each containing 43 galls. of petrol.

The undercarriage is to be of the simple V-type, with the front struts (steel) cross-braced, with streamline wire, and the rear ones telescopic, to give the necessary springing. The latter will be by rubber cord, and a pneumatic damper gear is to be fitted.

The engine, a Rolls-Royce "Eagle" of 360 h.p., will, as already stated, be mounted in front as a detachable unit, four lugs being provided for securing it to the cabin. By suitably designing the engine controls and petrol leads, the whole engine unit, with its nose radiator, can be changed for a new one in a very short time. For inspection, and minor adjustments, the engine is made accessible by designing the engine cowling somewhat after the fashion of the bonnet of a motor-car, quick-release safety catches being used for fastening the cowl in place.

As regards the controls, these are to be of standard type, with joy-stick for elevators and *ailerons*, and a foot bar for the rudder. No cables will, however, be used in the controls, all movements being transmitted by rigid control rods, or tie rods, running in suitable guides. In this manner, the wear and tear and the amount of attention usually associated with control cables will be avoided. Ball-bearings will be used extensively so as to render the controls easy to operate, and to lessen the physical fatigue of the pilot on long journeys.

The tail plane will be of the trimming type, with hinges on the front spar, and a worm gear, similar to that used on the Nieuport "Night-hawks," will be incorporated, in the support of the rear spar so as to allow of trimming the tail during flight.

Following are the main characteristics of the Gloucestershire "Goods 'Plane": Length o.a., 36 ft.; span (upper), 45 ft.; chord (upper), 6 ft. 2 ins.; span (lower), 34 ft. 8 ins.; chord (lower), 5 ft. 2 ins.; area (upper), 261 sq. ft.; area (lower), 154 sq. ft.; total wing area, 415 sq. ft.; structure weight, 1,936 lbs.; weight of engine, radiator, water, piping, accessories, and propeller, 1,175 lbs.; petrol, 628 lbs.; oil, 70 lbs; pilot, 180 lbs.; goods load, 1,600 lbs.; total loaded weight, 5,589 lbs.; wing loading, 13·5 lbs./sq. ft.; power loading, 15·5 lbs./h.p.; useful load per h.p., 4·45 lbs. at 104 m.p.h.; 5·7 lbs. at 92 m.p.h., maximum speed, 104 m.p.h.; speed at three-quarter throttle, 92 m.p.h.; climb to 10,000 ft. in 30 mins.; ceiling, 14,000 ft.; air endurance, 4¾ hrs. at cruising speed of 92 m.p.h.

LONDON TERMINAL AERODROME

Monday Evening, February 6, 1922

THE outstanding event of the week has, of course, been the visit of the members of the Air Conference to the aerodrome today. They arrived by special train and motor-car, and numbered some 400. The train was run straight into the factory premises, now leased by the Disposal Co., in order to show members the ease with which the aerodrome could be reached when this factory site is used as the departure station for the Continent. It is rather a pity, in a way, they were not made to travel down by the ordinary methods. It would have shown them what an outlandish place the aerodrome really is when no special arrangements are made. The sooner there are arrangements for some reasonable method of getting to the aerodrome, either by train or omnibus, the better it will be for civil flying. At present, the inaccessibility of the aerodrome from Town is doing more than anything else to hamper commercial aviation.

There was quite a good muster of aeroplanes on view, and the thanks of the Air Ministry are certainly due to the manufacturers who sent 200 machines in order to make the visit a success.

The fact was commented upon that out of twelve machines lined-up for inspection six were of De Havilland design and construction, a striking tribute to the enterprise of this firm.

Flights for the visitors were provided in the Vickers-Vimy, one of the "D.H.18's," the Napier-Bristol, a "D.H.9c.," and the Jupiter-engined Handley Page.

Pilot's Praise of the "Jupiter" Engines

MR. OLLEY, who flew the Jupiter-Handley during the conference visit, and also from Bristol, is loud in its praise. He is delighted with the smooth running of the air-cooled radials, and says they are just like a couple of turbines. How they will stand up under strenuous commercial service conditions now remains to be seen.

The Disposal Co. was again well to the fore, and put several machines into the air in exhibitions of stunt flying. There were also one or two R.A.F. machines on view. The Gloucestershire Aviation Co.'s "Mars I" attracted considerable attention, and Mr. James was flying her in the afternoon.

The "D.H.29" monoplane made its first appearance at the air station on Friday, and a stream of aerodrome officials passed into the Handley Page sheds, where it was housed, to inspect and comment on the machine.

It is understood that the Daimler Hire air service is to commence operations on April 3. According to the latest reports, they have acquired two "D.H.4's," and expect, it is said, to have two others allotted to them by the Air Ministry. The pilots at present engaged are Messrs. Hinchcliffe, Milnes, and Reeves. Mr. Hinchcliffe was chief pilot of the K.L.M. before joining the new company, and Messrs. Milnes and Reeves are old Aircraft Transport and Travel pilots.

The K.L.M. Monoplane Service

THE date of the re-opening of the Amsterdam-London service is not, as yet, definite. It seems almost as variable as the weather, changing from day to day. Mr. Plesman, the general manager of K.L.M., was over for the air conference, but was uncertain as to the date of resuming operations. Meanwhile, there is activity in the office of the K.L.M., but only, so far, in the matter of decorations.

Mr. Earle, of "Air Express," the booking agents, was at the aerodrome during the week. There appears to be a general revivial of interest in flying all round, in anticipation, no doubt, of the increased activities which are expected in about a couple of months' time.

The new weather-board has, at last, been erected opposite the traffic-movement board, and this morning there was feverish activity in order to get it finished in time for the arrival of Air Conference visitors.

Captain Muir, of the Surrey Flying Services, tells me that arrangements for their "air-taxi service to everywhere" are now well advanced, and that by the end of next month they will be able to supply machines at a moment's notice. It is the intention of this firm to make a speciality of air-taxi work between Croydon and Southampton and Liverpool, in connection with the arrival and departure of trans-Atlantic liners.

Air Mail Stamps.

THE special stamps for use with the French Air Mail service to Morocco, referred to in our issue for January 12 last, have now made their appearance. It has been decided by the Czecho-Slovak Government that a special set of stamps shall be used for mails carried on the air services running in that country. Some time back the ordinary postage stamps overprinted with a design showing an aeroplane were used for this purpose.

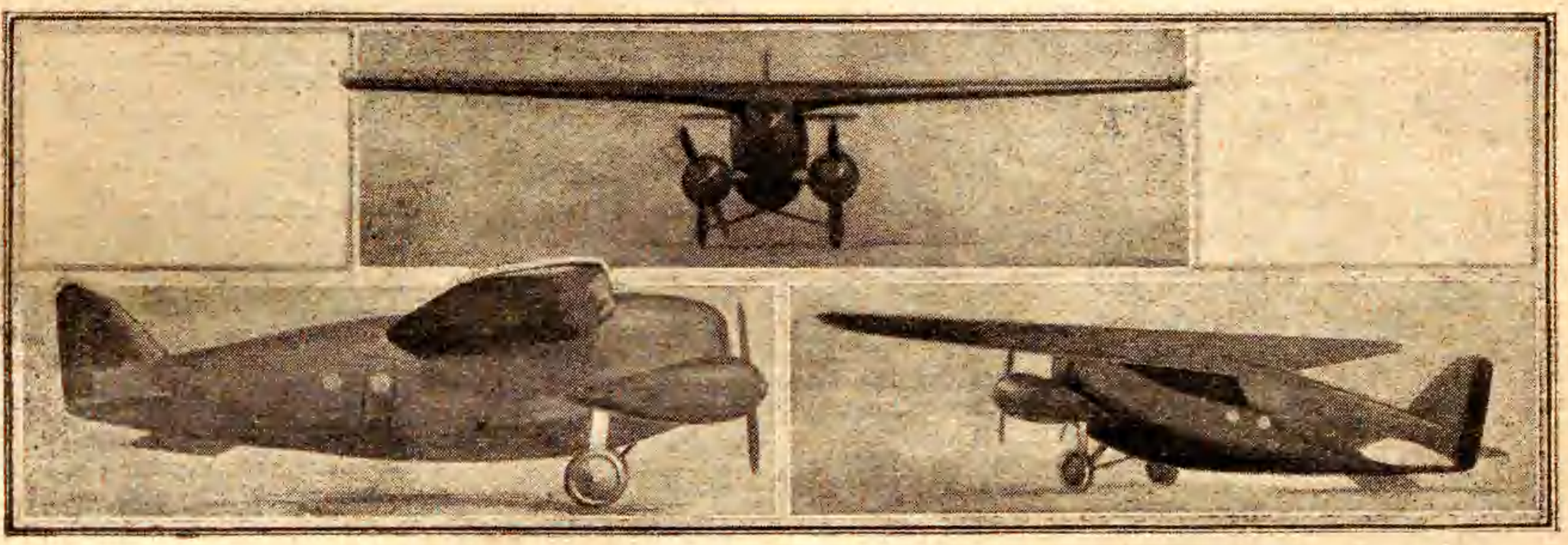
The Coupe Deutsch, 1922

FOR 1922, it has been decided by the Aero Club of France that the Deutsch Cup shall be contested on September 22, over a distance of 300 kilometres, on a 50 kilometres' course. The actual circuit has not yet been fixed.

THE ERNOUL COMMERCIAL MONOPLANE "F.A.T.M.A. 2"

An Interesting French Machine now being Built

AT the Paris Aero Show, held in the Grand Palais, during November last, there was exhibited, on the stand of *Aero Transports Ernoul*, a large scale-model of a very interesting commercial monoplane which is now being constructed for this firm at Toulouse. It is to be regretted that the actual machine could not be finished in time to be exhibited, as the model appeared to indicate that the machine will be of more than ordinary interest. M. Ernoul is head of the firm which has been operating the Bordeaux-Toulouse-Montpellier air service, and which it is proposed to extend during this summer by a line running from Bordeaux to Marseilles, Geneva and, possibly, Constantinople and the East. It is considered that for this service a machine of high-speed and good range is essential.

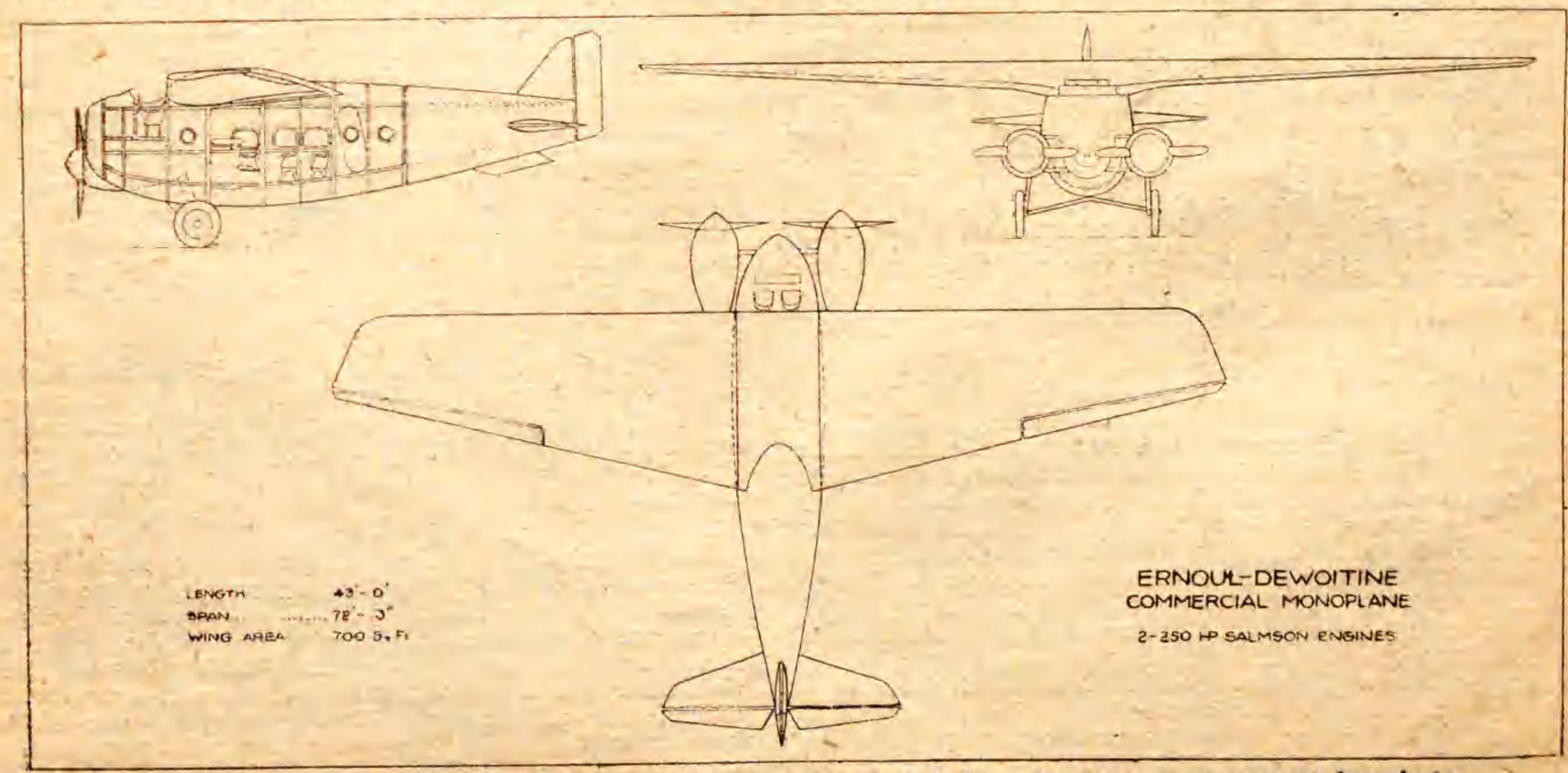


THE ERNOUL-DEWOITINE MONOPLANE : **Front, side and three-quarter rear views of scale model.**

The Ernoul commercial monoplane has been designed by M. Dewoitine, and, as will be seen from the accompanying illustrations, is of somewhat unusual design. It is a monoplane of the cantilever type, *i.e.*, without external wing bracing, and resembles the "D.H.29," in having a pronounced taper to its wing. In other respects, however, it has no resemblance to that machine. We have no information relating to the wing section used, but judging from external appearances, it is one of the Göttingen sections, possibly No. 441.

The *fuselage*, which is of monocoque construction, has a good streamline form, and every effort has been made to reduce resistance to a minimum. The large cabin has seating accommodation for eight passengers, and, it is stated, that folding berths will be fitted so that passengers making long journeys will be able to lie down for a rest. It is difficult to see how room can be provided for sleeping accommodation in the space available, but possibly the passengers will take it in turns. The cabin is lighted by windows in the side, and as there is no lower plane, the view obtained is excellent. The pilot and a passenger or engineer are placed in front of the leading edge of the wing, and as the nose of the *fuselage* is very narrow, to clear the propellers, the pilot has an extremely good view forward.

By far the most interesting feature of the "FATMA" is, however, the placing of the engines. The arrangement was first suggested by Herr Dornier, of the Zeppelin company, photographs of a wind tunnel model of whose machine were published in FLIGHT of May 19, 1921. Briefly, the mounting of the engines consists in two cantilever beams, streamlined so as to reduce resistance, springing out laterally from the *fuselage* near the nose, and carrying on their outer ends the two engines. The main object of this arrangement is, of course, to get the two engines as close together as possible, so as to reduce the turning moment set up when one engine stops. By placing the engines well forward, and narrowing down the nose of the *fuselage*, the engines need be separated by little more than the diameter of the propellers used. It might be objected that for such a small machine, it is unnecessary to have two engines. While that is to a certain extent



THE ERNOUL-DEWOITINE COMMERCIAL MONOPLANE : General arrangement drawings.

true, it must be pointed out that the machine is required to have a good performance, high speed, good reliability (owing to the difficulty of finding suitable landing grounds on the route contemplated) and long range. Thus, it might be rather a tax on a single engine to provide the necessary power for long periods. Furthermore, the designer may have been handicapped by the lack of a suitable single power unit, and with two engines placed so close together it should be possible—which is far from always the case with ordinary twin-engined machines—to fly on one engine only. In fact, the calculated performance figures for this machine indicate that with only one engine working (although at its full power, of course) the speed is 87 m.p.h.

A very practical advantage of the Dewoitine design is found in the case with which the engines can be "got at" and overhauled, or replaced with new ones. In fact, we do not think we have ever seen a machine in which this can be so easily accomplished. As the engines are well forward of the leading edge of the wings, a tackle can easily be employed for lifting them off their bearers, or, if necessary, the entire engine *nacelle* can be lifted off and replaced. In the present design, the tanks are placed in the *nacelles*, behind the engines, but it would be an easy matter to transfer them to the top of the wing, and thus provide direct gravity feed. Altogether, it appears to us, that the Ernoul firm has chosen very wisely in adopting the Dewoitine design. There are few French designs which we like better, and this form of engine mounting, although it is probably somewhat heavier than the usual placing of the engines on the wings, is much more what operational firms are really wanting than are those of the majority of machines in actual use. There is, of course, no reason why it should not be adopted for biplanes also.

The main characteristics and estimated performance of the "FATMA," are as follows: Length o.a., 43 ft.; span, 72 ft. 3 ins.; wing area, 700 sq. ft.; weight empty, 3,590 lbs.; weight of fuel, 1,120 lbs.; useful load, 1,870 lbs.; total loaded weight, 6,580 lbs.; wing loading, 9·4 lbs./sq. ft.; power loading (on base of 500 h.p.), 13·2 lbs./h.p.; maximum speed at 6,500 ft., 127 m.p.h.; speed on one engine at 6,500 ft., 87 m.p.h.; landing speed, 46 m.p.h.; ceiling, 10,000 ft.; engines, two 250 h.p. Salmson C.U.Z.9, geared down; range, with full load, about 600 miles.

CANADA AND AERIAL FOREST PATROLS

Under the Canadian Directorate of Flying Operations, aircraft is being used in various directions with ever-increasingly satisfactory results. Forest reconnaissance and timber cruising in Ontario forms one important scheme now nearing completion over certain blocks of land north of the Trans-Continental Railway. But the most direct benefits have accrued under the system of patrolling for forest fires which have been carried out in the Province of Quebec and on behalf of the Forestry Branch of the Government of Ontario. Valuable work has been done by aeroplanes and seaplanes, and vast areas, which in previous years have been damaged by fire owing to their inaccessibility, have been saved from total destruction. On one occasion a big fire was brought to the notice of the Crow's Nest Forest Reserve on Sunday, August 28, and kept under close observation from that time until finally extinguished on Thursday, September 8. This fire was started as a result of high winds blowing embers across the main range of Rockies into the Alberta timber area from a fire in the Alexander Valley, British Columbia. By the continuous reports furnished by aircraft watching these operations, the Forestry Branch were able to be warned well in advance of the course the fire was taking, and the danger lying ahead that would be inevitable should the fire cross towards certain areas.

After the fire had been abated, a most complete survey was brought back as to the exact area burnt, and very valuable information of the surrounding country.

Dealing with the work of the aeroplanes, the Forest Supervisor of the District in a long letter and report becomes enthusiastic in connection with a demonstration flight of 1,000 miles, entailing a complete circuit of Lake Winnipeg, Winnipegosis and part of Lake Manitoba and as far north as Pas and Cumberland House, culminating in the following expression:—

"More than anything I had previously imagined, this trip impressed me with the future of the Air Service in the Northern Territory. I obtained a grasp of the topography and water system in the Saskatchewan Valley of which I had not had any conception. I have had considerable experience in mapping in territory from the canoe, and feel satisfied and more than ever impressed with the conviction that the only way that the Northern Territory can be mapped is by the camera from the air."

By way of further demonstration of the very valuable help of aeroplanes in exploration, at the request of the Dominion Parks Branch, Department of the Interior, an aeroplane was despatched to Jasper Park, in the heart of the Canadian Rockies. In the seven hours' flying over the parks the Superintendent claimed to have travelled a greater distance and seen more country than he could possibly have done by trail in six weeks to two months' hard travelling. The following results of the operation were reported as worthy of special note:—

(1) Several hitherto unknown lakes and river valleys were discovered and accurately located, and valuable information secured as to the possibility of tracking new trails over such regions.

(2) "Close up" reconnaissances were made of well-known peaks, valleys and mountain passes, and photographs were taken of the same.

(3) Valuable information was obtained as to the extent and character of the timber in various portions of the park and best methods to adopt to ensure adequate fire protection.

(4) On several occasions messages were dropped to construction crews working on new trails, who were ordinarily at least two days' travel from the nearest telephone communication.

These are but a few of the practical results so far obtained. There are innumerable directions in which further progress is possible and is being achieved, such as the investigation of mosquito-breeding areas, geological surveys, etc. In regard to the mosquito plague, reconnaissance flights by aeroplane have been carried out for representatives of the Entomological Branch, who were able, by direct observation as well as subsequent study of the aerial photographs taken on each flight, to accurately map the limits of the inundated sections.

The difficulty in the past has been to accurately determine the extensive areas, comprising sometimes many thousands of acres, which are subject to flooding at times of high freshet. On such occasions it has been found that serious outbreaks of the mosquito pest invariably occur. It has, in fact, been found *impossible* to obtain satisfactory data by means of the usual surveys by motor-car, on foot or by boat.

All of which tends to force recognition of the fact that aircraft are something more than mere war machines—they are highly specialised "weapons" for benefiting the human race.

Aviation in Siam

From a report upon commercial matters in Siam, up to the latter part of 1921, by Mr. J. Crosby, C.I.E., just issued by the Department of Overseas Trade, it is stated that good work is being done by the aviation branch of the Siamese Army, which has established an aerodrome in the neighbourhood of Bangkok. Flights have been undertaken to Korat and thence to Ubon, in the north-east, and to Chantaboon in the south-east. Siamese airmen have flown to Battambong (in Cambodian territory), whilst French military aviators have made the journey *via* that place from Saigon to Bangkok.

It is to be borne in mind that aviation in Siam is in the hands of the military authorities. Civil aviation is unknown as yet, and no very hopeful inducements for its inauguration can be said to exist. Should Bangkok ever become a stage upon one of the great commercial air routes projected for the Far East in the future, civil aviation in this country may possibly be made remunerative. In the meantime, the practical utility of flights by air is likely to be confined to such matters as the despatch of official mails or of medical aid, when needed, to the less accessible portions of the kingdom.

Air Travel by Cinema

A new scheme has been devised by the Lep Aerial Travel Bureau to display to prospective air passengers the advantages of travelling to the Continent by air. A small daylight cinema of a new type has been erected in the bureau in Piccadilly Circus, and films depicting the Customs examination, start from the aerodrome, scenes *en route*, etc., etc., are shown, while an official explains the film and points out the benefits to be obtained by using the newest method of travel.

THE USE OF LIGHT AS AN AID TO AERIAL NAVIGATION*

By LIEUT.-COL. L. F. BLANDY, D.S.O., R.E.

In his opening remarks the author stated that he proposed to deal primarily with the use of light in connection with commercial aviation, but passing reference was made to the anti-aircraft searchlights employed during the War.

Turning to peaceful flying, he first referred to lights carried on aircraft—internal and external. In connection with the former, which are used for working the craft, and for the convenience of the passengers, a description was given of the system employed on "R.36." This ship is lit internally with ordinary 12-volt metal filament lamps, from current supplied by five generators, one in each of the engine cars, belt-driven from the main propeller shaft, and charging a floating secondary battery of 40 amp./hrs. Batteries and generators are laid out in two systems, those in the four wing cars supplying current to the passenger, control, and wing engine cars and internal navigation lights. The stern car generator supplies current to this car, stern navigation and after corridor lights. All generators are coupled through switches and fuses so as to admit of the isolation of any one generating unit, and all cables are run through bonded aluminium troughs; switch boxes and cable exits are rendered gas tight. (Further details of the installation were given, and a wiring diagram was shown). The author stated that the "D.H.34" and "D.H. 32" commercial machines are to be provided with internal lighting. Brief mention was also made to the lighting of instruments on certain machines.

With regard to the external lighting, in accordance with the International Convention for Aerial Navigation, after enumerating the requirements laid down, the various problems arising in connection with same were dealt with. It was pointed out that, perhaps, practical experience would have to solve the problems confronting us.

The importance of eliminating any "fringe angle" was explained. This can be partially effected by screening, a similar method to that employed for port and starboard lights on ships being an ideal method. There are, however, constructional and aerodynamical difficulties in applying this method to aircraft. Careful experimenting has led to a design of screen which is a compromise, giving a uniform intensity of beam throughout the prescribed dihedral angle, and limiting, as far as possible, the fringe angle. Dioptric lenses or reflectors have not been experimented with, as a satisfactory solution has been found with the screen.

Difficulty has been found in obtaining the correct formula for the tinting of coloured glasses, the usual signal red and green not giving satisfactory colours when high intensity filaments are used. The Board of Trade and Air Ministry are now working on this problem. The International Convention rules may have to be modified. It was explained, now that speeds of 200 m.p.h. have been reached, how little time there is for the pilot to act in avoiding a collision.

Another form of light carried on aircraft is that to facilitate landing, especially in emergency, on an unilluminated area. One of these, the Holt wing tip flare, consists of an inflammable aluminium composition, suitably attached to the underside of the wing tip, and electrically ignited from the cockpit. It gives about 6,000 c.p., and illuminates the ground for about 100 yds. from a height of 150 ft., and lasts about two minutes. The usual Vérey light is also used for this purpose.

During the War, the English, French and German air services were each independently developing means to assist air pilots in this connection, electrical methods being favoured by France and Germany. German designs mainly embodied metal parabolic reflectors, with medium power filament lamps and without lenses. French designs were more varied, comprising small power wing tip lamps, *fuselage* lamps—in one type, four lamps with parabolic reflectors in a row, mounted below *fuselage*—high power filament lamps, with metal or silvered glass reflectors, and complicated front compound lens schemes. English devices developed by the Air Force were much more varied in character, and covered all types experimented with, both in France and Germany, and a special type of gas-filled filament lamp of 1,000-2,000 c.p. for use with standard 12-volt engine starting or general service accumulator. The early models of this latter lamp presented difficulties, but the latest device, consisting of a high power 12-volt filament lamp, with special sealing in devices, mounted in a streamlined and watertight lantern, so as to withstand landing shocks, gives promise of successful results. The lantern gives reflection and diffusion over 180°, and complete lamp weighs 7 lbs.

The concensus of opinion amongst pilots shows that for landing the electric lamp is as good as the chemical flare. The latter is superior at heights above 500 ft., but below this the electric lamp lights up the ground better, especially in a fore and aft direction. The electric lamp also has the advantage of being switched on and off at will, whereas once the flare is lit it must remain on until burnt out. Risk of fire is another point against the chemical flare.

The author next touched upon the important matter of *Aerodrome Lighting*. These are divided into three classes:—(1) Obstruction lights; (2) Illumination of the actual ground; (3) Fixed signs to show the direction of the wind, etc. Briefly, referring to the various obstruction lights erected at Croydon and Lympne, the author proceeded to go somewhat fully into the matter of illuminating the ground. Here, the main object is to flood the whole ground with light, without causing any confusing shadows or bringing any glare into the pilot's eyes.

Various systems have been tried, starting from the Money flare system, in which an asbestos composition, compressed in a wire cage (10 ins. diameter), is soaked in paraffin, is placed in a metal bracket and ignited; a series of these flares are arranged in the form of an "L," the long arm being in the direction of the wind, and the short arm at the windward end. This serves to indicate to the pilot the direction in which he must land, and also the level of the ground without dazzling the pilot. It is a well-tried product, and most night-flying pilots prefer it to any other; it is, however, costly in labour, requiring a party of half-a-dozen men to lay out the flares, and to rearrange them with any shift of wind direction. A substitute has been tried, employing electric lamps, placed along a cable laid out in L-form, but this also requires a number of men to handle it. This last system, elaborated, as used at Croydon, was then described.

The use of powerful searchlights is the first thing to strike one. One objection to these is their running cost, the 36-in. lights at Croydon taking 140 amps. at 60 volts across the arc—a cosumption of about 51 units per night per projector. Shadow trouble is another objection to the searchlight, if the pilot lands in the beam. If the beam is concentrated a very narrow path is illuminated, but the pilot can now come in nearly over the projector, and land immediately alongside the beam. Moving the projectors with the shifting of the wind is another trouble. The value of the intense illumination given by a large searchlight has been considered sufficient to instal at Croydon, three 36-in. projectors, arranged in the angles of an equilateral triangle, the beams having a divergence of 45°. For landing, the beam which is most approximately at right angles to the wind is switched on, and used in conjunction with the land "L's."

The French have adopted a similar method, having equipped a motor lorry with four flood lights (Barbier, Bénard and Turenne) using 1,500-watt ½-watt gas-filled lamps at the focus of split 200 mm. dioptric lenses. The light given by each is about 15,000 c.p. over an arc of 180° in the horizontal plane.

Considerable attention is being given to the problem of fog-piercing lights, which is still unsolved. Two systems show greater promise than any of the number tested; one consists of an ordinary dissolved acetylene pressure-fed flame, into which is introduced a liquid strontium composition, giving a reddish flame of considerable intensity. The second system, for emergency use only, consists of large composition (magnesium and other earth salts) flares which are ignited electrically, and burn for about five minutes with great intensity (about half a million c.p.). These have not yet been actually used on a machine.

Passing on to *Illuminated Ground Signals*, a description was given of an interesting system employed for mergency landing grounds, when no personnel are available. This consists of an illuminated "T" sign, the long arm 20 ft., and the short arm 10 ft. overall. Each arm is illuminated by lenses placed round a flashing light source (giving 27,000 c.p.) at the junction of the arms. The "T" is visible at about 10 miles from normal flying height. The light is made to rotate so as to indicate the changes of wind direction, and thus serves as a landing light. The whole apparatus is automatic in action, being equipped for six months' unattended operation. Dissolved acetylene and special incandescent mantles are used for the light source; defective mantles are replaced automatically, and the light is lit and extinguished by a sun valve. (Described in FLIGHT for April 21, 1921.—ED.)

Aerial Lighthouses may be classified as (*a*) Navigation Lights and (*b*) Local Pilotage Lights. Earlier forms of navigation lights were small, portable lighthouses, of 500 mm. half-optic type, with open burners (dissolved acetylene) and served to help our Service pilots during night flying. But commercial aircraft must be provided with aerial lighthouses in the same way as the marine lighthouse provides for shipping. Marine and aerial lighting are very similar, basically, except that whereas in marine work the greatest available light power is projected to the horizon, the aerial light must throw its rays through practically the whole upper hemisphere—and it is, obviously, impracticable for aviators, when approaching a lighthouse, to reduce height steadily in order that they may remain within the beam. This problem has demanded more thought and experiment than would at first appear, and various methods have been tried out.

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* Extract from a Paper read before the Illuminating Engineering Society at the Society of Arts, Jan. 31, 1922.

In his concluding remarks, the author briefly described the Croydon type aerial lighthouse (described in FLIGHT, April 21, 1921) and Cone (Local Pilotage) lights. He also referred to the question of modifying marine lighthouses, to meet the need of aviators. A number of observations have been made from the air, and it has been found that certain existing marine lights are of considerable assistance to aerial navigation. It is not, at present, proposed to make any alterations to marine lighthouses in this country.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JANUARY 23 AND FEBRUARY 4, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon-Paris	13	36	5	10	13	2 46	D.H. 18 G-EARO (2h. 10m.)	B. (1), D.H. 4 (1), D.H. 18 (3), G. (3), H.P. (1), Sp. (2).
Paris-Croydon	16	32	6	11	12	2 56	Spad F-ACMI (2h. 18m.)	B. (3), D.H. 4 (1), D.H. 18 (3), G. (3), H.P. (1), Sp. (3), V. (1).
Totals for 2 weeks ...	29	68	11	21	25			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

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PERSONALS

Married

A. E. DIRCKS, late R.A.F., Dept. of Agriculture, Kenya Colony, son of Mr. I. F. W. Dircks, East London, The Cape, was married on December 22, at the Memorial Cathedral, Mombassa, to WALWYN ST. CLARE COBLEY, daughter of Mr. W. H. Cobley, I.S.O., late Natal Civil Service, Maritzburg, Natal.

Death

THE death took place on January 26, at West Wratting, near Newmarket, of Mr. EDWARD PURKIS FROST. Mr. Frost, who was born in 1842, was one of the first members of the Royal Aeronautical Society. He became a member of its council, and later its president, retiring from the chair in 1911. Mr. Frost spent much time in observation of the flights of birds and insects. His early experiments in building aeroplanes were spoiled largely for want of engine efficiency. King Edward, when Prince of Wales, once visited Mr. Frost's workshop, and expressed great interest in his experiments.

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AIRSHIP CONFERENCE

AN International Conference has been arranged for February 14, and the representatives of all nations interested in commercial airship work will meet at Australia House under the Presidency of Mr. Ashbolt, the Agent-General for Tasmania, at 10.30 a.m.

The purpose of the Conference is to standardise mooring and replenishing arrangements, so that all airships can be received at any airship station should stress of weather or other circumstances make this desirable, and so increase the safety and reliability of airship travel. Anyone having proposals for mooring airships and for supplying them with gas, fuel and water, which they may wish to have considered by the Conference, are requested to communicate with the Hon. Secretary, Commander F. L. M. Boothby, R.N., C.B.E., F.R.Ae.S., c/o Royal Aeronautical Society, 7, Albemarle Street, London, W. 1. Representatives of the United States, France, Spain, Italy, Germany and Great Britain have already arranged to attend.

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THE INSTITUTION OF AERONAUTICAL ENGINEERS

LIEUT.-COL. J. T. C. MOORE-BRABAZON, M.C., M.P., who has consented to become President for the coming year, will give his Presidential Address and a paper on "The Early Days of Aviation" on February 23 at 8 p.m., at the Royal Society of Arts, Adelphi. Tickets may be obtained by application to the Institution of Aeronautical Engineers.

Other Fixtures.—February 15: Visit to the Works of Messrs. D. Napier and Son, Acton, to see the manufacture and testing of the famous Napier aero-engines. Meet at the works at 2 p.m. March 4: Visit to the Instone Air Line, at the Croydon Aerodrome. Meet at the aerodrome at 3 p.m. March 22: Visit to the De Havilland Works of the De Havilland Aircraft Co., Ltd., Stag Lane Aerodrome, Edgware, at 3 p.m. Meet at the works; Paper, "Seaplane Design," by Mr. W. O. Manning, at the Engineers' Club, Coventry Street, at 8 p.m. March 31: Paper, "Aircraft Design," by Mr. Folland, Royal Society of Arts, at 8 p.m.

THE ROYAL AIR FORCE

London Gazette, January 31, 1922

General Duties Branch

The following are granted perm. comms., retaining their present substantive ranks and sen. except where otherwise stated, with effect from the dates indicated. *Gazettes* of these dates, appointing them to short service commns., are cancelled :—

Flight Lieuts.—E. D. Johnson, A.F.C. ; Sept. 12, 1919. F. H. Laurence, M.C. ; Oct. 24, 1919. A. L. Messenger, A.F.C. ; Sept. 12, 1919.

Flying Offrs.—C. T. Anderson, D.F.C. ; Oct. 24, 1919 (since promoted). A. L. A. Perry-Keene ; Sept. 12, 1919. J. G. Walser, M.C. ; Sept. 12, 1919.

The following are granted perm. commns., retaining their present substantive rank and sen., with effect from the dates indicated. *Gazettes* of dates indicated in brackets, appointing them to short service commns., are cancelled :—

Flying Offrs.—E. Burton ; June 30, 1920 (July 2, 1920). A. T. S. L. de Lacroix ; Aug. 23, 1920 (Aug. 27, 1920). M. G. L. T. Leroy, A.F.C. ; June 1, 1920 (June 15, 1920).

Observer Offr.—J. F. Titmas ; July 14, 1920 (July 23, 1920).

A. T. Chapman is granted a short service commn., as a Pilot Offr., on probation, with effect from, and with sen. of, Jan. 18. Flight Lieut. E. Drudge is placed on half-pay, Scale B ; Jan. 31. Flight Lieut. P. Worthington is transfd. to the Reserve, Class B ; Feb. 1. Flying Offr. C. O. Anson relinquishes his short service commn, on account of ill-health, and is permitted to retain the rank of Lieut. ; Feb. 1. Observer Offr. M. G. Ryan (Lieut, E. Lancs. R.) relinquishes his temp. commn. on retirement from the Army ; Feb. 1.

Medical Service.

Capt. O. Armer, Army Dental Surgeon, is granted a temp. commn. as a Flight Lieut. while attached for duty with the R.A.F. ; Nov. 30, 1921. He will continue to receive emoluments from Army funds.

Memorandum

Lieut. W. N. Sherlock is re-classified from Flying O to Flying A ; May 16, 1919 (since granted short service commn.). The permission granted to Lieut. H. Howard to retain his rank is withdrawn on his joining the Army ; Jan. 5.

London Gazette, February 3, 1922

Group Capt. E. R. Ludlow Hewitt, C.M.G., D.S.O., M.C., A.D.C., is appointed Air Secretary to the Secretary of State for Air, and relinquishes the appointment of Deputy Director of Training, Air Ministry ; Feb. 1. Group Capt. P. L. W. Herbert, C.M.G., C.B.E., is appointed Deputy Director of Training, Air Ministry ; Feb. 27.

General Duties Branch.

Wing Commander F. Ranken, O.B.E., is place on half-pay, Scale B ; Feb. 1. Flying Offr. H. V. Rowley is placed on half-pay, Scale B, from Dec. 22, 1921, to Feb. 21, inclusive.

Memoranda

The following Cadets are granted honorary commns. as Sec. Lieuts., with effect from the dates of their demobilisation.—182045 C. Alexander, G21718 T. H. Chessun.

Sec. Lieut. D. A. Stenhouse is transfd. to the Unemployed List ; March 5, 1919 (substituted for *Gazettes*, March 18, 1919, and June 10, 1919).

Errata

Gazette of Jan. 27.—For L. G. A. Kirchener read L. G. A. Kirchner. *Gazette* of June 22, 1920, for J. G. P. B. Angell read John Beazley Patrick Angel.

* * * *

Over the Alps

ZANETTI, the Italian pilot, is reported by the Paris correspondent of the *Daily Mail* as having flown the Alps at an altitude of 30,500 ft. Starting from near Lake Maggiore, Italy, he flew to Antibes, alighting there in a gale, close to the lighthouse.

Washington Armament Agreement

IN the final draft of the Washington Agreement, which, it is now stated, has been agreed to by all the nations concerned, the total tonnage of aircraft carriers is fixed as follows : United States and Great Britain, 135,000 each ; France and Italy, 60,000 each ; Japan, 81,000.

The Pope Election and the Aeroplane Watchers

ACCORDING to the *Conservatore Romano*, the official Vatican organ, very great objection is taken to aeroplanes which, on several occasions, have flown low above the Vatican during the Conclave. It is considered, they state, a breach of the Italian Government's promise of protection, which all seems much ado about nothing, as the occupants can hardly see more from above than those watchers on *terra firma*. No doubt, it will end in smoke.

Air Post to the Rescue Again

HOLLAND and Sweden are feeling the direct effects of the German railway strike, the mails from and through Germany having been completely suspended. Holland at once remedied their part by carrying the mail by aeroplane. Sweden, in a like predicament, is endeavouring also to recommence the air-service for mail-carrying, as the British mails are carried *via* Germany.

Honouring Aviation in France

THE importance attached to the progress of aviation in France may be in part judged by the Legion of Honour appointments just made. These include one "Cravate," three "Rosettes," and seventeen Crosses. M. Clement Ader comes in for the Commander "Cravate," and the officers' "rosettes," fall to MM. Louis Blériot, Georges Bescancon (Secretary-General of the A.C. de F. and Editor of *l'Aerophile*) ; M. Delage of Nieuport-Delage ; and M. Réné Hanriot. The seventeen Crosses include the Under-Secretary of State for Aeronautics, MM. Lemoine (of Peugeot's) ; Henri Claudel, of carburettor fame ; Dick Farman, brother of Henry and Maurice Farman ; L. de Saint-Germain (Gnôme and Rhône) ; and François-Marie Le Men, a prominent commercial aeroplane pilot.

Berlin-Moscow by Air

IT looks as if the attempt to link-up Berlin with Moscow is to be seriously made, as further details are reported from Berlin, in regard to the agreement which the Soviet Government have made with the Aero Union Company in Berlin. This is for a regular service between Germany and Russia of aeroplanes belonging to the Soviet Government, under the name of the German-Russian Air Co.

The first route is to be between Königsberg and Moscow, in connection with the night express to Moscow. The arrangements are in the hands of German and Russian experts, and the route service is being organised by the Deutsche Luft Rederei. One object of the service is to promote an official courier service between Berlin and Moscow. The Aero Union is associated with the A.E.G., the Zeppelin Co., and the Hamburg-Amerika Line.

Fruit by Air for Covent Garden

IT is not improbable, according to the *Daily Telegraph* that this year a serious effort will be made to enlist the services of the aeroplane for the conveyance of products to Covent Garden. For some time past, Continental growers have been attracted by this new and speedy method of transport. Last year, an early consignment of Dutch tomatoes reached London by an air route. On another occasion strawberries were brought from France by aeroplane ; and when an English railway strike was threatened a Belgian grower suggested that he should send his fruit by aerial transport. The aerial service that is now receiving serious consideration is one that would make the aeroplane a link between an important growing centre and Covent Garden. Plans have been discussed with the growers, and there is a keen desire to see experiments made this season. It is not, of course, proposed to drop consignments from the air on to the roof of the market ; but a landing place not far from Covent Garden has been suggested. The movement is in its initial stage, and developments are awaited with interest.

As to Aviation in 1930 ?

IN response to a request for opinions upon what stage aviation is likely to have reached in 1930, our Paris contemporary, *L'Auto*, has been able to publish quite a number of opinions, illuminating and otherwise, pessimistic (a few), optimistic (the majority) and fantastic (one or two). The forecast we fancy most of all, as summarising aviation's possibilities in a nutshell, is the reply of M. Pierre Lafitte, as follows :—

In 1860, in general conversation upon the railway.

Unanimous conclusion.—"Never can the railway be in any way a practical form of locomotion. It can only be of service to an acrobat or a fool."

In 1885, in general conversation upon the bicycle.

Unanimous conclusion.—"Never can the bicycle be in any way a practical form of locomotion. It can only be of service to an acrobat or a fool."

In 1895, in general conversation upon the automobile.

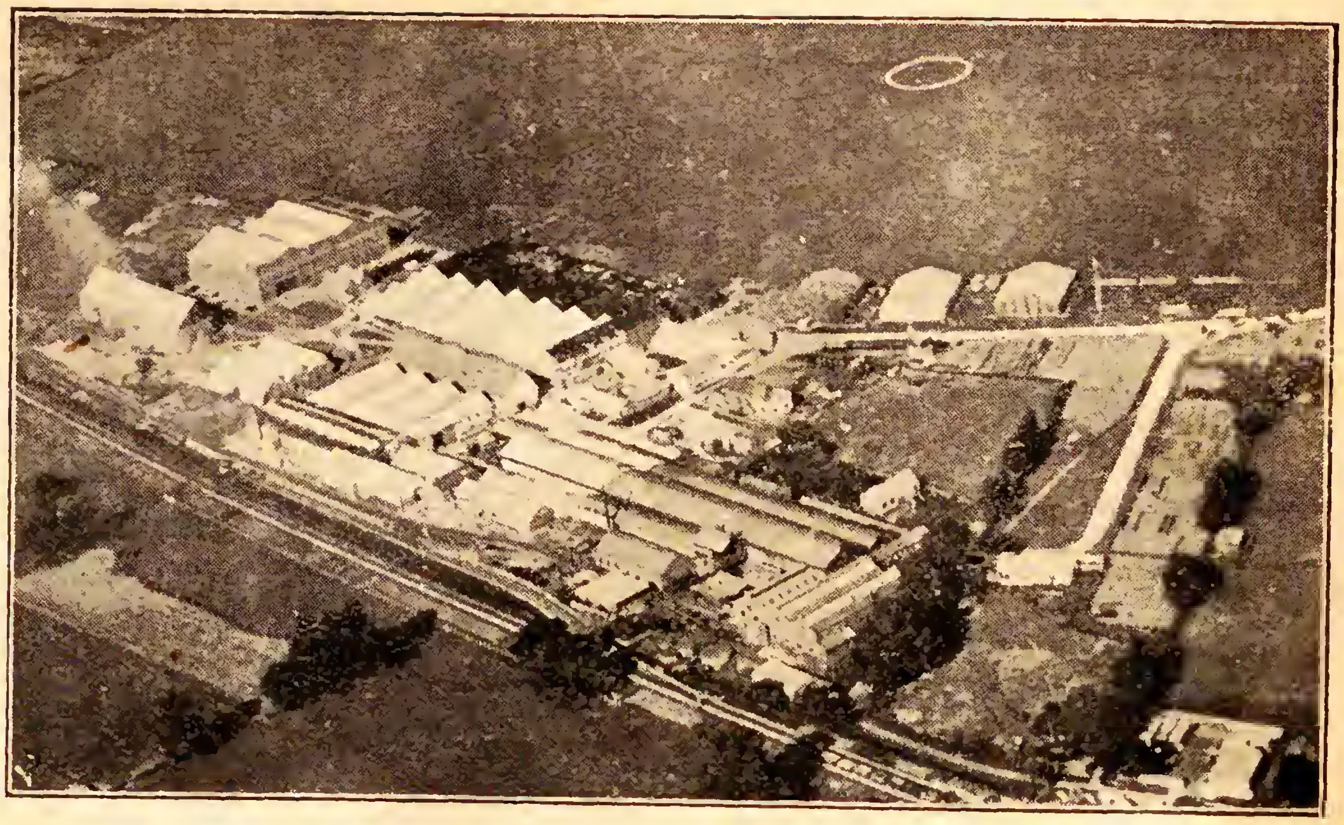
Unanimous conclusion.—"Never can the automobile be in any way a practical form of locomotion. It can only be of service to an acrobat or a fool."

In 1919, in general conversation upon the aeroplane.

Unanimous conclusion.—"Never can the aeroplane be in any way a practical form of locomotion. It can only be of service to an acrobat or a fool."

In 1930—

" . . . Draw your own conclusions ! "



Westland Aircraft Works, Yeovil, photographed from the air. A good idea may be formed from this photograph of the extent and layout of these works, which, being built during the War, are of the most up-to-date type. At present they also house part of Petters, Ltd., the parent company.

London Aero Models Association

At the General Purposes Committee held on Thursday, February 2, the question of Country Members and Affiliation of Provincial Clubs was discussed with very great thoroughness, and the Secretary will be in a position to notify all those who are interested in the L.A.M.A. as soon as the particulars have been received from the printers.

On Thursday, February 9, a Smoking Concert will be held at Headquarters, 20, Great Windmill Street, Piccadilly, W. 1.

On Thursday, February 16, Mr. F. J. Camm is giving the second part of his lecture, "Model Aeronautical Research," and the Committee earnestly hope that all members will make a special effort to be present on this occasion.

On Thursday, February 23, a meeting of the General Purposes Committee will be held so as to discuss the programme of Competitions for the ensuing six months.

The Secretary regrets the delay in sending out particulars of the Association to those who have made enquiries from the provinces; they will have full particulars at a very early date.

Full particulars as to membership, etc., can be had from the Hon. Sec., Mr. A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

The Aveline Stabiliser at Croydon

On Monday last a Farman Goliath, fitted with the Aveline Automatic Stabiliser, arrived at Croydon from Paris. Comte de La Vaulx was amongst the passengers, and the pilot was M. Chaillous—who also piloted a machine fitted with the Aveline Stabiliser from Paris to Amsterdam some little time back. Demonstration flights with the Goliath referred to above were made at Croydon last Wednesday, and will probably be continued today (Thursday). The Aveline Stabiliser was described in Flight for Feb. 21, 1921.

Lieut. Parer Crashes

Lieut. Parer—who, with Lieut. McIntosh, flew from England to Australia in 1920—when starting for a renewed attempt to fly 10,000 miles round Australia, accompanied by his cousin, Mark Parer, last Tuesday, had the misfortune to collide with a telegraph post and crashed. Lieut. Parer was not badly hurt, but his cousin is dangerously hurt.

* * * *

PUBLICATIONS RECEIVED

The Airliner and its Inventor, Alfred W. Lawson. By Cy. G. Faunce. Rockcastel Publishing Co., 55, East Main Street, Columbus, Ohio, U.S.A.

Analogies Mécaniques de l'Électricité. By J.-B. Pomey. Gauthier-Villars et Cie., Quai des Grands-Augustins, 55, Paris. Price, 15 fr. net.

Light Carpentry Designs. Evans Bros., Ltd., Montague House, Russell Square, London, W.C. 1. Price 3s. 6d. net.

Technical Note No. 81. Langley Field Wind Tunnel Apparatus. By D. L. Bacon. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 124. Aerodynamic Characteristics of Aerofoils—II. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

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20,718. H. Junkers. I.C. engines for aircraft. (148,895.)
27,566. I. Williams. Means for supporting and propelling flying-machines. (173,586.)

Published February 9, 1922

18,961. G. Caproni. Cellular structure for five-plane aeroplanes. (147,017.)
18,988. A. Flettner. Apparatus for steering aircraft. (147,034.)
20,082. A. Flettner. Steering-planes of aircraft. (148,172.)
20,087. A. Flettner. Apparatus for steering aircraft. (148,177.)
20,101. A. Flettner. ,, ,, ,, ,, (148,188.)
20,112. A. Flettner. Auxiliary steering-apparatus for aircraft. (148,194.)
20,134. A. Flettner. ,, ,, ,, ,, ,, (148,211.)
20,204. A. Flettner. ,, ,, ,, ,, ,, (148,293.)
20,207. A. Flettner. ,, ,, ,, ,, ,, (148,296.)

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(*Continued from* p. xiv.)

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Central 1156 (3 lines); "Cheery," Cent. London.

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Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

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Telephone 278; "Asteroidal," Coventry.

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Monk Engineering Co., High St., Coventry.
Coventry 807; "Assistance," Coventry.
Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MISCELLANEOUS—
British Oxygen Co., Ltd. (Hydrogen Gas), Elverton St., Westminster, S.W. 1.
Victoria 4706 (2 lines), 6717 (2 lines).

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Victoria 4155; "Aceterator," Sowest, London.

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Gerrard 5122; "Pliantness," Phone, London.

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"Kaalgee," Phone, London.

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Holborn 2041; "Aerography," London.
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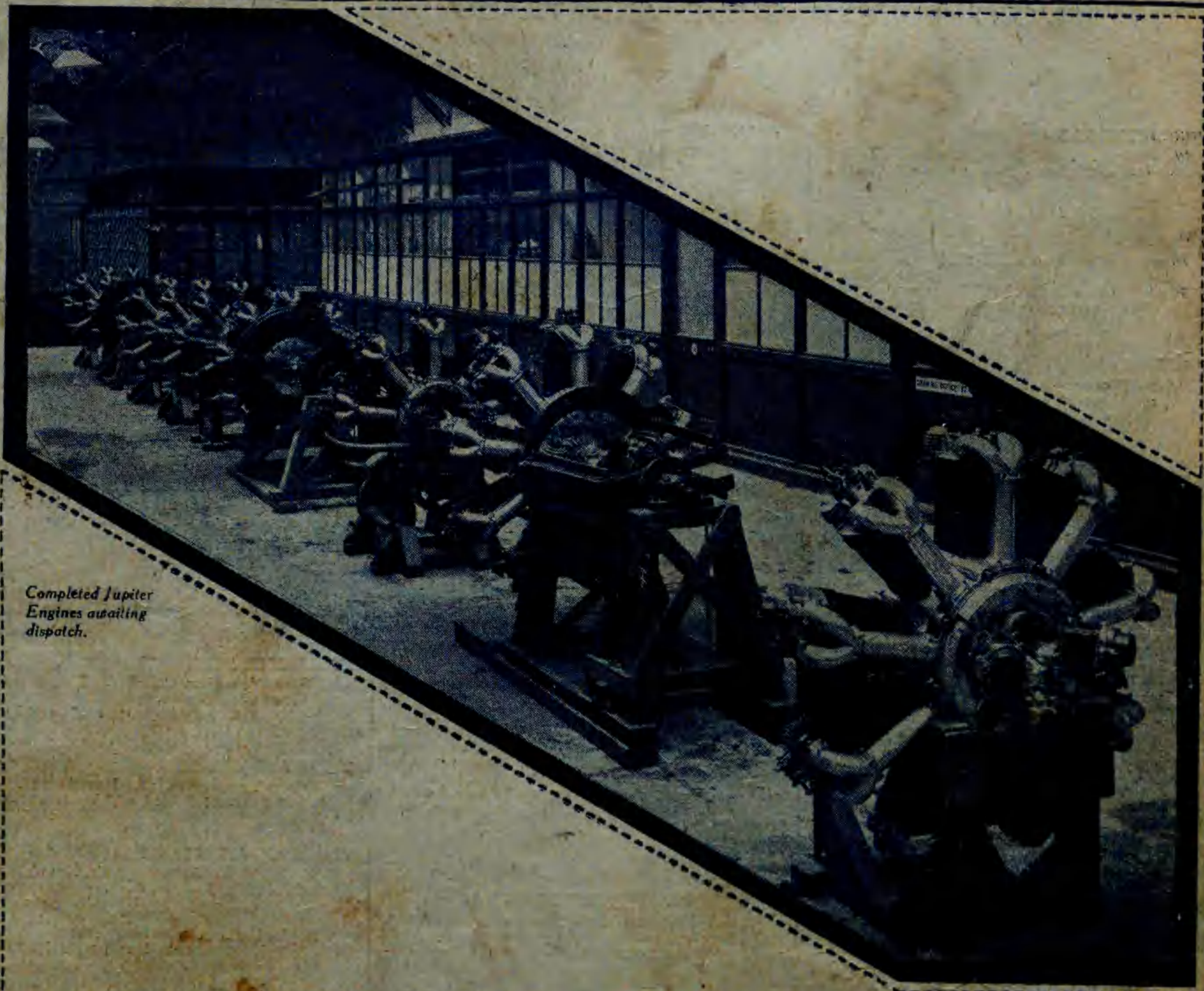

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

1922.	
Feb. 16	**Lecture, "Methods of Instruction in Aeroplane Flying," by Sq.-Leader Portal, before R.Ae.S.**
Feb. 23	**Lecture, "Some possible Improvements in Aero Engine Installation," by G. R. Irvine, before Students' Section R.Ae.S.**
Mar. 2	**Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.**
Mar. 16	**Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.**
Mar. 26–April 2	**Nice Meeting**
Mar. 30	**Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.**
April 17	**R.Ae.C. Race Meeting, at Waddon**
June 5	**R.Ae.C. Race Meeting, at Waddon**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22 ...	**Coupe Deutsche (300 kil.)**

EDITORIAL COMMENT

Interim Report of the Geddes Committee

THE "axe" has fallen at last. The report of the Geddes Committee, or, to give it its official title, the Committee on National Expenditure, has been published. As far as we are concerned, the portion of the report (reproduced elsewhere in this issue) which interests us most is that dealing with reductions in the Air Force Estimates and their relation to the reductions suggested for the Army and Navy. On the whole there is, we think, not a great deal to find fault with in the report, although we must disagree on certain points to which we will refer later. Generally speaking, however, the suggestions made appear to us to be sound, and, always bearing in mind the vital necessity for reductions, it must be remembered that we have to be content with something less than what we should like to have claimed. There runs through the report, almost as a guiding thread, a realisation of the future importance of the R.A.F., and one can read between the lines a desire to point to the older services and say, "Unless you are yourselves capable of doing this or that work more efficiently, it can and should be better done by the Air Force!" This is wholly encouraging to those who believe that in the future the Air Force will be our first line of defence, and as such is entitled to financial support in increasing proportion as it proves capable of taking over many of the functions of the Navy and Army. The undercurrent formed by this realisation comes to the surface in the introductory remarks, in which the report states : "The necessity for this (the consideration of the cost of the defence of the Empire as a whole) is much more apparent now than it was before the War, more especially because of the advent of the Air arm, which has come so much to the front, either as an addition to the older fighting services, or in substitution for them."

In view of this acknowledgment of the capability of the R.A.F. to supplant the older Services in many directions, and doing it more cheaply, it is to some extent disheartening to find that the percentage of suggested reduction for the R.A.F. is very considerably greater than that of the Navy and Army. In the case of the Navy the reductions suggested amount to approximately 26 per cent., and those suggested for the Army to a little more (about 26·6 per cent.), while the 5½ million reduction proposed for the R.A.F. amounts to as much as 35 per cent. If it were not for the fact that a great proportion of the reductions suggested are based upon certain reductions in personnel and organisations, which are considered to represent overlapping and waste or luxury, we should take a more serious view of the "cuts" proposed. It must, however, be conceded that in any organisation there is room for improvement, and it would be futile to claim that the efficiency of the R.A.F. reaches the 100 per cent. figure; nor, for that matter, do those of the Army and Navy, and we venture the opinion that the R.A.F. as a whole is at least as efficiently conducted as are the other Services. That, however, is scarcely the point. Reductions all round have to be made, whether we like it or not, and the main thing is to effect them where they will do least harm. We think that, taking a long view of the situation, the suggestion of doing away with Halton is probably unwise, as the training of personnel is one of the greatest importance. It may be conceded, however, that for the time being, at any rate, the other establishments, such as Cranwell, can do all that is required, and therefore, although we would rather not have seen Halton scrapped, we are not inclined to quarrel violently with the Committee over its decision in this respect.

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Technical Equipment

There are, however, certain other respects in which we cannot find ourselves in agreement with the suggestions made. For instance, the Committee suggests a reduction of £1,000,000 under the Vote for Technical Equipment. Progress in aviation is so rapid that material very soon becomes obsolete. The retention of obsolete or obsolescent machines may therefore easily prove not only at least as but more costly in the long run than the acquisition of progressively modern flying craft. To us it seems that to suggest saving a million on technical equipment is a very short-sighted policy. The Committee itself states in its report that "It can no longer be denied that by the intelligent application of air power it is possible to utilise machinery in substitution for and not as a mere addition to man-power." Therefore, one would have thought that a million pounds cut under the heading of Technical Equipment would prevent such substitution of machinery for man-power, or at any rate tend to minimise its full utilisation. If the Committee have in mind obtaining the greater part of the million reduction from the certainly somewhat excessive figures for motor and other transport, and for buildings and land, we think the efficiency of the R.A.F. would not suffer greatly, but if a large portion is to be deducted from the sums set aside for the purchase of new and improved machines, then we do say that the efficiency cannot but be very seriously affected. The whole science is as yet so young that progress is abnormally rapid, and a machine is generally obsolete within a few months of its launching.

The report states that a saving can be effected in technical equipment, owing to the suggested reduction of the number of squadrons from 32½ to 24. We do not pose as military experts, and consequently we do not presume to say whether such a reduction is justifiable, but even if it is, it should be remembered that, as suggested by the Committee, the use of R.A.F. units to replace Army units abroad will mean using the flying stock in countries whose climatic conditions are such as to call for frequent renewal of machines, quite apart from the question of crashes.

Closely connected with the question of technical equipment is that of research. The Committee realises that there is probably more justification for continued research in connection with the Air Force than there is in the older Services. Nevertheless, it suggests that the amount spent on aeronautical research should be limited to £1,000,000. This may seem a generous sum, but those intimately connected with the extraordinarily complicated nature of the different classes of research required will realise that a million will not go very far. We would also point out that it is reasonable to suppose that a fairly liberal expenditure on research might, and in all probability would, result in establishing information that would, in the long run, save vast sums on new types of machines.

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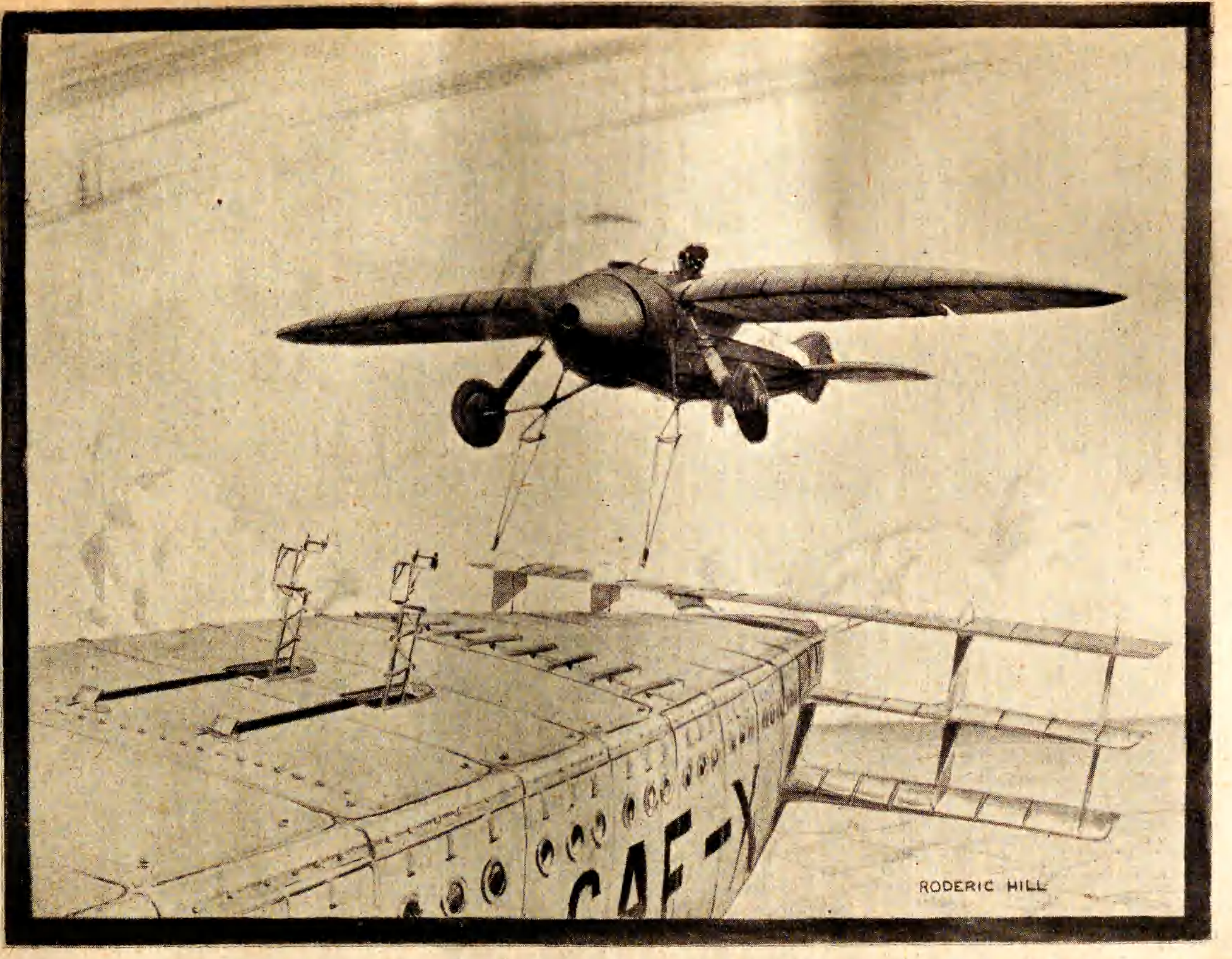
A Ministry of Defence

The Committee strongly urge the co-ordination of the three fighting Services under a Ministry of Defence, in order that the necessary economies may be effected and overlapping and duplication avoided. Again, as we do not pose as military experts, we shall not presume to say whether or not such a scheme would be in the best interests of the country. We would say, nevertheless, that to us it appears that, if the right man can be found, such a Ministry would tend to ensure that each of the fighting Services did its share of the work of defending the Empire, and was supplied from the funds available in direct proportion to its value in Imperial defence. The main difficulty, to our mind, is that of finding the right man for the position. He would have to be a man of the very strongest personality, to begin with, and it is essential that he should not have been connected directly or indirectly with either of the three Services, otherwise he could hardly be expected to be entirely unbiassed when it came to considering and weighing the respective claims made by the different Services. This would necessarily mean that he would not have any very intimate technical knowledge of any of the Services. That, we think, would not necessarily be a disadvantage. A judge has continually to hear cases in which evidence of a highly technical nature is given. It is for him to decide which of the contending parties has succeeded in proving its case. And so with a Minister for Defence. He would hear the claims made by the Imperial Staff of the three Services, of which the Ministry should be composed, and would have to decide, on the evidence presented, which Service had the greatest claim—in other words, which Service could do the particular piece of work most efficiently. On the whole, we are inclined to think that the establishment of such a Ministry would be an advantage. That it will materialise in the coming financial year is, perhaps, open to doubt. It will mean a great amount of reorganisation and will necessarily take time. This fact need not, however, mean that the scheme will be permanently abandoned; and certainly, when, as is bound to occur sooner or later, the R.A.F. is *the* great service, it will be far better for it to have been removed from the shackling effects of the jealousies of the older Services.



"A GLIMPSE OF THE FUTURE" *(From the original by Roderic Hill.)*

The picture shows a fast single-seater customs aeroplane about to settle on the alighting deck of a big air liner. At a signal from the customs official, who incidentally flies his own aeroplane, the captain of the air liner brings his ship to a steady speed and the pneumatic trap on the alighting deck is set ready. Gliding a little faster than the liner, the customs aeroplane approaches over the tail. As it nears the trap it reduces speed slightly until, except for a lateral swaying, it hovers apparently motionless. For a few seconds the "dactyls" on its under-carriage flicker in the jaws of the trap; then there is a metallic clang and the little aeroplane is safe, moored fast to the liner. The customs official slips out from his cockpit, and, crouching in the wind, makes his way forward. When 50 feet in front of the trap he suddenly disappears down a well, where we leave him to commence his round of necessary, if unpleasant, duties.

The Position of Civil Aviation

Though the Geddes Report pays relatively little attention to the question of Civil Aviation, it is suggested that a reduction of £400,000 could be effected in this department. Considering that the amount provided for 1922–23 is only £700,000, a reduction of more than one-half is a little too drastic to be contemplated, especially in view of the assistance which civil aviation will and can render to the R.A.F. in the matter of reserves. Apparently the Committee considers the £200,000 per annum voted for the next three years a commitment which cannot be escaped, and the saving of £400,000, it is suggested, should come almost wholly out of personnel. It is also thought by the Committee that under the heading of meteorology considerable savings could be effected. In view of the vital importance to aviation of meteorological services, and its importance, scarcely less vital, to other sections of the community, we do not agree that any great reduction could or should be made. The Committee evidently realise this fact, and wisely suggests that if more extensive meteorological services are required by the Air Force, they should be provided for on Air Ministry votes other than that of civil aviation.

Incidentally, if the suggested Ministry of Defence should materialise, the whole position of civil aviation would have to be very seriously reconsidered. Already under existing conditions the effect of the military mind is being felt in the Civil Aviation department, and there can be not the slightest doubt that under a Ministry of Defence Civil Aviation would stand in grave danger of becoming entirely overshadowed by the military side. This could not be tolerated for a moment, and it is well that this fact should be kept in mind when discussing the pros and cons of the suggested Ministry. Civil Aviation would have to be entirely separated from the influence of such a Ministry, except in such matters as affected the framing of arrangements for co-operation in case of war.

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The Air Conference

Now that the Air Conference is closed, it is possible to begin to form an opinion of its possible value. The papers read were of a very instructive character, both those of a technical nature and the papers dealing with general matters of policy. One fact was most startlingly brought out, *i.e.*, the divergence of opinion that exists between the views of the Secretary of State for Air and those of more than 90 per cent. of the speakers. Capt. Guest's views, at any rate as he expressed them at the Conference, are so pessimistic in regard to Civil Aviation that they strongly emphasise the need for separating entirely civil aviation from the military side of flying. It was most unfortunate that the Secretary of State for Air should have chosen the Conference as a suitable place for airing such views, as there is always the danger that some of those attending the Conference—those interested in but not in close touch with commercial aviation—may have come away with the idea that Capt. Guest voiced the general opinion. This, of course, is far from being the case, and the many outspoken criticisms levelled at his pessimistic statements must have served to convince the majority that the general considered opinion was not in agreement with that of Capt. Guest. Nevertheless, it is to be regretted that at a time when Civil Aviation is straining to obtain the interest of the great industries that will help to make aviation a commercial success, a Minister of the Crown should have thought fit to do his best to damn the cause of aviation with faint praise. As one speaker suggested, it would appear that we have an Air Minister who does not believe in aviation.

For the rest, the Conference may have done a certain amount of good, inasmuch as it allowed aviation subjects to be discussed on a much larger scale than can be done at the Royal Aeronautical Society. Otherwise one heard exactly the same speakers talking upon the same subjects in exactly the same manner as one can hear at almost any of the meetings of the R.Ae.S. From the other side, the industries and organisations which are, one hopes, going to make use of aviation, one heard nothing or practically nothing. The reasons are, perhaps, not far to seek. From the list of acceptances issued by the Air Ministry one gathered that a fair number of representatives of the "other side" were present, but they added but little to the general discussion. This may be understood if one looks the matter squarely in the face and admits that we—the aviation world—have to a great extent ourselves to blame. Instead of enlarging upon what we can do at present, and are absolutely ready to do, we appear to be divided among ourselves and to have a tendency to finish up every other sentence with "but tomorrow we shall be able to do very much better." The business man is not interested in what we can do tomorrow; what he wants to know is what we can do for him today, and at what price. If we spent a little more time, at these Air Conferences, in stating clearly, and considerably more briefly than was done this year, what we are prepared to do, and leave the discussion of wood *v.* metal, high-lift *v.* high-speed wings, the Diesel engine of some-day-after-tomorrow *v.* the petrol engine of today, etc., to be thrashed out in our own private camps, we might interest those for whom we shall have to cater, quite apart from presenting a somewhat more dignified appearance to the outside world.

Matters of commercial and general policy, and of our aeronautical relations with other nations, are, to our mind, the appropriate subjects for such a Conference, and that is why we press for making them more international in character. Commercial aviation will of necessity be of an increasingly International nature, and the sooner we get together the various nations interested the sooner shall we be able to formulate, with some degree of certainty, policies having due regard to the requirements of other countries and their claims upon recognition.

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One Resting-Place for Lafayette F.C.

An echo of the tragedy of the late War is the bringing into one burying-ground in France the Americans who fell fighting whilst with the famous Lafayette Flying Corps. According to the *Pall Mall Gazette*, the French Government have decided to provide a plot and arrange for the reinterment of the bodies of more than forty heroes who lie buried in different parts of Europe.

The maintenance of the graves and the erection of headstones will be undertaken by survivors of the famous corps. Of the 186 members of the Lafayette Flying Corps who went to the front, 63 were killed. The bodies of six of these have not been recovered.

Among the bodies to be placed in the new cemetery, which is situated near Souain, is one recovered on the shores of the North Sea, one in Salonika, and one in Genoa.

The cemetery will not be military in character, but will be as simple as an American country graveyard.

THE AIR CONFERENCE, 1922

[LAST week we published a *résumé* of the paper read before the second Air Conference by Lord Gorell, Under-Secretary of State for Air. This week we continue with extracts from a most instructive paper read by Lieut.-Col. W. A. Bristow, entitled "Aerial Transport, Today and Tomorrow," and with a brief report of the discussions of the two papers. Col. Bristow's paper may appear pessimistic to some, but it cannot be denied that all is not well with civil aviation, and the sooner we realise, and admit, its shortcomings, the sooner shall we be in a position to remedy them. We therefore make no apologies for publishing extensive extracts from a paper in which some strong opinions are very frankly and very ably expressed.—ED.]

AERIAL TRANSPORT, TODAY AND TOMORROW

By Lieut.-Col. W. A. BRISTOW, M.I.E.E., M.I.A.E., F.R.Ae.S.

IT is a matter of some little difficulty to write in a practical manner of the future of aerial transport owing to the lack of sufficient data upon which arguments can be based or from which conclusions may safely be drawn, and in consequence our ideas of the future must to some extent be founded on a mixed basis of theory, practice and imagination. It is impossible, for example, to give schedules of operating costs that could be taken as a guide to the future, as no company in the world has yet run with a complete fleet of aeroplanes and engines such as are considered today to be satisfactory for the purpose, neither can we consider that many other important factors are in a satisfactory condition. It is probably a fair statement that commercial aviation has, up to the present, been little more than full scale experiment with apparatus largely of a makeshift and temporary character. In spite of these limitations, however, the results have been of an extremely interesting and valuable character, and it will doubtless be agreed that the very greatest credit is due to those who have, in face of serious difficulties, carried ever-increasing loads with factors of regularity and safety of a high order.

Before attempting to deal with the subject in detail, it may be as well to examine briefly some of the main outstanding features of the present situation. In the first place, we have to recognise that at present it is not possible to carry on the business without a subsidy in some form or other, and therefore the character, allocation and working of the subsidy system will have a most important effect on development. It has been said that it is a mistake to confine the operations of subsidised services to the London-Paris route, and that there are many other routes which are capable of yielding equally good results.

As a result, however, of close pratical acquaintanceship with the working of several of the present air lines, I am convinced that a better route could not have been chosen, and that it possesses inherent advantages not to be found elsewhere. In the first place, it is about the right length for severity of test, the wide strip of water necessitates a high standard of reliability, and the rapidly fluctuating weather conditions along the whole route absolutely compel the rapid development of the two great guardian services of aviation—namely, meteorology and wireless telegraphy and telephony. In addition, the two termini and the general operations on the route are controlled by different countries with different ideas and methods, and no doubt much of the progress that has been made is due to the mutually instructive effect obtained by such an arrangement. Regarded as an experimental laboratory for the instruction of designers, constructors and operators, an international route is almost bound to be of far greater value than any purely national one.

From a commercial standpoint also, the London-Paris route has very great advantages. The actual journey by land and water, with its changes, delays and vexatious examinations, is rendered far more troublesome than its mere length would indicate, and very few people who have experienced the convenience and speed that can be obtained on this route in any reasonably suitable aeroplane will feel inclined to revert to the old means of travel. Further, the number of potential passengers is enormous, and, in addition to the subjects of the two countries, there are the scores of thousands of travellers and visitors from every country in the world who yearly pass between the two capitals. Many of these gain their first experience of air travel between London and Paris, and it is highly probable that they would not have the opportunity of obtaining it elsewhere.

There are, of course, hundreds of routes within the Empire that could be opened up to air traffic with advantage, but it is considered that success in these will be best assured by first hammering out the many technical and commercial difficulties on our own doorstep, and the Paris-London route, for the various reasons given, is, in the author's opinion, specially suitable for this purpose.

The question that next arises is as to whom the subsidy should be given, and the decision to increase the number of firms on the London-Paris route from two to three has been somewhat criticised.

What are the objects in view for which the subsidy is granted? As I see them, their order is, firstly, to promote and encourage British aerial transport undertakings in order that they shall be enabled to put up a good fight against the very powerful and heavily subsidised competition of the French, and secondly, to help us keep in existence some of the very valuable designing and constructional staffs we had in 1918. But behind all this is the real and vital question of the value of a commercial aviation industry in connection with the defences of the country. Progress in flying generally, and especially in connection with the design of machines and engines, depends largely upon actual flying experience, and already we see most of the flying all over the world being done by commercial aircraft.

It is hardly possible that the profession of aeronautical engineering can be built up on the requirements of military aircraft alone, so that it may well be that the future superiority of our naval and military air fleets will depend mainly upon the growth of commercial aviation, although the actual difference between civil and military aircraft may be as great as that between a "Hood" and a "Mauretania."

The nation is beginning to realise that our position as a naval and military power is undergoing a radical change, and that without adequate air power we cannot expect to maintain the Empire. France and Germany both realise this, and at the moment the French are actively staking out their claims on every airway of importance on a vast field bounded by Brussels, London, Africa and Constantinople, whilst Germany is concentrating on research and experiment on a most extensive scale. Once the latter is free to establish air fleets for service abroad, she will undoubtedly make strenuous efforts to become the greatest air power in Europe, if not in the world. We cannot disguise the fact that technically and geographically Germany is in the strongest possible position for accomplishing this purpose, and we undoubtedly must think of the day when German air lines will radiate from Berlin over the whole of Europe, and probably a part of Asia in addition. Already one of the largest firms of aircraft manufacturers in Germany has concluded an agreement with the Russian Government whereby they jointly run a very large factory in St. Petersburg and halve the profits.

Germany knows and France knows that the future history of Europe will depend to a very considerable extent on the distribution of aerial power, and if we are to retain anything like our present position it is absolutely imperative that we develop our commercial air fleets by every means at our disposal. Cutting down our expenditure on the Air Force and Commercial Aviation may render possible some trifling reduction in the income tax, but that will be of little comfort if, as a result of the next war, the income itself disappears.

This is rather a long digression, but it all relates to the question of the number of firms to be subsidised, and I think you will agree that all the objects in view will be furthered by the addition of suitable firms to the list of operating companies. It is not meant, of course, that such expansion of numbers can be continued indefinitely or that anybody should receive the subsidy. I feel sure, however, that we need have little fear but that British aviation on the London-Paris services will be worthily represented this year by the firms chosen, and that the policy of adding to the number operating is sound and in the best interests of all concerned.

The Air Ministry having provided very largely the ways and means, it now remains with the operating companies to examine carefully the results of past operations with a view to devising means for a more successful solution of the many problems to be solved before commercial aviation can be regarded as a permanent item in our social and industrial life.

The first item that has to be recognised (in fact it does not wait to be recognised) is the impossibility of at present making anything but a financial loss from the operation of commercial aircraft, although on paper it can be shown with comparative ease that the conveyance of passengers and goods by air can be attended with the happiest financial results, even without the assistance of a subsidy. In practice, however, it works out very differently, and operating companies are usually to be found, pruning-knife in hand, attacking every form of expenditure in order, not that the profit may be increased, but that the losses may be reduced.

What then must be accomplished in order that a heavy loss can be converted into a profit, and moreover with such a reasonable certainty as will from time to time ensure the supply of such new capital as will allow the industry to be properly maintained and expanded? The whole future of the aircraft industry, the aerial transport companies, our national defence, and even the future of the Empire may depend upon our ability to answer this question correctly, and it may be as well at once to examine the various means proposed as an amelioration of the present position.

Since the first days of air transport, it has been apparent that the very heavy interest and depreciation charges in respect to the fleet can only be met by keeping the machines constantly in the air with paying loads. This year it has been reported that we are to see an aeroplane doing three or four London-Paris trips in a single day. It is not seen, however, that this will solve the problem. If, for example, two machines are worked on a schedule that keeps them going all day, it will only be possible to maintain the necessary regularity and all the operational advantages that are allied to regularity by maintaining at least one spare machine on each side. A 100 per cent. reserve fleet would theoretically always be idle, and it would seem, therefore, to be just as economical to work the four machines on half time. And, in any case, in several months of the year, weather and lack of light prevent more than one journey per machine per day, or two at the most.

Designers and constructors of aircraft and aircraft engines approach the subject from another standpoint, and are bending their energies to effect improvements which have for their object an increase of the paying load in relation to the fuel consumed, and the cost of maintenance and operation. Such work is of the utmost importance, and progress will be vitally affected by the degree of success that is achieved in these directions. It is clearly impossible, however, to wipe out all the loss by improvements in thermal and aerodynamic efficiencies. Engines already closely approach the limit of thermal efficiency, and he would be a bold designer who would gurantee actually to produce aeroplanes even 15 per cent. more efficient than the best of those existing today. I see no immediate hope, therefore, that the work of the aircraft designer will enable the loss to be turned into a profit.

If civil aviation, therefore, is to have any future, what *is* required? In the author's opinion there is only one answer—Passengers and yet more passengers. Given even a moderate percentage of the travelling public, civil aviation, it is considered, could be made to pay its own way within the next five or six years. It is true that last year showed a welcome increase, and that this year may see a still further advance in the total number of passengers carried, but as the excess will be shared by some seven or eight companies, it is extremely doubtful if the nett increase per company will be anything material.

The regular and safe transport of passengers by air demands a highly skilled staff, but in addition to the overhaul and maintenance staff, which will have to be increased as the number of passengers increases, although not in the same proportion, there are those engaged in the management and operation of the commercial side of the business and also those responsible for superintending the actual working of the fleet, What other class of transport company could afford to keep a staff of such proportions for less than 50 passengers per week, taken as an average over a whole year? In some undertakings, the total number of persons employed in the working of the fleet is greater than the weekly average of passengers carried. No other form of transport could live for long under such conditions, however efficient their vehicles or methods.

It is very difficult at this early stage to form any exact opinion as to the minimum number of passengers that should be carried per week. Incidentally, the aerial week will probably have to consist of seven days as in every other transport undertaking. To cease work on Sundays, in addition to inconveniencing the public and delaying the expansion of the business, causes a loss of 14½ per cent. per year on the working time, thus further raising the cost per flying hour. On the basis of a week of seven days, the author has formed the opinion that the minimum number of passengers necessary weekly for the profitable operation of any one company is not less than about five hundred, and these must be carried in the most efficient machines operated by an exceedingly skilled and highly organised personnel.

By what means then are we to attract the far greater number of passengers required? It cannot be said, at present, that there is any real concerted effort being made by the companies to attract the public. Much of the advertising and propaganda is aimed at securing as large a share as possible of the numbers already travelling, and but little, if any, to encourage the general use of the airway. Before we can answer the question as to how the increase is to be obtained, it will be necessary to try and form some idea as to the main reasons that keep the public back.

It is considered that the chief reason lies almost wholly in the fact that insufficient attention has been concentrated upon the problem of making flying really safe, and secondly, we have not made it look and feel as safe as it is. We are rather apt to think that the public know little of the factors determining safety in flight, and that to them all aeroplanes are very much alike. Experience has shown this idea to be completely erroneous. The author has heard many conversations that show the contrary to be the case, and on more than one occasion has witnessed passengers refusing to travel on a machine which they did not consider either safe or sufficiently comfortable.

Factors Affecting Safety

Pilots.—The experience of last year has revealed several points that require serious attention, even although the number of fatalities and injuries was low, and in the case of the British Cross-Channel Services was actually *nil*. As, however, all companies have to suffer if anything impairs the confidence of the public, it is necessary to survey the European services generally. Probably the most serious cause of accidents has been lack of skill and judgment on the part of the pilots, although it is necessary at once to except British pilots from this generalisation. Our own pilots have, on the contrary, proved themselves over and over again to be exceptionally skilled and resourceful pilots and navigators, and it is impossible to praise their work too highly.

On the Continent and in America, however, there is considerable room for improvement, not only in the actual flying methods, but in the qualifications deemed necessary by the operating companies for pilots that are to be entrusted with passengers to be taken on long and difficult routes. It is considered by many that the question of the training of suitable pilots is one calling for the most serious attention by all those concerned with the control and operation of commercial aerial transport.

Aeroplanes.—It is, of course, highly desirable to design aeroplanes capable of carrying the maximum possible useful load for a given horse-power, which will be capable of being operated at a high speed with a minimum consumption of petrol and oil. It is impossible, however, to attain these ideals to their fullest extent and at the same time preserve the same factor of general safety, and if passengers, because it is not sufficiently safe, will not come forward in sufficient numbers to make the business pay, then the possession of the most money-saving aeroplane in the world does not place the owner in a very much better position.

Is it too much to ask that all aeroplanes used on, say, the London-Paris service, should be able to land and pull up with absolute safety almost anywhere in the country *en route*? If this cannot be done, then are we not bound to conclude that aerial transport is inherently much more dangerous than transport by land and sea? How much is it that would have to be sacrificed in order to render machines capable of taking off quickly and landing safely and providing them with stronger under-carriages, with much greater shock-absorbing capacity, and capable of being brought to rest within 60 yards after touching the ground?

It would have an immensely reassuring effect on the public mind if they knew that before a commercial aeroplane could receive a certificate of airworthiness, it had to make, say, ten forced landings on a given route immediately upon receiving wireless instructions from the ground, and at moments selected entirely by the wireless operator.

Aerodromes.—Sufficient attention has not yet been given in any country to the perfecting of the aerodromes in use. Even at Croydon and Le Bourget there are obvious improvements called for, but for some reason or another time drags on without the defects being remedied. There are few aerodromes in which it is possible to take-off with equal safety in any direction; it certainly is not the case at the two aerodromes just mentioned, and it appears almost easier nowadays to tear down a dynasty than half a dozen poplar trees. Further, there is not a single public aerodrome properly equipped with apparatus by which loaded aeroplanes can be readily weighed or the position of their centre of gravity determined, and it is nothing short of remarkable that more accidents do not occur as the results of ignorance as to these two vital factors.

Meteorology and Wireless Services.—Experience shows these two services to be the twin guardians of safety in the highest possible degree. Times innumerable, machines have been saved from danger by timely warning by wireless telephone of sudden changes in the weather conditions, apart from which in a very large number of cases, it would not be possible to undertake the journeys at all if it were not for the meteorological information transmitted by wireless beforehand. During the past year the departments responsible for this work have made rapid strides towards perfecting their organisation. The services also of the Marconi Company and the constant work of their able staff on the development of wireless telephony has been of the very greatest value, and the improvements that have been made are of a most substantial and gratifying nature.

Any suggestions that have been made for the improvement of these two departments are generally concerned with a possible subdivision of the work in the wireless department. At present there is no wireless operator acting solely as watcher and guide to the machines in the air. At one moment an operator may be talking to a machine, and then for fifteen minutes or more he may be engaged on transmitting or receiving weather reports or writing out messages. It is considered that the work should be divided, and one or two operators should do nothing but talk to machines in the air, keeping them posted all the time on weather conditions and other necessary information, giving them a bearing even in fine weather, and in effect helping the machines with all the meteorological and other information that becomes available as their journeys proceed. In view of the expected increase in traffic next year, this question assumes a very real importance.

In the Meteorological Department one could sometimes wish for a little greater promptitude in the reports, and especially with the reports from French stations. On many occasions machines have had to leave this side only very scantily informed of the weather conditions existing over long stretches of the route in France, and in some cases with no information except some several hours old. As a result passengers have been landed in all sorts of out-of-the-way places. It is considered by the author that the safest policy is not to send passengers off unless and until complete reports are available showing a safe route for navigation along its entire length, but this obvious desideratum cannot, of course, be obtained unless the meteorological and wireless departments on both sides of the Channel are working at 100 per cent. efficiency.

Greater Apparent Safety.—At present aeroplanes often do not look and sound as safe as they actually are. The average man in the street taking to the air for the first time is often rendered extremely nervous by the unmuffled roar from engines giving hundreds of horse-power. Most passengers complain of deafness after a flight, and also of not being able to talk, except with the greatest difficulty, when *en route*. There are at least two proved types of efficient silencer available, which are easy to fit and low in cost, and it is hoped that this year may witness their general adoption.

Pilots should as far as possible avoid any sudden alteration in position of the machine, and should also abstain from unnecessarily sharp turns involving undue banking. A careful and considerate pilot can do much towards establishing the confidence of his passengers. Many of them do not like being seated in or near the line of the propellers in twin-engined machines. It may be quite all right, but it does not look safe, and many passengers also do not feel safe when sitting facing the tail of the machine. It is considered that every effort should be made to sit all the passengers facing forward with sufficient leg-room, comfortable chairs and a clear outlook.

Comfort.—In addition to the problem of increasing the safety and the apparent safety of flight, there is the added difficulty of providing a machine that can favourably compare with other forms of transport in the matter of comfort. Most passenger cabins are either too hot or too cold, and there does not appear to have been any serious endeavour to arrange for a sufficiency of fresh air without draughts.

Lieut.-Col. C. B. Heald, C.B.E., Medical Adviser, and Wing-Comdr. Beatty, C.B.E., A.F.C., Deputy Controller, Department of Civil Aviation, Air Ministry, have carried out some very valuable experimental work in connection with the ventilation of aircraft, and with the data now available there is little excuse for the continuance of the discomfort and illness that has been caused in the past through inattention to these important questions. In machines fitted with water-cooled engines it should be a comparatively simple matter to fit specially light hot-water radiators in the cabins in parallel with the main engine cooling circuit, and with air-cooled engines a portion of the cooling air flow, not the exhaust, could be passed through light tubes.

Luggage.—The difficulties in dealing with passengers' luggage have also to be surmounted before the travelling public can be diverted from the railways in the necessary numbers. In the past about 30 lbs. weight has been allowed for free luggage, but, as can easily be seen by watching the departure of the boat trains, there are only a relatively small proportion of passengers whose luggage does not exceed this weight. There is also the difficulty with regard to the size of the packages that can be taken. There is sometimes plenty of room in the *fuselage*, but the doorway is too small. All these things may seem very trivial to the makers of the machines, but the inconvenience caused to the public and the operating companies is enormous. The author is of the opinion that the maximum weight of free luggage allowable must be raised, that the charge for excess luggage must be reduced, and that companies shall not part a traveller from his baggage.

Landings en route.—Another serious source of inconvenience to passengers is the delay that arises if they should be unfortunately landed anywhere else but at an aerodrome at which a Customs officer is stationed. First the pilot must find a constable, who on arrival in effect arrests all the passengers and conveys them to the nearest police station, perhaps several miles away. Here they are put through their paces by the Superintendent, who then retires to consult his numerous notices and regulations in order to see the next move. He then proceeds to impound all the passports and send for the nearest Customs officer, which may involve a hunt through all the hotels for miles around. After he has been found and has conducted his examination, passengers are free to proceed to the nearest main line and catch a train, if there is one left, but without their passports, which remain at the police station, from whence they are sent to some authority in London.

This actual case is recommended to the notice of the authorities in the hope that something can be done to reduce the delay and inconvenience that so often accompanies what is obviously a perfectly *bona fide* forced landing of a well-known machine and pilot. The remedy is in the hands of many. Firstly, it is essential that we procure international co-operation with a view to improving the system of reporting the weather *en route*. It ought to be made impossible for pilots to have to land at all sorts of out-of-the-way places because of unforeseen weather conditions, and if bad weather comes up suddenly they should be warned by wireless in time to enable them to retrace their steps to the nearest aerodrome. Designers also should sit down deliberately to design a bad-weather aeroplane in which the probability of arrival at the proper destination is as great as in the case of, let us say, an Atlantic liner. Much improvement could be made if the principle involved were adopted. In such a machine, for example, amongst other important features, great care would be devoted to the position of the compass and the wireless equipment, as a full and proper use of these has a most important bearing on the subject.

Further, the operating companies themselves are divided into two distinct camps. There are those who consider that the public must have reliability, and that this means reliability of departure; the other school of thought believes that reliability involves reliability of arrival, even though it may involve gaps in the programme of start. It will probably be found that the business as a whole will best be encouraged by adopting the alternative policy.

Cost of Travelling by Air.—The old price for a ticket to Paris was £10, and when the fare was reduced to £6 the number of passengers increased very considerably.

The question that naturally arises is, can the required volume of traffic be obtained whilst the fare is so much higher than that charged by train and boat? The standard reply is that the difference between the first-class fare and the price charged is only small, but is this a fair way of looking at the question? Considering that much of the aeroplane accommodation has been only fourth class (and that flatters some machines), it would appear to be a wrong basis for comparison. If the companies believe they will obtain their full volume of passengers from the rich there is nothing more to be said, but if it is agreed that an aggregate of two or three thousand passengers weekly are required, then it seems inevitable that the fare will have to be adjusted to meet competition, and the hitherto despised second-class passenger will have to be catered for.

Very few people seem to know that a return ticket to Paris can be procured for less than £3. The author is of opinion that the single fare from London to Paris by air will have to be reduced to £4 before the necessary increase of passengers can be obtained. The time may not be ripe for this reduction, as it is doubtful if the British machines available this summer will be sufficient to deal with a very large increase of passengers, but it is considered that at least by 1923 the question will have to be very seriously considered.

Educational.—In the foregoing notes it has been assumed that there are already a sufficient number of people willing to travel by air providing it is made perfectly obvious to them that their safety and comfort are assured. This assumption, may, however, be incorrect, and it is possible that if the views of the bulk of the cross-Channel travellers were taken it would be found that in the great majority of cases they would refuse to travel by air in any circumstances whatever. It may be, therefore, that at present there would not be sufficient passengers even if the fares were the same, and if this be the case some form of general educational propaganda is a vital necessity if the needs of the future are to be met. In any case it is probably a necessity, and if the tube railways of London still find it necessary to spend large sums yearly in order to attract more passengers to the underground system of travel, how much more essential must it be to undertake a similar campaign in respect of travelling at about three thousand feet over ground and without any visible means of support!

A whole paper could be written on this subject, but a few words will suffice to give some idea of what such a policy of education and propaganda might entail. (*a*) The history of flying, the development of commercial aerial transport and the engineering and scientific aspect of flight should be part of the curriculum in every school in the country, so that the rising generation may be taught to regard air travel not as a romantic novelty, but as one of the sober facts of life. (*b*) The cinema should be much more extensively employed for the purpose of keeping the public informed of the possibilities of air travel. (*c*) The Press, who already carry on such excellent work, could render it even more valuable by publishing statistics as to the high standard of safety and reliability already attained, and occasionally affording some of their space to the rather more practical side of commercial aviation. (*d*) Joy-riding concerns should be encouraged as much as possible, and approved firms might even be given a small subsidy in some form or another.

The author suggests that this is eminently a case for the consideration of the Society of British Aircraft Constructors who might form a small committee including representatives of other interested bodies, the object of which would be to devise and actually carry into effect some sort of general educational work.

Life Assurance Policies.—Last, but by no means least, assurance companies should be persuaded to allow ordinary flying under the terms of their standard life and accident policies. Is it likely that people who have paid premiums for years are going to travel by a route on which their policies would be null and void in the event of their death, especially if they have real dependants? Further, it is a very bad advertisement for civil aviation when almost every life and accident policy in the country places a complete ban on flying. The general removal of this restriction will mark a red-letter day in the history of flying, and it will become certainly an important, if not the most important, date in civil aviation, and no effort should be spared in endeavouring to procure this vitally necessary reform.

Conclusion.—This Conference comes at a most critical period alike for the country and for commercial aviation. In view of the vital importance of commercial aviation and its relation to air power, it is lamentable in the extreme that, in this year, the fourth after the Great War, the British Commercial Air Fleet should consist all told of less than twenty aeroplanes.

The British Empire embraces close upon 13 million square miles of territory, and has a population of 440 millions. In the development of the various parts of the Empire and in the interlocking of the whole, the question of transport and communication is of fundamental importance, and it is greatly to be regretted that the public here are not more fully aware of the importance with which the matter is regarded in other parts of the Dominions. For example, take Canada—the latest Canadian Air Board report clearly indicates that much of the work in connection with the development and protection of the country is being completely revolutionised by the use of aircraft, and that every day aircraft are engaged in forestry reconnaissance, photography, fire prevention, exploration, communication, transportation, and for many other purposes with the most remarkable results.

The United States with one-fifth the population of the British Empire, and of less than a quarter of the area has a railway mileage of 251,984, as against 134,131 miles in the British Empire. Not only that, but the narrowness of our tunnels and the weakness of our bridges so hampers the development of our locomotives and rolling stock that we are compelled to operate on a very low level of efficiency, with the result that today we see trades being forced on to the roads in their frantic endeavours to save their business from disaster. The neglect of other means of transport in our waterways costs this country millions of pounds yearly. Is the history of British Commercial Aviation to proceed along these dismal lines? Are we to see French and German machines all over Europe and running as far out as our interests in the East? Are we going to take a short-sighted view of the technical needs of the situation as the railways have done, so that we are handicapped from the very start?

In these notes stress has been laid upon the fact that commercial aviation should be able to stand by itself financially, and there is no doubt that if we can make it so our chances of supremacy will be improved, but, profit or no profit, other countries are not going to allow the business to fade away. The London-Paris service has been of the greatest value in showing us what to do and what not to do, but the situation urgently demands that we ask ourselves today—what is our real programme and what is the next step? Are we prepared to face the opening of 1923 with a a total fleet of about twenty machines, or one for each 600,000 square miles in the Empire? The position is serious in the extreme, and what should be a big concerted national effort is left to a small group of enthusiasts in the Air Ministry and in the industry.

What we want are, firstly, funds and a revised policy for research and experiment in connection with the problems associated with the development of civil aviation, and as a temporary measure, we want a large number of engines and machines ordered tomorrow of the very latest types. We also require an establishment for the training or re-training of commercial pilots, and such training must be of a far more comprehensive character than it was possible to give during the War. Our present position, with about a dozen first-class pilots in training, is almost ridiculous, especially when we consider that four years ago we had about 20,000 pilots, and 35,000 engines were turned over to the Disposal Board.

For months past we have been giving unemployment pay to thousands of skilled workers in the late aircraft industry. Is it impossible to put these men to work on manufacturing machines and engines? I am told that in many grades there is little difference between employment and unemployment pay, and if this is true, it seems absurd to keep on paying away hundreds of thousands of pounds to idle men whilst an industry that is vital to our very existence as a first-class power is allowed for want of orders to languish to the point of extinction. As business men, we do not need reminding that it is imperative that the national expenditure be reduced, but being business men we also know that much of the money that has been spent since the War could have been most advantageously expended in other directions, and that a small portion only would have enabled the aircraft industry to be kept alive and civil aviation to be placed upon a much broader and more efficient basis.

During the War we utilised our materials to the fullest possible advantage by establishing a system of priority. Money is the raw material of peace, and if we are to husband our resources and yet achieve the maximum possible progress we must have a properly thought-out system of priority in expenditure. At present, incredible as it may appear, there is no such system.

It is the duty of the Government, the Air Ministry, and the aircraft industry mutually to co-operate with goodwill on a bold and militant policy that will secure for the country and the Empire the great and material benefits that most surely will follow upon the establishment of a British aerial transport industry on a wide and sound basis. Neglect of this opportunity will involve us in consequences of the most disastrous description, and although we cannot pretend to see the full measure of the cost, we at least can see that our position in Europe and the integrity of the Empire would be most gravely imperilled.

Appendix

This is not a technical paper, and the author has endeavoured as far as possible to abstain from dealing with matters that may form part of the subject of technical papers. It is desired, however, to draw attention to two matters which, although of a technical nature, have in addition a most important bearing on the commercial side of the business and which call for most serious attention. I allude firstly to the problem of getting aeroplanes into the air and landing them, and secondly to the many questions relating to the supply of fuel. The first calls for very considerable research and experiment, and the second for a clearer vision of the objects in view and more effective co-operation between the various parties concerned.

Getting-off and Landing.—An aeroplane, in addition to operating in its normal medium, must first haul itself up to its operating level, a process which is much more difficult than normal flying, and which necessitates a much less advantageous form of vehicle. It is as if a locomotive, before commencing its journey, had to haul the train out of a field and up a stiff gradient before it could get on to the rails and proceed on its journey. With the ordinary type of wing in use today a loading of about 10 lbs. per sq. ft., is accepted as about the maximum possible, but if this difficulty of getting up and down again did not exist machines could operate quite safely with a wing loading of 20 lbs. to the sq. ft., or alternatively, if it were only a question of level flight, the power unit could be cut down to something like half its present output. These twin operations of getting off and landing also account for nearly all the accidents that occur, and the high cost of insurance is entirely due to the dangers attending these operations. Here then is a problem that calls for the most urgent attention; its solution is vital to the progress of commercial aviation and also to the successful development of two very important classes of naval and military aircraft.

It is possible to help matters to some extent so far as getting-off is concerned by so designing the propeller that a greater proportion of the full power of the engine is available on the ground, and which is also more effective in producing thrust at the getting-off speed. It is, of course, also better for the engines when on full throttle to run at speeds more closely approximating to the full load speeds for which they were designed.

The Petrol Position.—Let it be assumed that in the most efficient aeroplane existing a given load can be carried from London to Paris at a cost for petrol of 100 shillings. It will not be a very large load; that is immaterial. By improvements in design of the structure based upon long and painstaking work in the wind tunnel and full scale experiments, we may succeed in another few years in so cutting down the resistance that our expenditure on petrol may drop to 80 shillings; in addition we may increase the working thermal efficiency of our engines by as much as 10 per cent. These improvements will reduce the cost of the petrol consumed on our hypothetical journey from 100 shillings to 72 shillings, and represents what would be a very considerable over-all gain. But if the price of petrol were reduced to 1*s.* 9*d.* per gallon, this 28 per cent. saving could be effected today, and thus by a stroke of the pen the whole aviation industry could be placed in the same position that otherwise will only be attained after years of effort.

Everybody connected with aerial transport has been making sacrifices of one sort or another in order that the business may be developed. As far as I know, however, the petrol companies themselves have made no similar sacrifices, but on the contrary have made a handsome profit out of the very large needs of an industry of supreme national importance struggling for its very existence. I do not wish to do the companies any injustice, it may be that they make only a fair and reasonable profit on aviation spirit, but I do ask them to consider whether they cannot give a special rebate on petrol for commercial aviation for the next three years, even if it involves giving up their profit on this particular portion of their sales. If commercial aviation ultimately fades away, the petrol companies will lose what would have been an exceptionally good market, and will have themselves largely to blame for the loss.

As this is a matter of very considerable importance, it is proposed to examine this question in detail. In the first place it is essential that aircraft shall be fitted with accurate and easily read petrol gauges, or, better still, with flowmeters in addition, by which the consumption can be checked from point to point and at any moment. A mere examination of the figures of over-all consumption is insufficient; it is essential to know how, when and where the fuel is being consumed at every stage of the operations. Having fitted suitable gauges, which incidentally must indicate correctly both in the air and at rest with the tail skid on the ground, the next step is to inaugurate a petrol log-book for each machine in which a complete stage-to-stage record is kept.

The first thing that will probably be observed is that the engines are using more in actual flight than would have been expected from a study of the test bed consumption figures. Some of the causes of this cannot easily be remedied, but some economy can be effected. It will often be found the carburettors are at fault. It is easy enough to set a carburettor on a test bench so that the mixture never errs in the slightest degree on the rich side, but the engine is there always at one level, it is not bumped about, and even if it were occasionally starved somewhat on being opened out, it would not matter. But the ground engineer has a totally different proposition before him, and if the regulation of the mixture is in his hands he is always bound in the interests of safety to err on the rich side.

At some period in the development of aero engines, somebody invented the term "altitude control" for the fuel economiser. The result was that commercial pilots formed the idea that it was a device that did not interest them, as they never flew at any altitude worth considering. For commercial machines it should have been termed the petrol economiser, and every effort should have been made to induce pilots to use it to the uttermost capacity.

In my opinion, the carburettor for commercial machines should contain two independent means of regulating the supply to the engine. The flow should be through a fixed jet of such capacity that the maximum requirements for getting-off are never prejudiced, and an economiser under the control of the pilot added to the circuit in order that once safely in the air and well warmed up, the petrol could be cut down to the minimum. Further, the economiser should operate in such a manner that in the event of its becoming at all out of adjustment, there would be no chance of the petrol supply becoming strangled. One means of effecting this would be by making the economiser work on the principle of reducing the pressure in the float chamber so that if anything went wrong all that could happen would be a loss of economy until the fault was corrected, but with economisers of the needle valve type it is almost certain that sooner or later trouble will be experienced necessitating a forced landing.

Another and a most important factor in the petrol situation is the wide variation in the quality of the petrol supplied by the various companies. The first requisite is a drastic revision of the basis on which petrol is sold. At the present time there seems to be a conspiracy of silence on the part of petrol companies as to the real value of their fuel for aero engines, and most of the official specifications for petrol are based on false premises, and are entirely useless for all practical purposes. It would perhaps be the simplest course if engine makers published a table showing the maximum compressions that could be used with their engines, according to the different toluene values that could be guaranteed by the petrol supplier.

Thus, supposing a firm were using Lion engines, Messrs. Napier would provide a specification showing the maximum compression ratios possible with fuel of various toluene values giving consumption curves corresponding to the compressions indicated. The chief engineer of the transport company would decide the compression he would wish to adopt after consideration of the special circumstances of his particular service, and then proceed to place a contract for fuel according to the requisite toluene standard. But, and a very important "but," the petrol companies would have to guarantee and actually maintain the standard agreed upon, otherwise there would be trouble of the most serious description.

There are also minor ways of effecting economy. For instance, petrol can be saved by avoiding as far as possible taxying machines under their own power. There is also far too much petrol wasted tuning engines and warming them up before departure. A good ground engineer is worth paying well; if he thoroughly understands his engines and can test accurately and quickly, he will save nearly £10 weekly on petrol alone.

The Discussion

Tuesday, February 7, had been set aside for the discussion of the papers read before the Air Conference on the previous day. Lord Weir, who took the chair during both morning and afternoon sessions, announced that he had been asked to state that the Secretary of State for Air (Capt. Guest) regretted that he was unable to attend, owing to his attendance being required in the House. In opening the discussion, Lord

Weir said that a review of the achievements of the last three years showed very meagre results. He was, he said, intensely pro-aviation, but we had to admit that the aeroplane had been unable to show results compatible with expenditure. In saying this, he would except the cross-Channel services. What was the reason, and should the fact lessen our belief in civil aviation? He was of the opinion that there was absolutely nothing that gave cause for lessening our faith in civil aviation. He pointed out that if one could obtain the balance-sheet of modern machines and that of those three years old one would find great improvement, but that the aeroplane, in spite of this, still carried relatively small commercial loads. Subsidies had enabled us to keep machines flying on the cross-Channel services with fairly good regularity, and with regard to subsidies, he endorsed Lord Gorell's remarks relating to the fallacy of making comparisons with what was being done in other countries. He thought that, for the purpose in view, the present subsidies were sufficient. We must now, he said, ask ourselves the question whether the experience gained on the cross-Channel services justified us in taking the next step in the form of an additional route elsewhere in the Empire.. He was of opinion that such a step was justified, and that the logical one was undoubtedly the Cairo-Karachi route. On this, more modern machines were becoming advisable. With regard to the formation of the new C.A.A.B. (Civil Aviation Advisory Board), as chairman of the old Committee, he heartily welcomed the formation of the new, and thought that it should be fruitful of good results. He then called upon General Sir Frederick Sykes, Controller-General of Civil Aviation, to open the discussion.

Sir F. Sykes stated that we are all concerned in laying down the broad principles on which aviation in this country can best be developed. We are, as a nation, poorer by some £14,000,000,000 since 1914, and must practice the strictest economy. There are certain things which we must make up our minds to go without. Is aviation, he said, one of those luxuries which we can afford to forego? He thought the answer must undoubtedly be that it is not. The air, Sir Frederick said, materially helped, if it did not actually win, the last War. Next time it will be the same, but more so. He quoted Mahan as saying "Sea power is based upon a flourishing industry." If, Sir Frederick said, we substitute "air" for "sea," the analogy is still true. The Air Force, by itself, is not air power. Wise generals maintain a reserve of at least three men for every one in the firing line. To maintain an Air Force capable of prolonged resistance, the same ratio as a minimum in pilots, personnel and material is necessary. Peace and commerce, he said, never yet looked well tied to war's chariot, and he pleaded for something greater than a measure of financial support, namely, for freeing Civil Aviation from the blighting incubus of military end-all and be-all, and allow her to go her own way as a peaceful, not unproductive, sister, a child as yet, but in time capable of assisting the fighting arm. Real progress depends on commercial development. Personally, Sir Frederick said, he was convinced that as yet civil aviation cannot fly by itself, that support must be given and is justified, and that we run a grave risk if, for want of support, we allow the aviation industry to fade and die. He would throw this apple into the arena: (1) Is aviation a necessity of our national life, and therefore to be afforded at any cost? (2) Can Service aviation exist without its civil counterpart? (3) How best to develop civil aviation.

Col. Armstrong, President of the Federation of British Industries, said that his federation had had the subject of aviation in mind for some considerable time. The Federation thinks, he said, that aviation can and will be of great service to the community. It seemed to him that the Government looked upon civil aviation too much from the military point of view. He thought it could best be developed on sound commercial lines. With regard to air mails, he thought that the G.P.O. was not as sympathetic as it might be. He was of the opinion that an air mail stamp would help materially in popularising air mails. As regards the carriage of goods, he thought, and quoted figures to prove his opinion, that the amount of goods sent by air was negligible; far more important were passengers and mails. He thought, however, that the London–Paris route was far too short, and did not provide a fair test of the advantages of commercial aviation. Much more might be done by extending services to cities in the United Kingdom, and he looked forward to seeing such services established. He thought that there would be very great advantage in linking up distant parts of the Empire with the Mother country, and pleaded for services to Egypt, India and Africa. As regards expense, although air travel cost more than other means of locomotion, he thought that if a distinct saving in time could be effected, business men would willingly pay at a higher rate for the services rendered, and he thought that services to Egypt, India, Australia etc., would certainly receive great support from passengers.

Brig.-Gen. Sir Sefton Brancker said he was speaking on behalf of the Air League of the British Empire. He criticised the speech of Capt. Guest, and could not agree that it would be many years before air lines in Europe would pay. That, he thought, was a very pessimistic statement. He did not believe in developing civil aviation at the expense of military aviation, and said that already the Service had been cut down to the bone. The R.A.F. was better and more economically run than either of the two other Services. He congratulated the Government on making Palestine an Air Force Command, as that would make for economy. The cross-Channel services were of no value, he thought, except for the purpose of gaining experience, and now was the time to go for Imperial air routes. He did not agree with the policy that the R.A.F. should open air routes. Apparently the impression was, he said, that whereas civil aerodromes cost a lot of money to establish and run, military aerodromes cost nothing. As a matter of fact they cost a great deal more, and the services were of no value in demonstrating the cost of running commercial lines, as the machines were not of commercial types and there were, furthermore, unlimited supplies of them.

With regard to subsidies, he knew that many were opposed to subsidies for aviation. He really did not see why, as other services were subsidised. What about the P. and O. subsidies? he asked. Competition was said to be good for trade, but he did not think that any good purpose was served by competition between British companies. We had, he thought, plenty of competition from France. As regards paying, it was not for the Government to insist that civil aviation should pay at once. The telephones did not pay, but nobody suggested that we should do without telephones. The General then referred to civil aviation as a sort of fifth wheel which, moreover, had been jammed. In 1920 we heard a lot about "all-red routes," blazing the trial and so on. The C. of C.A. was then £300,000 in pocket, but no assistance was given to aviation. Later came a change, and now he thought the subsidies were greater than necessary. He pleaded for the formation of a *national* company so as to avoid competition between British firms.

Gen. F. H. Williamson, C.B.E., representing the General Post Office, gave first a brief summary of what has been done in the matter of air mails. On the London–Paris services there was a distinct gain so long as the morning services were running. Letters were then delivered on the same day. On the London–Amsterdam service there was a very considerable saving in time. The efficiency of this service had been 89 per cent. He also referred to the extensions of the London–Amsterdam route to Bremen, Hamburg and Berlin, and stated that, on the whole, the service was very successful and gave a very considerable saving in time. It was rather significant that Berlin made far greater use of the air mails on this line than did London in the opposite direction. Thus in one month the number of letters transmitted by air from Berlin to London was 2,540, while in the same period only 480 letters were sent in the opposite direction. On the Cairo-Baghdad route a saving in time of from 11 to 18 days was effected, and there was, he said, a gratifying increase in the use of this service. The Belgian services in Belgian Congo saved about 11 days. As regards the future, Gen. Williamson thought that civil aviation was full of promise, although still in its infancy. The Post Office authorities had to consider four things: regularity, cost, distance over which air services were possible and night flying. It was, he said, difficult to foresee what would be the effect of the charges made for conveyance by air. Thus when the air fees were reduced from 2*s.* to 2*d.* the increase might be expected to be enormous; as a matter of fact, the number using the air service only increased 200 per cent. Parcels post by air was very useful and effected a great saving in time. Thus parcels posted from London in the morning were usually delivered in Paris the same evening. Real development would come, he thought, with services over longer distances, and night flying, when it becomes possible, would materially assist. On the subject of the air mail stamp, he thought that, while such a stamp might have a certain amount of advertising value, it would tend to hamper the extensive use of air mail as it would necessitate a special stamp, whereas now one could use the ordinary stamps and post the letter anywhere.

Mr. F. Handley-Page said that he had been somewhat depressed by the remarks made at the opening of the conference by Capt. Guest. It seemed that that gentleman's experience recently on a flight to Paris had been unfortunate, and he did not, of course, use the regular air lines for his trip. (Laughter.) He would like to associate himself with some, but not all, of Gen. Brancker's remarks. With regard to development, he thought that experience of a useful nature could only be got by actual flying under commercial conditions. He was sorry to see the fashion adopted in some quarters of belittling what had been and was being done by other countries in the matter of civil aviation. Certainly their manner of doing things and their types of machines might not conform to our own pet theories, but much useful work was nevertheless being done, notably in America. He did not think that lines abroad should be established by the R.A.F., but by commercial subsidised lines. Imperial air lines could not, he thought, be expected at once, and to him it seemed that a more likely development was the establishment of smaller local lines throughout the Empire. Later these would link up to form a long-distance Imperial air line. Turning to the question of goods-carrying by air, he pointed out that great reductions had already been found possible, and that this year the charges would be but very little higher than those of the railways.

Sir Samuel Instone said he had been shocked by some of the remarks made by lecturers and by the Secretary of State for Air. He was beginning to wonder, he said, whether he had come to the funeral of civil aviation. He was sorry to hear that Lord Gorell did not think that there was any future for civil aviation in Europe; personally he thought that there was a very good future. He was pleased to learn of the establishment of the new Civil Aviation Advisory Board, but he greatly regretted that the operational companies had not been included, and hoped that it would be found possible to include their representatives on the Board. He had stated at the last Conference, and he would state so again, that civil aviation did not pay, and that subsidies were necessary. Our personnel and machines, etc., were not equalled abroad, and people preferred to travel in British machines. That was a position which we should at all costs strive to maintain. He pointed out that out of a total Vote of £18,000,000, £200,000 was spent on civil aviation, and out of that half was to go to the purchase of machines. One could not, he said, help wondering a little as to how the remaining £17,800,000 was being spent, and he thought that some of it ought to go to civil aviation. The Government attitude reminded him, he said, of a play he saw some years ago entitled "Brewster's Millions." Unless that gentleman could spend his millions he would lose his job. As civil aviation would provide the reserves for the R.A.F., why not give half of the money to civil aviation? Sir Samuel then proceeded to indicate certain economies which, he thought, could be effected elsewhere so as to leave more money for aviation. For instance, he said, are we not outgrowing the use of coast-guards as at present established? There is, on an average, a coast-guard stationed every three miles along our coast, looking out to sea through such an antiquated instrument as a telescope. He thought that the work could be much more efficiently done by amphibian machines, which, when they saw a ship on the horizon, would go out, circle around it and, if necessary, alight by its side. He pleaded for greater use of aviation by the business community, and pointed out that, before establishing an air line, his firm had their own machines and were very frequently able to beat competing firms by being able to get contracts signed long before rival firms could do so who were not using this speedy means of transport. His firm would, he stated, establish an air route to India as soon as the necessary aerodromes were available. Regarding the carriage of newspapers by air, he was pleased to announce, although he would not divulge the name of the paper for fear of giving information to competitors, that he had a contract with a certain well-known newspaper for the carriage of it by air.

Sir Charles Bright thought the general lack of sustained interest was most remarkable in view of the work done by the Royal Aeronautical Society and the Air League. On the question of airships, he was glad the decision to scrap was due to economic reasons only, as he considered the airship specially suitable for long-distance work.

He called attention to the necessity for research if progress was to be sound. He had personally tested the air mails, and regretted to say that three times out of four the ordinary mail beat the air mail. This was due to faults in the terminal connecting links and not to the aircraft themselves. As regards the greater use made by Berlin of the air mail, this he thought was due to the German Government doing more to popularise aviation and the use of air mails. Sir Charles thought that the objections raised by Gen. Williamson to the air mail stamp could easily be got over.

The advantages of using the air would, he pointed out, be greater over long distances, and he pleaded for the establishment of Imperial air lines. For the sake of economy he would suggest that aviation matters should be dealt with by a ministry of transport.

Mr. G. F. Luke said that, as a member of the Federation of British Industries, he would like to associate himself with the views expressed by its President (Col. Armstrong). The success or failure of aerial transport is largely dependent upon the support which industry in this country gives to it. Two of the main sources of revenue of an air transport company should be mails and freight, and he thought it could hardly be disputed that, except for a few devotees, the facilities offered by existing air mail and transport services are unknown to the great majority of industrial Britain. With reference to air mails, he stated that in the provinces the post officials were frequently as ignorant as the inquirer. As regards transport of goods by air, he thought that what was wanted was the inauguration of some system of payment of freight and charges on delivery, so as to avoid the delay that now takes place between the delivery of goods in London and their forwarding to the consignees. By way of an example Mr. Luke took a consignment of goods from Paris to Glasgow. The consignment leaves Paris and is delivered to the transport company's forwarding agent in London on the same day. The latter then writes to the consignee stating that on receipt of the amount of freight and charges the goods will be forwarded. The result is that the consignment takes about 72 hours to do the journey from Paris to Glasgow, whereas on a payment on delivery system it would only take about 24 hours.

Commercial aviation, Mr. Luke said, if it is to pay its way, will require the support of the whole of Great Britain, and not of its Capital only. Canvassing for freight should be undertaken in all the big industrial centres by agents of the air transport companies, and special arrangement should be made with the railway and express companies so that goods destined to be forwarded by air would receive preferential treatment. He thought it was abnormal that our continental services should end at Le Bourget, and that we should be dependent on French lines to carry our passengers, merchandise and mails from there to the four corners of Europe. He suggested that we should attempt to get an agreement with France whereby Le Bourget became an international air port. Similarly with regard to Amsterdam, some such arrangement would facilitate opening up of British air routes to Scandinavia and the Baltic States.

Mr. Luke pointed out the importance of Egypt as an aviation centre, and said that, even if we could not at present afford to establish Imperial air mail lines, we should take steps to ensure that we had a right-of-way over Egypt in the future.

The Chairman (Lord Weir) then read a communication from the Chinese Chargé d'Affairs, in which were outlined the progress made already in that country and the air lines already established (with Vickers-Vimy aeroplanes). China fully realised the possibilities of air transport, and when the time came that British lines ran to her borders she would be ready to link up with them. At present, the communication stated, the Trans-Siberian Railway is out of working order, owing to the conditions in Russia, and it was suggested that aeroplanes might be employed at once to secure a better communication with China until the railway is again running as it used to do.

The Agent-General of Tasmania (Mr. Ashbolt) said that so far all the talk had been about the aeroplane, and he now proposed to say a few words about his pet, the airship. He was sorry to hear Capt. Guest's pessimism, and thought his statements did not and could not represent the British spirit. He repeated that commercial interests are prepared to find money for airship services, and only a reasonable subsidy would be required. The Government organisation of the routes must, however, come first. Technically the airship is ready for commercial work, and the only obstacle is the financial difficulty of ground establishments. He pointed out that in two or three years' time, owing to the general progress made the world over, we shall be forced to take action whether we like it or not. He very much regretted that New Zealand and South Africa had turned down the airship proposition, and if India turned it down also it would seem to be the end of the matter. He had, however, a proposition for establishing airship routes, but it was not one with which he was particularly in love, and he only would suggest its adoption if all else failed. Briefly it was this: that Germany should supply the airships, whose value should be deducted from Germany's war indemnities. It would not, he explained, mean any hardships on British workmen, as if the whole scheme fell through there would not be any work for airship workers in any case, while if we got the airships there would always be a certain amount of repair work to be done. To summarise, his suggestion was that Germany should be allowed to supply the flying stock. The Air Ministry should supply the necessary stations, and the other costs should be divided between India and Australia.

Col. J. Barrett-Lennard, of Handley Page Transport, Ltd., also spoke of the gloom of Capt. Guest. He did not like to put the question, he said, but one was forced to ask oneself: Is it possible to have an Air Minister who does not believe in aviation? With regard to subsidies, he knew that many thought these were unnecessary. That was not so, and his firm had always lost heavily on their air services. He said they were not grateful to the Air Ministry for their subsidy, as it was a piece of pioneer work which had to have assistance. He also spoke of the competition between British firms, and stated that there was inevitably a duplication of expenses, such as each firm maintaining headquarters, etc., and now it was proposed to add yet a third competitor.

At the closing of the morning session a resolution was moved by Gen. Brancker, on behalf of Mr. Holt Thomas, as follows:—"That, in view of the necessity of increased rapidity of communication within the Empire, and in view of the progress made by other nations in civil aviation, this Conference calls upon the Government to give due and immediate consideration to the foundation of an air mail throughout the Empire." The resolution was agreed to without discussion.

In next week's issue of FLIGHT we hope to be able to publish *résumés* of the technical papers and the discussion of them which took place during the afternoon session.

LONDON TERMINAL AERODROME

Monday Evening, February 13, 1922

AERIAL passenger traffic is showing a steady upward trend again. Last week no fewer than 98 pasrengers passed through the Customs on the aerodrome, and although this may have been due, in part, to the return of good flying weather, there is little doubt but that the worst of the "slack" season is over.

Arrangements for coping with the increased activity expected within the next few months are proceeding rapidly. The Instone goods' office is completed, and already occupied, and the alterations to their main offices are approaching completion. The whole of the Instone offices are being painted the vivid blue which appears to be a "monopoly" of this air-line.

Grands Express are to erect a passengers' waiting and writing-room alongside their present office. Mr. Bouderie declares that it will be an improvement on anything erected so far on the aerodrome. It is to have a verandah running the whole of its length.

Sites have been marked out for the offices of the Daimler Hire Air Service; for the Anglo-American Oil Co.; and also for Messrs. Ogilvie and partners. There will soon be no room left on the main-entrance road for any additional offices.

"The Automatic Pilot"

DEMONSTRATION flights have been made with the Messageries Aériennes' "Goliath," fitted with the Aveline Stabiliser. The device appears to be perfectly satisfactory, and the pilot of the Goliath expressed great faith in it, saying he would have no hesitation in flying in weather such as has, up to now, been considered unfit—provided always that his machine was equipped with this stabiliser. The automatic control corrects movements of the machine, almost before they have become perceptible, while the method of "damping" prevents oscillation, such as might otherwise be set up in the operation of any automatic device.

Another "D.H.18" has arrived from Martlesham, where it has been undergoing "type" tests. It carries the registration number "G-EAWX." and is practically a replica of the last delivered, having handle-starting and similar cabin fittings.

The Napier-Bristol has been handed over to Handley Page Transport by the Air Ministry, and is having final touches put to it before going on the Paris service.

The Jupiter-Handley is to go to Paris for demonstration there, and, in the meantime, is doing a lot of test-flying.

On Saturday, the Napier-engined Vickers "Vimy," which has been sold to the Grands Express, and which was exhibited at the Paris Aero Show, arrived from Paris, and continued on to Brooklands today. It is understood she is to have slight alterations made there before going on the regular service.

Mr. "Jimmy" James arrived from Paris during the week on the "Sparrow-hawk," and later flew it over to the Gloucestershire Aircraft Co.'s works.

News of the 10,000-miles "Air-Taxyman"

TIDINGS have reached us that Mr. Alan J. Cobham has reached Rome on his 10,000-mile "air-taxi" tour of Europe and Northern Africa. He arrived there on Sunday, just as the Pope was being crowned, and flew round St. Peter's three times during the ceremony. He flew from Morocco to Rome by way of the Sahara, the Garden of Allah, Tunis, and Sicily, passing over Mount Etna and Naples. His next stage is to Athens.

The new hangars on the "operations" side of the aerodrome are nearing completion. The concrete floors have been laid, and the canvas coverings are on. Air Ministry electricians are now fixing the lights, and load after load of ashes are being "tipped" to form firm ground for the machines to "taxi" over.

The electric supply to the "cone" light, which, up to the present has been of a temporary nature, has now been put underground and made permanent.

"Joy-Riding" Begun Again

THE Surrey Flying Services have started "joy-riding" again, and obtained several passengers during the week-end. The Renault-Avro they are erecting for Mr. Derwent Hall Caine is now nearly complete, and, with its coating of aluminium dope, looks very attractive. Captain Muir tells me they are now to put in hand the erection of the "D.H.9's" which his company intend to use as "air-taxis" this year.

One of the Grands Express "Goliaths," which has been named "Verdun," has been equipped with a full set of lights for night-flying. In addition to the cabin lights, there are red and green navigation lights on the wing-tips. Under the *fuselage*, two big headlights have been fixed to throw brilliant beams ahead and slightly downwards. These are to be made movable, so that the pilot can swing them vertically downwards to light up the ground immediately below. Under each lower wing-tip, two Holt landing-flares have been fixed. The current for the lights is supplied by two dynamos, driven by the slipstream. The small propellers on these dynamos are of unusual design, having only one blade, which is balanced by weights. This machine and its lighting equipment are to be tried-out shortly in an actual night flight.

NOTICES TO AIRMEN

Holland: Work at Rotterdam Aerodrome

WORK is in progress on the southern half of the Rotterdam aerodrome (lat. 51°53'N., long. 4°27'E.). Pilots should, therefore, when possible, land in the northern half of the aerodrome, until further notice. A chimney (height 25 metres = 82 ft.) is also in process of erection behind the hangar, *i.e.*, in the north-east corner. The row of trees along the southern side of the aerodrome will be removed shortly.

(No. 17 of 1922.)

Lympne Aerodrome: Extension of Cloud, Visibility and Weather Signals

1. THE system of ground signals at Lympne aerodrome denoting to pilots the height of clouds, visibility and weather at Biggin Hill and Croydon aerodromes, which was described in Notice to Airmen No. 57 of 1921, will be extended as from February 13, 1922, to include information referring to the aerodrome of St. Inglevert.

2. The additional signals will be prefixed by the letter "S," and will be similar to those already in use; the same scales for height of the cloud, distance of visibility and symbols for weather will be adopted.

3. The signals will be situated near the existing signals, but will be so placed as to appear the right way up to a pilot flying in a south-easterly direction.

(No. 18 of 1922.)

THE GEDDES REPORT AND AIR ECONOMIES

CONSIDERABLE space is given in the Geddes "Axe" report to the air and possible economies, although, reading between the lines, there is a strong leaning in favour of a huge future for aircraft in the Nation's commitments, and in all Air Ministry activities, giving promise of effecting many savings in the two older services by reason of its great mobility. In a foreword, the Committee say: We have come to the conclusion that the cost of the defence of the Empire, so far as it falls upon the British taxpayer, must be considered as a whole. The necessity for this is much more apparent now than it was before the War, more especially because of the advent of the Air arm, which has come so much to the front, either as an addition to the older fighting services, or in substitution for them.

When dealing with the growth of expenditure generally, the Committee make the following statement :—

The Air Force was, essentially, a War creation, and owed its separate existence mainly to the necessity for preventing competition between the Navy and the Army for men and material in aerial warfare. It was also felt at that time, that a definite function of independent air attack was called for, but would not be realised, unless the Air arm was freed from Naval and Military control. No other nation, however, has as yet followed the example of this country in establishing such a separate force. The Navy and the Army both urge that the most effective and most economical use cannot be made of the Air arm, so long as the personnel is controlled by another service, and they suggest in general terms that it might be possible to effect economies by utilising air forces in place of, say, light cruisers in the Navy or cavalry in the Army, but no concrete proposals on these lines have been furnished to us. The War Office also suggests economies in administration—for example, in supply, transport, education, and medical services. On the other hand, it can be pointed out that by dividing the Air Force between the two Senior services, duplication in experiment, design, and supply would be inevitable, and that duplicate flying schools would result. To avoid duplication, the two senior Services admit the need for a certain amount of joint organisation of a subordinate character, but have given no clear appreciation of what this joint organisation should be.

There is the further argument that, without a separate existence, there is a grave danger that the Air Service would be unable to work out developments which might in the next decade or so entirely revolutionise methods of attack and defence, and so render possible very large economies in the cost of the fighting services as a whole, by substituting air for land or sea forces.

We cannot say that we have been convinced that the Air Force is less economically administered than the other fighting services, but we are impressed by the fact that public funds are admittedly being spent in both of the older Services, because of a certain overlapping with the Air. The question of aerial *versus* naval or military command in operations in the future will doubtless cause difficulties; but economies to an increasing extent ought to result in the older arms from the advent of the Air Force. We have in mind not only the substitution of aircraft for certain other arms of the older Services, such as light cruisers or cavalry, but a revolution in the method of carrying out certain operations. We are particularly impressed with the very large savings which we are told can be realised in the Middle East as soon as the transfer of responsibility from the Army to the Air Force can be effected. By the use of aircraft in this region, it has been found possible to reduce the estimates in respect of the Middle East from £27,000,000 in 1921–22, to £13,000,000 in 1922–23. It can no longer be denied that by the intelligent application of air power, it is possible to utilise machinery in substitution for, and not as a mere addition to, man-power.

Ministry of Defence

In our opinion, full economy in the fighting services cannot be realised under existing conditions. There is overlapping and duplication throughout. In order to fully realise these economies, the three Forces must be brought together by the creation of a co-ordinating authority, or a Ministry of Defence, responsible for seeing that each Force plays its part, and is allotted appropriate responsibility for carrying out various functions. The theory of such a Ministry in embryo appears already to exist in the Committee of Imperial Defence. With the creation of a co-ordinating authority or Ministry of this description; it would be possible to ensure that corresponding reductions in expenditure were realised when either of the older Services was relieved or assisted, and no additional expense or extra Ministerial appointment need, in our opinion, be involved, as the Minister and his staff, could all be drawn from existing organisations. All the arguments of an economic character, which have been urged for the absorption of the Air Force into the two older Services apply, in our opinion, also to the fusion of all three Services under one Minister. Complete co-ordination in Supply, Transport, Education, Medical and other Services, would then be possible.

We attach great importance to a settlement of this question in the interests of economy.

Dealing in detail with suggested savings in the Air Force, the Committee state :—

The criticism of the Estimates which follows, is based on the assumption that the Air Ministry will not be absorbed by the two older Services. We indicate economies which we think might be realised even if the recommendation as to a Ministry of Defence is not adopted; but we consider that further economies depend upon one co-ordinating authority being responsible for the three Services.

The Outline Estimates for 1922-23 compare with the Estimates for 1921–22 as follows :—

	1921-22. £	1922-23. £
Gross Estimates	16,367,867	13,317,100
Add—		
Middle East	1,081,000	1,720,700
War liabilities	1,585,000	504,900
Total	19,033,867	15,542,700
Appropriations-in-aid	622,400	2,585,400
Net total	18,411,467	12,957,300

The Air Ministry divide their expenditure in the following way :—

	1922-23. £
Active Service Squadrons	3,511,000
Other Establishments	7,912,000
Capital and miscellaneous expenditure including Supply and Research and Civil Aviation	4,944,000
	16,367,000
Deduct expenditure in India	825,000
	15,542,000

It will be seen that the expenditure on Active Service Squadrons is only 21 per cent. of the total expenditure.

We have continually before us the view of the Cabinet that no great war need be anticipated for at least ten years, and in these circumstances suggest that the question of a considerable reduction in the number of Squadrons should be considered. We recognise that a sufficient nucleus must be retained for training personnel, and, further, that the germ of co-operation with the other two Services must be kept alive. We consider, however, that all expenditure beyond this minimum should be eliminated unless the Service requiring a further allotment of Air Forces for co-operation with it can show that such allotment will result in savings in other directions.

For 1922-23 six-and-a-half Squadrons are shown as working in co-operation with the Navy and three in co-operation with the Army in the United Kingdom, and we feel that, having regard to the circumstances referred to above, these Squadrons should be reduced in number. We suggest they should be reduced to—

One Squadron in co-operation with the Navy in the United Kingdom,

One Squadron in co-operation with the Navy in the Mediterranean,

One Squadron in co-operation with the Army in the United Kingdom,

which would give a saving of six-and-a-half Squadrons.

If the Navy and the Army require further Air Units, we feel that they should be able to show reductions in their own provisions which would justify the supply of these units.

There are five Squadrons in Egypt and Palestine working in co-operation with the Army. It has not been shown to us that proper allowance has been made for the existence of these Squadrons in fixing the force necessary for the garrisons in Egypt. In these circumstances we recommend that the question of reducing the number of Squadrons to three should be considered, unless greater economies can be effected in the Army expenditure by their retention. If the Squadrons in Egypt are reduced to three, we suggest that a fair proportion of these three should be allocated to the Air Force for use in Trans-Jordania. These suggestions would reduce the total number of Squadrons in the Air Force from 32½ to 24, and, including indirect expenditure on administration, training, reserves, etc., would involve a saving of over £2,500,000 per annum.

The numbers engaged in giving or receiving instruction are particularly striking, as the following figures show :—

	Officers.	Men.	Total.
Engaged in connection with education and training	532	5,669	6,201
Under training	466	6,035	6,501

The figures are exclusive of civilian teaching staff (fifty-one full time and a number part time). This appears to be a very heavy establishment of training personnel in comparison to the numbers under training.

The education given at Cranwell to the Cadets, apart from technical training, is similar in most respects to that given to the Cadets at Sandhurst and Woolwich; but the total cost, namely, £850 per annum, is very much higher, due to the expensive technical training given. As in the case of Dartmouth, Sandhurst, and Woolwich, where the cost is £462, £373, and £366 respectively, the fees charged to the parents of Cadets are out of all proportion to the cost to the State, and, as in the case of those Colleges, we feel that a considerable increase in the fees should be imposed. We suggest that the fees should be raised from £75 per annum to £200 per annum, with a reduction of 50 per cent. in the case of sons of officers of H.M. forces, leaving also, as in the case of the other Services, a few places for scholarships or bursaries to boys whose parents are of slender means and who show marked ability by some prescribed test.

The cost of recruiting for the Air Force appears to us to be very high, namely, £26,350 for next year, and the matter has been fully discussed with the Chief of the Air Staff. As a consequence, the Air Ministry have seen their way to reduce their estimate of the cost of recruiting to £14,010, which is, however, equivalent to £7 per head per accepted airman, and still seems high.

	Gross Estimate.	Net Estimate.
	£	£
1921-22	3,143,000	3,105,000
1922-23	2,465,000	2,059,000
Reduction	678,000	1,046,000

The charges for provisions and transport account for a large percentage of this Vote. The provisions are mainly obtained through the Army so as to obtain the benefit of the Army's larger contracts. Clothing costs something over £200,000 per annum. The present arrangements as to clothing provide for the issue of a complete free kit on joining, and an upkeep allowance of 8*d*. per day, equal to £12 3*s*. 4*d*. per annum. As in the case of the Navy and Army, we think this should be reduced by one-third and a lower standard of upkeep accepted. All civilians have had to make their clothes last longer, and we see no reason why uniformed men should not.

We desire also to call attention to the travelling concessions, whereby, as in the case of the other fighting services, officers and men of the Air Force obtain return tickets at a single fare, the difference being paid by the Air Ministry. There seems to us to be no sufficient reason for the continuance of this concession.

One of the large items of expenditure in the Air Ministry Votes is for technical equipment. The estimate for 1922-23, compared with that for 1921-22, is as under :—

	Gross Estimate.	Net Estimate.
	£	£
1921-22	4,058,000	3,758,000
1922-23	2,383,500	1,352,000
Reduction	1,674,500	2,406,000

The large difference between the gross and net estimates for 1922-23 is accounted for by Appropriations-in-aid of upwards of £1,000,000, mainly repayments in respect of operations in India at the cost of that country, and in Mesopotamia at the cost of the taxpayer. The reduction of the gross estimates is due to the reduction of reserve stocks, and to the estimated life of an aeroplane being slightly increased. The latter, if justifiable, is a real economy; but the reduction of stocks, with which we thoroughly concur, will hasten the day when stocks have to be replaced, and to that extent the annual estimates of Departments do not reveal the true cost.

It appears that there will be in stock on April 1 next 1,924 machines in excess of establishment.

We feel that the expenditure on conversion and reconditioning of old machines should be strictly limited to cases where satisfactory machines of a particular type required, or some other reasonably suitable type, are not available. We suggest for consideration, the reduction of expenditure under this Vote by £1,000,000.

The Air Ministry have also indicated their intention to ask for authority to spend an additional £500,000 on machines, stores, etc., over and above the amount provided in the estimate for Technical Equipment. This additional equipment is only required in the event of a serious war; and having regard to the pronouncement as to the unlikelihood of immediate war, and the arguments set out above, we feel that this expenditure should not be authorised.

Included under the heading of Technical Equipment, is a sum of £352,500 in respect of mechanical and other transport. With regard to the estimated expenditure of £95,000 for the overhaul of 200 vehicles by the makers, we are by no means satisfied that an average cost of £475 is justified.

We have given attention to the position with regard to motor transport, and attach a statement showing the normal establishment asked for by the Air Force at home and abroad, which amounts to 1,761 motor vehicles. They have in addition to full establishment—which includes in many cases provision for reserve—a total of 1,436 vehicles. These are mainly touring cars, of which they have 164 surplus to establishment; landaulettes, of which they have 34 surplus; and lorries, of which they have practically 1,000 surplus. We consider that the whole of these additional vehicles should be surrendered. The same remark would apply to trailers used for motor transport, of which there is shown an establishment of 493, with 251 additional vehicles. The position with regard to motor-cycles is similar. There is an establishment of 512 cycles and 316 side-cars, with a surplus of 195 cycles and 248 side-cars which also should be surrendered. It appears to us that the establishment for motor transport is throughout on an unnecessary scale.

The Air Ministry propose to spend £50,000 on the purchase of armoured cars for Trans-Jordania. Both the Navy and Army used armoured cars during the War, and we consider that, if at all practicable, cars which were used in the War should be adapted for use in Trans-Jordania; it ought not to be necessary to buy new ones.

Like the two Senior Services, the Air Force asks for considerable sums for works and buildings. The amount proposed to be spent on works, buildings, and lands in 1922-23 compared with the present financial year is as follows :—

	Gross Estimate.	Net Estimate.
	£	£
1921-22	3,048,000	3,018,000
1922-23	2,431,000	2,166,000
Reduction	617,000	852,000

Of the total amount of the estimate only £600,000 represents works which have not been commenced or in respect of which no commitments have been entered into.

In the present financial circumstances, we are of the opinion that any sanction which may have been given for these works should be cancelled, and that the case for any new commitments under this head should be fully reviewed.

Apart from these new works, there are a large number of cases of continuation expenditure, such as permanent roads, sick quarters, improvements to regimental accommodation, recreational facilities, etc., and we think that every case of this kind should be reviewed and that the total Estimate should be reduced by £1,000,000.

The largest work, which has already been commenced, raises an important question of principle. It is the provision of buildings at Halton to accommodate 2,000 boys for training as air mechanics, the total expenditure on which will reach some £720,000. Accommodation exists at Cranwell, where it is intended to train a further 1,000 boys, making a total of 3,000 boys under training. Under the present system, the boys receive three years' training, and then serve seven years with the Colours and two years in the Reserve. The cost of training each of these boys for a period of three years is £711, so that an amortisation charge of £129 per annum, or 7*s*. per day, during the seven years of active service, has to be added to the pay of the mechanics of the Air Force when arriving at their cost to the state. With the reduction in the strength of the Force, there will be a corresponding reduction in the number of boys to be trained, even if the principle of training boys as mechanics is adhered to. There is already at Cranwell accommodation which actually takes 1,300 boys, and in the present financial circumstances we feel that the expenditure at Halton should be very fully reviewed, and that, without very full investigation as to the possibility of using other buildings or temporary accommodation, no further expenditure on this work should be incurred.

The cost to the country of boys trained by the Air Force during their time as mechanics, may be put at 16*s.* 6*d.* to 17*s.* 4*d.* a day, for seven days a week, and possibly non-substantive pay and marriage allowance in addition, representing a further 5*s.* 8*d.* a day. This cost of approximately £6 a week for a single man and £8 a week for a married man is altogether excessive. The alternative policy of recruiting tradesman personnel from engineering shops throughout the country commends itself to us, and we recommend its adoption.

It is understood that the reorganisation of the Air Ministry is under the consideration of the Secretary of State with a view to effecting further economies than those shown in the sketch estimates submitted to the Committee. We feel that, having regard to the suggested reduction in the strength of the Force, and the suggested reduction in the monies to be available for experiment and research, and civil aviation referred to hereafter, considerable reductions in the numbers of personnel in the Air Ministry should be possible, and we are of opinion that the provision of £825,000 asked for should be capable of a cut to £600,000.

Civil Flying

The amount provided for 1922-23, compared with 1921-22, is as follows :—

	£
1921-22	880,000
1922-23	700,000
Reduction	180,000

This expenditure includes certain meteorological expenses, but is exclusive of £107,500 expenditure at Headquarters, partly in connection with civil aviation and partly in connection with Meteorology. Civil aviation has not made the progress which its supporters anticipated, and, broadly speaking, it may be stated that at the present time there is no civilian flying between points in this country, the only regular services being the Cross-Channel services, which are heavily subsidised either by the French Government or the British Government, the fares charged to passengers being very considerably below the economic level. There are certain commitments, representing subsidies of £200,000 per annum for the next three years, and certain expenditure in connection with Meteorology which must be incurred ; but at the present time the amount spent on Meteorology at Headquarters, and under Vote 8 amounts to more than £150,000 a year, which appears to be capable of some reduction. If the contribution towards civil aviation be limited to the present commitments and a reduction made in the cost of Meteorology, we feel that the amount spent under these headings could be reduced by £400,000.

If the Air Force require a more complete and extended Meteorological service, we consider it should be provided for on the votes of the Ministry other than "civil aviation."

Auxiliary (Territorial) Air Force

A proposal has been put forward for the formation of an Auxiliary (Territorial) Air Force. The amount originally asked for was £360,000 for 1922-23, with a recurring expenditure of £160,000 per annum ; but it is understood that the Air Ministry feel that this force could be commenced with an expenditure of £167,000 and a recurring expenditure of £139,000.

The desirability of encouraging the art of flying with a view to the formation of a Defence Force is recognised ; but before any expenditure of this kind is sanctioned, we think that the whole question of the defence of the country should be reviewed. The War Office propose to spend £5,750,000 for a Territorial Force, and this force is primarily intended for defence against invasion. If the Auxiliary Air Force has the same object in view, we feel that, having regard to the unlikelihood of a great war, the country cannot afford a duplication of services of this kind. Therefore, if the Auxiliary Air Force is formed, it should be possible to make savings on the amount suggested for the Territorial Army. Here we are confronted with the dual and uncoordinated plans of two services.

In dealing with each of the Services, we have commented upon the extraordinary activity in the Department of Experiment and Research. There is probably more justification for continuance of experiment and research in connection with the Air Force, than in connection with the older Services, but we feel that a case for immediate hurry has not been made out, and that some reduction in these activities should be possible, without permanently injuring the development of the Service. . . . It is difficult for us to indicate any particular branch of activity in connection with research and experiment which should be discontinued ; but we feel that in the present circumstances a reduction should be made, and suggest that the limit of expenditure under this heading should be £1,000,000 for 1922-23, inclusive of all costs incurred at the Ministry or elsewhere, it being left to the Air Ministry to apportion this sum in the manner which is likely to be productive of the best results.

Conclusions

As a result of our consideration, we are of opinion :—

1. That the best way of obtaining economies which may be looked for from the full use of air-power in land and sea operations, and also economies in administrative, medical, and educational services, is by the creation of a Minister of Defence as a co-ordinating authority.

2. That the air units allotted to the Navy and Army should be reduced by eight-and-a-half Squadrons in accordance with our recommendations.

3. That, although we have no pre-War figure with which to compare the staffing of the Air Ministry and its establishments, considerable room for economy exists, both in administration and in policy. We have given a few examples in our Report, and, in particular, we recommend that the scheme of training boys at Halton should be abandoned.

4. That, apart from the reduction in machines—which follows upon our proposed reduction of the Air Force allotted to the Navy and Army—the provision in the Estimates for the re-conditioning of old machines and the purchase of new ones is excessive.

5. That in all the circumstances of the case, the Air Force Estimates should be reduced from £15,000,000 to £10,000,000.

In this recommendation, no account is taken of any reduction in pay and allowances which the Government may decide to make, and no account is taken of any abnormal increase in the non-effective Vote, caused by a reduction of personnel transferred to the Retired List.

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Aviation in Uruguay

CAPT. ERIC BUXTON, in a Department of Overseas Trade Report to the end of last year upon Uruguayan matters, states that in regard to aviation the principal centre of military aeronautics in Uruguay is the Military Flying School located at the Maroñas aerodrome. The machines employed consist of several Avros and Spads, in addition to a few Breguets and a Caproni. A regular course for Army officers has been established since February, 1921. A flying school for civilians was inaugurated at the Colon aerodrome of the Centro Nacional de Aviacion a few months ago.

In April last a service was commenced between Buenos Aires and Montevideo in connection with the delivery of *La Nacion*, one of the leading Argentine newspapers ; this was the first real attempt to establish a regular service by means of aeroplanes between the two capitals, but it was abandoned shortly afterwards. It is likely, however, that further efforts to establish a passenger and mail service over this route will be made, but in the meantime commercial aviation is not being developed on this side of the River Plate.

According to *The Standard*, Buenos Aires, of November 22, 1921, a regular aerial service is to be established between Buenos Aires and Montevideo by the Compañia Rio Platense de Aviacion, which has imported some Airco-Rolls-Royce machines. The company realises that until it is possible to run this service with much greater frequency it cannot be financially successful, but, on the other hand, if a tariff be established sufficiently high to allow profits on such an infrequent service, there is little doubt that the expense would effectively kill the business. The journey from centre to centre will only take 2 hrs. 30 mins., the crossing by air being made at an average speed of 80 kms. per hour.

In addition to the regular service to Montevideo, arrangements will be made so that parties of four can go direct to Punta del Este at a tariff of $160 each. This service should prove a great boon to holiday-makers, as the saving in time will be very considerable.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

SOARING FLIGHT

[2052] During the many voyages made by Lord Kelvin in connection with his work on submarine cables and also in his own yacht, he had good opportunities of studying the behaviour of gulls at the stern of a steamer. No evidence is known to me that he ever saw any other kind of soaring flight. When asked his opinion as to how it was done, he didn't say that the gulls took advantage of ascending currents; he said, "That which puzzled Solomon puzzles me also."

Dr. Bryant tells us (in his letter 2048 in your issue of December 15, 1921) that he has never had an opportunity of observing gulls at the stern of a ship. Is it not possible that this is the explanation of his holding opinions opposite to those of the two authorities above quoted, both of whom had studied the facts at first hand? In my original letter on the subject (2046 in your number of November 24, 1921) I had stated that the question whether or not gulls make use of ascending currents at the stern of a steamer would long ago have been settled were it not for the fact that soaring flight is a question about which every one seems too clever to learn. Dr. Bryant's view that further learning is unnecessary fails to convince me.

The prevalent habit of settling the nature of soaring flight without reference to the facts of the case reminds me of a controversy that once took place in the Middle Ages as to the number of teeth possessed by a horse. Many learned treatises were written advocating one view or another; but no one ever thought of looking in the horse's mouth. Such enormously practical results are likely to accrue from the discovery of the nature of soaring flight that it is high time that people should begin to "look into the horse's mouth" as regards this subject. What needs to be explained is not merely how a bird can remain posed in the air on the windward side of a haystack. We want to know how it is that a flock of cranes can glide across the sky without loss of height and at a speed that may reach 40 or more miles per hour, as I have described at length in my book "Animal Flight." We also want to know what happens to the air flowing over the stern of a steamer that makes it suitable for the soaring of gulls. Perhaps the air has acquired an increased degree of turbulence. The view is now gaining ground that the energy of soaring flight is derived from turbulent motion; but we are very far from understanding how this motion is able to propel a bird—how a bird weighing, perhaps, ten or more pounds can glide at from 6 to 10 metres per second speed, and with a well-marked gain of height, in air in which there is not enough turbulence to blow out a lighted match.

The gulls at the stern of a steamer offer a convenient opportunity for an experimental investigation. If they use ascending currents, the first thing to prove, as a formal control if for no other reason, is that they cannot soar in a descending current. The descending current on the leeward side of the stern would give an opportunity of testing this point.

In December, 1920, when in the Great Bitter Lake, when the steamer was going very slowly, gulls were seen by me gliding in the ascending current on the windward side of the ship, and also in the probable overhang of this current at some height above the leeward side of the stern. Their flight in this current was quite different from that shown by other gulls that were seen on the leeward side of the stern at a lower level and outside the limit of the ascending current and that were in true soaring flight.

I hope shortly to be in London, and to have an opportunity of publishing other facts bearing on this point.

E. H. Hankin

c/o H. S. King & Co.,
9, Pall Mall, S.W. 1
Jan. 25.

IN PARLIAMENT

Commercial Air Routes

Mr. L. Malone on February 10 asked the Secretary of State for Air the approximate mileage flown on recognised commercial routes in 1919, 1920, and 1921; what steps are being taken by the Controller of Civil Aviation to increase the routes, and which routes; and when can it be expected that reasonably reliable services will be found in operation on such routes as, say, to Egypt and to India?

Captain Guest: The mileage flown in 1919, 1920, and 1921 was 105,000, 642,000, and 224,000 respectively. As regards the second part of the question, the policy of the Government was announced in another place by my right hon. friend on October 27 last. As regards the last part of the question, it is not possible at present to give any forecast of the date when regular commercial services will be in operation to Egypt and India.

Mr. Malone asked the Secretary of State for Air the number of commercial routes now operating under the British flag; and what assistance, financial or otherwise, are they now receiving?

Captain Guest: In Europe the only route in operation under the British flag is that between London and Paris. The terms of the financial assistance given to the two firms operating this route are given in Command Paper 1521 presented to Parliament in October last. The agreements set forth in that Paper have been extended to the 28th instant. Additional assistance is given by the provision of aerodromes, emergency landing grounds, and the ground organisation, wireless and meteorological facilities provided at these aerodromes. The development of various routes in the Dominions is in contemplation by the Governments concerned. It is believed, however, that none of these routes is in regular operation at the present time.

Airships

Mr. Malone asked the Secretary of State for Air what is now the policy of the Air Ministry as regards the development of airships?

Captain Guest: In accordance with the agreement made with the Dominion Prime Ministers during the conference last summer, the Government agreed to suspend disposal of airships and airship material until the Prime Ministers had had an opportunity of consulting their Parliaments in regard to the establishment of an Imperial airship route. Replies from the Dominions and India are not yet complete, but the Governments of South Africa and New Zealand have stated that, owing to financial reasons, they are unable, at present, to participate in such a scheme.

Anti-Aircraft Artillery Staff Course

Army Order 25 of 1922 provides for the holding of anti-aircraft artillery staff courses of about five calendar months, of which nine weeks will be spent at the Artillery College and 13 at the Anti-Aircraft Artillery School.

Officers and non-commissioned officers under training as instructors in anti-aircraft gunnery will be required to pass the Gunnery Staff Course, Part I, before undergoing the anti-aircraft artillery staff course (Gunnery Staff Course, Part III), which is intended to afford such instruction in the theory and practice of gunnery and in artillery material as is applicable to anti-aircraft defence only. Officers and non-commissioned officers of the Regular Army will be given one month's leave after the termination of the course if they so desire.

Germany and Aircraft Freedom

From Berlin, under date February 10, it was announced that the prohibition by the Allies of the manufacture of aeroplanes and air material will cease as from May 5 next. The Council of Ambassadors decreed the date, February 5, as that on which Germany had fulfilled the terms of Article 202 of the Peace Treaty, and a period of three months has to elapse before manufacture and import can be resumed.

The announcement adds that the manufacture will not be entirely released from control. By the term of the London ultimatum Germany undertook to observe such regulations as the Allies might impose for the differentiation between military and civil aeroplanes. The Allies have not yet communicated to the German Government what these regulations will be, or what organisation it is proposed to set up to see they are carried out. It is assumed, however, that the Inter-Allied Air Commission will terminate its work on May 5, and on the new regulations will depend the further development of the German air industry.

Australia Building Up Air-Defences

Arrangements are being made by the Australian Government, a correspondent of *The Times* states, to establish this year two aerial defence bases, in Victoria and New South Wales. Developments in this direction have recently been facilitated by the acquisition by the Commonwealth Government of 128 aeroplanes of various types as a gift from the British Government.

It is the declared policy of the Australian Government to establish aerial defence bases in all the States of the Commonwealth as finances permit, and with this object in view the Victorian base is to be constructed so as to form a headquarters for all the State units. Here there will be a large depôt for equipment and stores, and a training school for pilots, observers and aerial gunners.

Plans are also being made to establish a seaplane unit at Sydney to work in co-operation with the Navy. Nearly all the equipment needed for this unit has been given by the British Government.

THE DEVELOPMENT OF COMMERCIAL AIRWAYS*

By SIR HENRY WHITE-SMITH, C.B.E.

WHEN Sir Henry wrote the very instructive and complete paper which he read before the Institute of Transport on Monday of this week, he had no means of knowing that the Air Conference would be held almost at the same time. Consequently, as he pointed out in his introductory remarks, he felt at some disadvantage, inasmuch as he thought he might be repeating statements and expressing views already given at the Guildhall last week. We think, however, that Sir Henry need not have entertained any fears on that score. In the first place, he was addressing a body of men who, although well-versed in the intricacies of older means of transport, are not, presumably, quite so familiar with the problems of the newest form of all. Secondly, although the figures have by now, perhaps, been slightly altered, there is little doubt that the figures of cost estimated by Sir Henry at the last Air Conference were very near the mark indeed, and have served as a very useful basis on which to build an estimate of the cost of air transport. In the present paper Sir Henry altered some of the figures to conform with the greater efficiency of modern machines, and it may be taken that his latest figures come very near representing actual facts as they apply at the present time.

In view of the fact that he was addressing a body not at present intimately connected with aviation, it was eminently desirable that Sir Henry should preface his remarks on the development of commercial airways with a review of what has already been done at home and abroad. This he did in a very complete manner, considering that only limited time and space were available for the purpose. As most of this information will already be more or less familiar to readers of this journal, it is not proposed to deal with it at length here, and we shall confine outselves to recording the fact that Sir Henry, during the first part of his lecture, managed to give a very complete picture of aviation as it has developed up to the present time. A series of tables were thrown on the screen, based upon the figures given by the C.G.C.A. in his last half-yearly report, and dealing with statistics relating to the number of flights made and passengers carried, the value of goods carried by air and the number of letters transmitted by air mail, figures of the efficiencies attained on the various routes, statistics of accidents, etc. Sir Henry also showed a series of lantern slides illustrating modern aircraft, both aeroplanes and seaplanes, so as to give his audience an idea of the types of machines that are now being used.

A brief review of the present position of aerial transport was also given, explaining the present subsidy arrangement, and giving the names of the firms which are operating at present, or which will be operating in the spring. From this brief *résumé*, Sir Henry said, it will be realised that interest in civil aviation is increasing as each country realises the great possibilities of air transport.

Sir Henry then dealt with the question of ground organisation, and, incidentally, stated that he disagreed with a statement recently issued by the Air League, reflecting on the Air Ministry and the Department of Civil Aviation, and the work they had done. He thought such attacks unfair, and considered that they could only be based on a lack of knowledge of what the Department had done. He felt sure that if the route between the French coast and Paris were as well organised as the route from London to the coast the cross-Channel services would be even more efficient than they are now. On the very important subject of night flying, Sir Henry said he thought we were well in sight of night flying being carried out during the summer months, although it will not be easy to carry on during the more severe conditions obtaining in the winter. He then quoted some observations which he made on the subject of night flying at the last Air Conference, pointing out how night flying will materially increase the usefulness of air transport. A brief indication was given of the lighting arrangements from Croydon to the coast, and reference was made to the great services which wireless and meteorology can and do render to aviation.

Sir Henry then turned to commercial considerations, and summarised the figures which he arrived at in his paper read before the last Air Conference. The cost of carrying a passenger from London to Paris was £4 16*s*., or 4¾*d*. per passenger-mile, and the cost of conveying 1 lb. of cargo from London to Paris was 4¾*d*., or 3*s*. 7*d*. per ton-mile. These figures were based on the use of the most efficient machines existing at that time, and on the assumption that a full load was carried, although a more correct figure would be that based on a 75 per cent. load factor. On that basis the figures became £7 4*s*. per passenger (7¼*d*. per passenger-mile), and 7*d*. per lb. for cargo (5*s*. 4½*d*. per ton-mile). The above figures Sir Henry had recalculated in the light of later experience, and on a basis of 1920 costs and 75 per cent. load factor the figures became £8 6*s*. per passenger (8¼*d*. per passenger-mile) and 8½*d*. per lb. of cargo (6*s*. 9*d*. per ton-mile). For the most modern machines, such as the Bristol 10-seater or the "D.H.34," Sir Henry arrived at the following figures, based on a 75 per cent. load factor:—Passengers £6 10*s*. (6½*d*. per passenger-mile), and 6*d*. per lb. for cargo (4*s*. 7½*d*. per ton-mile). Sir Henry thought that in the new year the machines in use will be of modern type, so that by the end of the year there should be available some definite information regarding costs. Under the new subsidy scheme this information will be in the hands of the Department of Civil Aviation, which, it is understood, intend to make it public.

Regarding the future, Sir Henry said that reductions will be achieved by perfecting traffic management and upkeep, and he pointed out two methods by which success in transport may be attained. The first is by increase of revenue, and the second by reduction in operating charges. Improvements in increase of revenue might, he thought, be effected by a greater measure of propaganda, publicity and advertising of the aerial services, but principally by the creation of confidence. The average Englishman, Sir Henry said, is a very conservative person, and we have to make him develop the habit of air travel. The lecturer pointed out that one of the factors that will inspire the public with confidence is for the operating companies always to run their aircraft to schedule by starting at the times stated in their time-tables. One question which has very considerable bearing on the increase of passenger traffic is that of carrying passengers' luggage. At present there is considerable uncertainty as to whether or not a passenger will be allowed to take more than a small handbag weighing up to about 30 lbs. free of charge. Sir Henry thought that, although carrying luggage in the same machine as that conveying the passengers has the advantage of ensuring that the luggage arrives with the passenger, it would be a mistake to load up with a lot of heavy luggage an aircraft built specially for speed and for the comfort of passengers. He thought it would be a matter for the transport companies, either individually or collectively, to arrange for special luggage machines, and suggested that there should be at a central point in London a collecting depôt, where passengers' luggage might be taken the day before, or in the early morning of the day on which the passenger wishes to travel. The luggage would be passed through the customs at this depôt, and would then in bond be taken to the aerodrome and placed in the luggage machine. On arrival at the other end the reverse process would take place.

On the question of goods carrying by air, Sir Henry thought that this class of traffic must be specially catered for, and that a slower type of machine could be used. By having machines specially designed for the purpose greater space could be provided and greater quantities carried than is the case with the present type of machine. More rapid handling at the terminals is also necessary, Sir Henry thought, and if the scheme outlined to deal with luggage was put into force, the bonded collecting and distributing centres could also be used for the handling of goods traffic.

Turning now to the question of reduction of costs, Sir Henry thought there is considerable scope under this heading. He thought that probably savings may chiefly be effected by improvements to the ground organisation. The aircraft designer can also help to a considerable extent in this direction by simplifying detailed parts of the machine and by making such parts as require to be overhauled more readily accessible. The accompanying table indicates how important is this aspect of the question. Maintenance represents 16 per cent. of the total running costs; depreciation represents about 18 per cent., and insurance about 6 per cent. The question of the economical use of petrol and oil is of great importance, as will be realised when it is pointed out that the cost figures for petrol and oil form 23 per cent. of the total running costs. Improvements will come gradually as experience points the way, but much can be done by the collaboration of the traffic manager and the aircraft constructor—one to state his experience and the other to respond and fill the requirements for which the transport operator calls.

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* *Résumé* of Paper read before the Institute of Transport on Feb. 13, 1922.

Operating Charges of "Bristol" ten-seater Aeroplane.

	£	s.	d.	Percentage of total operating charges.
General Charges—(Personnel, Advertising, Rent at Terminal Aerodrome, Transport, Administration Expenses, etc., etc.	18,160	0	0	20.9
Maintenance—Labour	5,100	0	0	5.8
Spare Parts (based on 25 per cent. of value of machines)	9,000	0	0	10.3
Pilots at £1 per hour, plus retaining fee	6,800	0	0	7.8
Petrol and oil, 6,000 hours	20,000	0	0	23.0
Insurance of Aircraft at 15 per cent.	5,400	0	0	6.2
Depreciation of Machines:— 3,000 flying hours—engines 2,000 ,, —aeroplanes	16,000	0	0	18.4
Interest on Capital—10 per cent. ..	6,600	0	0	7.6
	87,060	0	0	100.0

	£	s.	d.
Cost per flying hour	14	10	0
,, aircraft mile		2	10¾
,, passenger mile			4½
,, passenger per journey of 240 miles on 100 per cent. load factor	4	7	0
Cost per passenger on 75 per cent. load factor	6	10	6
Cost per passenger on 50 per cent. load factor	8	14	0
Cost per ton of cargo per journey of of 240 miles	37	2	0
Cost per ton mile		3	1
Cost per lb. of cargo per journey of 240 miles on 100 per cent. load factor			4
Cost per lb. of cargo per journey of 240 miles on 75 per cent. load factor			6
Cost per lb. of cargo per journey of 240 miles on 50 per cent. load factor			8

Sir Henry then proceeded to outline the commercial advantages of aircraft, pointing out that these may be put under three main headings—speed, mobility and direct transit. As far as speed is concerned, aircraft has an outstanding advantage over all other forms of transport. Even today we do not think of aerial travel except in terms of 90 or 100 m.p.h., and in the future Sir Henry did not see any reason why we should not employ higher cruising speeds, such as 130 m.p.h. To illustrate the gains which can be effected by air travel, Sir Henry showed a table of times taken by the express train and boat services to reach the principal towns in Europe, and also the time in which the aeroplane could complete the journey. Under the heading of mobility, Sir Henry pointed out the advantages of air lines in being able to plan their routes without having to consider the question of establishing a highly expensive permanent way. While considering the question of mobility, the lecturer said he would like to draw special attention to one particular type of machine, the amphibian, which possesses the great advantage of being able to alight in and depart from even the centre of a big town, provided a river or waterway is available. Under the third heading, that of direct transit, Sir Henry pointed out the ability of the aeroplane to move goods from one point to another with as little handling as possible, and the very great advantages arising from this fact. In conclusion, Sir Henry said that, while claiming these advantages for commercial air transport, he did not suggest that it was going to displace the older forms, but, on the contrary, he believed it would be additional and auxiliary to them.

The discussion which followed the reading of the paper was opened by the Under-Secretary of State for Air, Lord Gorell, who said that he was pleased to find that the lecturer had shown illustrations of the excellent work done by aircraft in Canada, as this work was not nearly so well-known as it deserved to be. He also agreed with the lecturer that the carriage of goods by air was important, and thought that, ultimately, this form of air transport might become more important than the carriage of passengers and mails. As a piece of exclusive information, the Under-Secretary informed the audience that news had just come through that, on the question of airship services, India regretted not being able at present to see its way to take part in such an undertaking. Lord Gorell stated that he had been severely criticised for pessimism, but that he did not think this was quite deserved, and he thoroughly believed in the future of aviation. He quoted Lord Weir's remarks at the Air Conference on the comparison between the balance sheets of machines three years old, and those of modern type, and how such a comparison led one to believe that the time will not be far off when civil aviation will be able to stand without artificial support. The policy of the Government, he said, was to place the cross-Channel services on a commercial basis. The next step would be to attempt to arrive at an international agreement with France, for the extension of services to Malta, and later to Cairo and Karachi. With regard to the Cairo-Baghdad route, as soon as the necessary organisation was available, this route should be handed over to commercial companies.

Brig.-General Sir Sefton Brancker said that, at the Air Conference, he had complained of seeing nothing but familiar faces, whereas at the Institute of Transport, he was pleased to be among more unfamiliar surroundings. He thought one could sub-divide the question of air transport under three heads. The first for use over densely-populated areas, the second between places of importance separated by sparsely-populated areas, and the third trans-oceanic transport. For the first, high efficiency and high speed were required, whereas for the second smaller speed was required, and for the third, he thought the airship most suitable.

Stability was a feature of aeroplanes which he believed to be of great importance, and one for which he was constantly pleading. He would do so again, and stated that with a stable aeroplane we could fly in gales, fog, rain, snow and everything else. On the question of economy, he thought that in a couple of years petrol would be a good deal cheaper, which would help aviation to a great extent.

Lieut.-Col. W. A. Bristow said he had expected to hear the views of transport people, but that it seemed that one had been listening to the usual aeroplane people instead. While appreciating General Brancker's plea for stable aeroplanes, he did not see how that was going to help one a great deal when the engine stops. On the subject of night-flying, he was not very confident yet, and suggested that, personally, his feelings were that before he would be really happy flying at night, some form of lighthouse of approximately the power of the sun would be required. He quoted figures of German commercial activities, especially of the *Deutsche Luft-Rederei*, and stated that if Germany had managed to do as much as this, under all her severe handicaps, there was no doubt that she regarded commercial aviation very seriously, and would make great strides as soon as she was at liberty to develop freely.

Commander James Bird, of the Supermarine Aviation Works, said he regretted very much that at the Air Conference no mention was made of seaplanes, and of all they could do and had already accomplished. He pointed out that a great deal of the development work abroad had been done by seaplanes. As a maritime nation, and in view of our far-flung Empire, he thought that much more attention should be given to the seaplane. As regards costs of air transport, he pointed out that seaplanes did not require the expensive organisation which was necessary for land machines, as they could make use of existing seaports and lighthouses. Alighting at night, or in a fog, is relatively easy for the seaplane, which need only worry about altitude, and but little about lateral direction. Commander Bird also referred to the use made by the guiding electric cable in New York Harbour, and at Portsmouth, and indicated the possibility of its application to the directing of aircraft. As regards amphibians, he was sorry to see that the Under-Secretary of State for Air did not see any possibility of opening up the Irish air route in the near future. This route would have called for, and would have been well served by, the amphibian type of machine. He thought the Air Ministry was making a mistake in not paying sufficient attention to the amphibian from the commercial point of view, and in leaving it to the Services to develop this type. Finally, as an indication of what developments the future might hold as regards seaplanes, Commander Bird stated that some time ago he had had a conversation with Mr. Thornycroft, and they had arrived at the somewhat startling result, that a modern destroyer, if relieved of certain not absolutely essential things, would have enough power for her weight to fly on her existing engines if wings of suitable size were fitted. He also mentioned that something is being done in the matter of very large and seaworthy seaplanes, and that his firm was, at present, engaged on the construction of a large flying-boat, which was intended normally to be moored out, and only leave the water for overhauls, much after the fashion of a ship going into dry-dock. The crew would sleep on board, suitable cabin accommodation and berths being provided.

THE ROYAL AIR FORCE

London Gazette, February 7, 1922

General Duties Branch

The follg. are granted permanent commns., retaining their present substantive rank and seny., with effect from the dates indicated. *Gazettes* of those dates, appointing them to short service commns., are cancelled :—

Flying Offrs.—E. R. C. Hobson, D.F.C. ; Dec. 5, 1919. H. L. P. Lester ; Dec. 19, 1919.

Obs. Offr.—C. P. M. B. Caillard ; Oct. 24, 1919.

Lieut. M. G. Penny, R.A., is granted temp. commn. as a Flying Offr. on secdg. for four years' duty with the R.A.F. ; Jan. 20.

The follg. are restd. to full pay from half-pay :—Flight-Lieut. E. Drudge, M.B.E. ; Feb. 4. Flight-Lieut. H. V. German ; Feb. 2. Flying Offr. C. C. Bazell ; Jan. 31.

Flying Offr. S. A. H. Bowyer resigns his short service commn., and is granted rank of Capt. ; Jan. 8.

Stores Branch

Flying Offr. A. T. Shaw is granted a permanent commn., retaining his present substantive rank and seny., with effect from Sept. 12, 1919, and is transfd. to the Stores Branch, with effect from Dec. 6, 1921. *Gazette* Sept. 12, 1919, apptg. him to a short service commn., is cancelled. Sec. Lieut. G. G. C. Pigott is granted a short service commn. as a Flying Offr. on probation, with effect from, and with seny. of, Jan. 28. Flying Offr. D. A. W. Sugden is granted a short service commn. in the rank stated, with effect from, and with seny. of, Dec. 17, 1921. C. N. Scott is granted a temp. commn. as a Flying Offr. on probation ; Jan. 15, 1921 (substd. for *Gazette* Feb. 4, 1921).

Nursing Service

Miss I. M. Tench is confirmed in her appt. as a Staff Nurse ; July 13, 1921.

Memoranda

Three Cadets are granted hon. commns. as Sec. Lieuts. with effect from the dates of their demobilisation.

Sec. Lieut. W. Mylam is deprived of permission to retain his rank on conviction by a Field General Court-Martial ; June 7, 1921.

Erratum

Gazette of Jan. 13 (FLIGHT, Jan. 19, p. 43) :- In notification relating to Flight-Lieut. J. S. Smith, for *Gazette* of Dec. 27, 1921, read *Gazette* of Dec. 30, 1921.

London Gazette, February 10, 1922

Air Commodore F. C. Halahan, C.M.G., D.S.O., M.V.O., is apptd. Director of Aeronautical Inspection, Air Ministry ; Jan. 3.

General Duties Branch

Flight Lieut. C. P. O. Bartlett, D.S.C., is placed on half-pay, Scale B ; Feb. 3. Pilot Offr. on probation D. C. Gray relinquishes his short service commn. on account of ill-health ; Feb. 1.

Memoranda

Three Cadets are granted hon. commns. as Sec. Lieuts. with effect from the dates of their demobilisation.

Hon. Sec. Lieut. C. W. T. Macgilivray relinquishes his hon. commn. on joining the T.A. ; Dec. 20, 1921.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

Air Commodores.—F. C. Halahan, C.M.G., D.S.O., M.V.O., from Directorate of Equipment (Air Ministry) to Director-General of Supply and Research, on appointment as Director of Aeronautical Inspection. 3.1.22. H. C. T. Dowding, C.M.G., from No. 1 Group Headquarters (Inland Area) to Headquarters (Inland Area), as Chief Staff Officer. 27.2.22.

Group Captains.—P. L. W. Herbert, C.M.G., C.B.E., from Headquarters (Inland Area) to Air Ministry (Directorate of Training and Organisation), as Deputy Director of Training. 27.2.22. E. R. Ludlow-Hewitt, C.M.G., D.S.O. M.C., A.D.C., from Directorate of Training and Organisation (Air Ministry), on appointment as Air Secretary to the Secretary of State for Air. 1.2.22.

Wing Commanders.—W. L. Welsh, D.S.C., A.F.C., from No. 14 Squadron (Middle East Area) to R.A.F. Depôt (Inland Area). 17.1.22. F. Ranken, O.B.E., from R.A.F. Depôt (Inland Area) to Half-pay List. 1.2.22.

Squadron Leaders.—T. S. Rippon, O.B.E., from Headquarters, R.A.F., India, to Headquarters (Middle East Area). 7.1.22. G. S. Trevin, A.F.C., from No. 10 Group Headquarters (Coastal Area) to command Seaplane Training School (Coastal Area). 15.2.22. L. F. Forbes, M.C., from Iraq Group Headquarters (Middle East Area(to R.A.F. Depôt (Inland Area). (Supernumerary.) 31.12.21. G. W. Robarts, M.C., from R.A.F. Depôt (Inland Area) to No. 7 Group Headquarters (Inland Area). 1.2.22. B. L. Huskisson, D.S.C., from Iraq Group Headquarters (Middle East Area) to Armament and Gunnery School (Cadre) (Inland Area), as Chief Fighting Instructor. 15.2.22. J. McCrae, M.B.E., from R.A.F. Depôt (Inland Area) to No. 5 Flying Training School (Inland Area). 18.2.22.

Flight Lieutenants.—J. R. McCrindle, M.C., O.B.E., from British Delegation (Air Section), Paris, to Half-Pay List. 25.11.21. B. A. Malet, D.F.C., from No. 10 Group Headquarters (Coastal Area) to Seaplane Training School (Coastal Area). 15.2.22. M. H. Butler, D.F.C., from No. 5 Squadron (India) to R.AF. Depôt (Inland Area). 7.1.22. E. Meynell, D.C.M., from Stores Depôt, Egypt (Middle East Area), to R.A.F. Depôt (Inland Area). 17.1.22. H. McW. Daniel, M.B., from Aircraft Park, India, to R.A.F. Depôt (Inland Area). 7.1.22. C. H. N. Nunn, from No. 27 Squadron (India) to R.A.F. Depôt (Inland Area). 7.1.22. C. P. O. Bartlett, D.S.C., from No. 39 Squadron (Inland Area) to Half-pay List. Pending embarkation overseas. 3.2.22. C. G. Hetherington, M.B.E., from Headquarters, No. 11 (Irish) Wing to School of Technical Training (Men) (Inland Area). 1.2.22. J. H. Hagon, from R.A.F. Airship Base (Coastal Area) to R.A.F. Depôt (Inland Area). To remain attached to School o! Photography. 1.2.22.

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The Airship Officers' Club

VERY happy was the gathering of members of the Airship Officers' Club, at the Connaught Rooms on February 8, for their Annual Reunion. It was like a delightful family party, and the President, Rear-Admiral Murray F. Sueter, M.P., was very welcome in the Chair. In the course of his remarks, the Admiral recalled the early days of airships and their troubles. In spite of all the enemies who were just now conspiring to belittle the lighter-than-air craft, he was convinced that in the near future airships would be recognised as ideal for transport for long journeys. Mr. Ashbolt, the Agent-General for Tasmania, who supported the Chairman, was a strength to the meeting. He was as enthusiastic as ever, and again advocated airships as the connecting link for cementing the interests of the British Empire.

Amongst about fifty members of the Club and others who were present were Rear-Admiral Davidson, the Italian Air Attaché, Major G. H. Scott, Major G. F. Herron, an indefatigable worker in keeping the units of the Club together, Comm. F. L. M. Boothby, Lieut.-Col. Mervyn O'Gorman, etc.

Airmen's Marriage Allowances

THE official index figure for the cost of living having fallen to 92 at January 1, 1922, it is notified, in accordance with Air Ministry Weekly Order 109 (para. 58) of 1921, that the rates of marriage allowance for the year commencing April 6, 1922, have been revised.

Disbandment of London Mechanical Transport Section, R.A.F.

IT is notified for information that the Air Ministry Garage, Ebury Bridge Road, S.W. 1, closed at midnight on February 5, 1922, and the London Mechanical Transport Section ceased to exist.

Withdrawal of R.A.F. Units from Ireland

IT has been decided that, as soon as the necessary arrangements can be made, all R.A.F. units shall be withdrawn from Ireland and the existing air stations disposed of. With this end in view, an advance party of Headquarters No. 11 (Irish) Wing, R.A.F., has been sent from Baldonnell (near Dublin) to Spittlegate (Lincolnshire) for the purpose of opening a new Wing Headquarters there.

Oranmore Aerodrome (Galway) has already been closed down, and the unit stationed there, a Detached Flight of No. 100 Squadron, has been moved to Baldonnell, while "A" Flight of No. 4 Squadron has already returned to England and rejoined its Squadron Headquarters at South Farnborough.

The machines are returning home by air, and the personnel and equipment by rail and boat as rapidly as circumstances permit.

Move of No. 70 Squadron to Irak

No. 70 Squadron has moved from Heliopolis to Baghdad, and was transferred for all purposes from the Egyptian Group to the Iraq Group, with effect from February 1, 1922.

Transfer to Coastal Area of Aeroplane Experimental Establishment, Martlesham Heath

THE Aeroplane Experimental Establishment, Martlesham Heath, and the detachment at Orfordness, were transferred from the Inland Area to the Coastal Area, with effect from February 1, 1922.

The King's Levee, February 10

AMONGST those who attended the Levee held by His Majesty the King at St. James's Palace on February 10 were the following :—Air-Marshal Sir Hugh Trenchard, C.B., D.S.O., K.C.B., Wing-Comdr. L. Greig (in attendance on H.R.H. the Duke of York), Capt. the Right Hon. F. E. Guest, C.B.E., D.S.O., M.P., Secretary of State for Air, Air Vice-Marshal Sir John M. Salmond, K.C.B., C.M.G., D.S.O., Wing-Comdr. A. H. Wynne, O.B.E., Flight-Lieut. H. H. Balfour, M.C., Flight-Lieut. R. H. Saundby, M.C., A.F.C., Flying Officer H. L. Macro, D.F.C. The following were presented to the King :—Flight-Lieut. J. C. Brooke, D.S.C., Observer Officer R. F. Casey, D.F.C., Flying Officer H. A. Dinnage, Flight-Lieut. V. Greenwood, Flight-Lieut. R. Halley, D.F.C., A.F.C., Sqdn.-Ldr. W. C. Hicks, A.F.C., Flight-Lieut. L. V. Hirst, Observer Officer G. McCormack, Sqdn.-Ldr. J. C. Quinnell, D.F.C., Flight-Lieut. E. B. Rice, Flying Officer R. L. Sweeny, Flight-Lieut. A. W. Turner, D.C.M., Flight-Lieut. C. Turner, A.F.C., Flying Officer A. R. Wardle, etc.

IMPORTS AND EXPORTS, 1921-1922

Aeroplanes, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "Flight" for January 25, 1912; for 1912 and 1913, see "Flight" for January, 17, 1914; for 1914, see "Flight" for January 15, 1915; for 1915, see "Flight" for January 13, 1916; for 1916, see "Flight" for January 11, 1917; for 1917, see "Flight" for January 24, 1918; for 1918, see "Flight" for January 16, 1919; for 1919, see "Flight" for January 22, 1920; for 1920, see "Flight" for January 13, 1921; and for 1921, see "Flight" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23

* * * *

Royal Aeronautical Society

Students' Meetings—The next students' meeting will be held in the Society Library at 7 p.m., on Thursday, February 23, when Mr. G. R. Irvine will read a paper on "Some Possible Improvements in Aero Engines." Mr. A. E. L. Chorlton, C.B.E., M.I.C.E., M.I.M.E., will take the Chair.

Cambridge University Aeronautical Society

Synopsis of this term's lectures, etc.: January 25, "Theory of Flight, Rigging Engines, etc." (Cinema films); February 1, "Installation," by Brig.-General R. K. Bagnall Wild, C.M.G., C.B.E.; February 8, "Performance Testing of Aircraft," by Major T. M. Barlow, M.Sc., F.R.Ae.S., A.M.I.C.E.; February 15, "The Auxiliary Air Force," by Air-Marshal Sir Hugh Trenchard; February 22, General Meeting, Election of Officers, etc.; March 1, "High Altitude Engines," by Mr. H. R. Ricardo; March 8, "Aerial Manœuvre in its Relation to Modern Flying," by Squad-Leader R. M. Hill, M.C., A.F.C. Dates to be arranged for visit to the Aircraft Experimental Station, Martlesham Heath, Suffolk, and a visit to the Royal Aircraft Establishment, Farnborough. All Meetings commence at 8.30 p.m.

Clive O. B. Beale, Hon. Sec., Trinity College, Cambridge.

Cross-Channel Air Services: London-Brussels route.

As the proposals for the operation of the London-Brussels service made by the syndicate approved for subsidy have not matured, the "approval" which had been provisionally given has been withdrawn. Applications for the operation of this service, which should be forwarded to the Secretary, Air Ministry, Kingsway, W.C. 2, before March 1, are, therefore, again invited, on the understanding that only one firm will be subsidised on this route during the present year.

The assistance to be given by the Air Ministry will be on the lines already announced; detailed information with regard to these can be obtained on application.

Cairo-Baghdad Air Mail

The Postmaster-General states that the Air Mail which was despatched from London on January 26 reached Baghdad on February 5. The next air mail to Baghdad will be dispatched from London on Thursday, February 23.

Navy Economising

With the object of effecting economies in the cost of the personnel of the Naval Service, the Admiralty announce that recruiting for the Royal Marines is to cease forthwith, and that officers seconded or attached to the Royal Air Force from the Royal Navy or the Army will not be liable to, nor eligible for, half-pay, whilst they are so seconded or attached.

Three R.A.F. Fatalities.

We have to record three unfortunate accidents which resulted in the death of three R.A.F. officers and a member of the R.A.E. The first occurred on February 8 last, when Lieut. R. J. Jenkins, M.C., R.A.F., was killed through an Avro, piloted by Observer Officer Hesketh, D.F.C.—who escaped with slight injuries—crashing into some trees just as it was leaving the ground at Farnborough. In the second accident, Flying Officer Geoffrey Robinson, M.C., and Mr. J. S. Mitchell, of the Royal Aircraft Establishment, were both killed when their machine came down in flames at Dropmore Park on the 10th. Major J. H. Vickers, B.A.—R.A.F.—who was close by at the time of the accident, made heroic efforts to extract the unfortunate men from the burning wreckage. The third fatality occurred at Baldonnell Aerodrome, near Dublin, the same day, when Flying Officer B. J. Parry crashed just after leaving the ground, prior to a flight to England.

A Model Club for Brighton and Hove

We are informed by Mr. A. L. Churcher, of 97, Clarendon Road, Hove, that it is proposed to form a Model Aero Club for this district. Will any of our readers interested please communicate with him to the above address?

S.T.D. Motors, Ltd.

At the General Meeting of S.T.D. Motors, Ltd., last week, Mr. James Todd, the Chairman, when dealing with the report of the directors, mentioned one point which he thought would interest the shareholders, *viz.*, that the directors had elected to the board of the company in France, Mr. Delage, who is the managing-director of the Nieuport Aeroplane Co., in France, one of the principal suppliers of aeroplanes to the French army, and Admiralty, and they had lately received an important order from the French army for the construction of a number of large aviation motors under the design of Mr. Louis Coatalen. Both Mr. Coatalen and Mr. Delage were confident that there was a profitable opening for the company in France in this direction, as, through the equipment of their works during the War they were especially adapted for the production of heavy aviation motors.

* * * *

PUBLICATIONS RECEIVED

Criteres de l'Aptitude au Vol en Avion. By Dr. P. Perrin de Brichambaut. Paris: Louis Arnette, 2, Rue Casimir-Delavigne.

Report No. 116. Applications of Modern Hydrodynamics to Aeronautics. By L. Prandtl. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Catalogue

Metal Propellers. The Metal Airscrew Co., Ltd., Regent House, Kingsway, W.C. 2.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

***Abbreviations*: cyl. = cylinder; I.C. = internal combustion; m. = motor.**

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published February 16, 1922

20,160. A. Flettner. Auxiliary steering-gear for aircraft. (148,236.)

20,635. Dr. E. F. Huth Ges. Wireless signalling for aeroplane sets. (148,804.)

21,054. E. Rumpler Luftfahrzeugbau Ges. Aeroplane supporting surfaces. (152,308.)

21,064. E. Rumpler. I.C. engines. (152,314.)

21,069. Rumpler-Werke Ges. (in liquidation). Aeroplanes. (152,340.)

21,081. E. Rumpler Luftfahrzeugbau Ges. Supporting-surfaces of aeroplanes. (151,922.)

APPLIED FOR IN 1921

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27,104. Rumpler-Werke Ges. (in liquidation). Aeroplane with one machine-gun mounted to fire rearwards, or several rigidly mounted parallel. (170,294.)

If you require anything pertaining to aviation, study "Flight's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xvi).

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued*

(Continued from p. xvi.)

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cheery," Cent. London.

MACHINING—

Arnott & Harrison, Ltd., Hythe Road, Willesden Junction. Willesden 2297.
Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.
Grahame-White Company, Ltd., Hendon, N.W. 9.
Kingsbury 120.
London Office: 12, Regent Street, Pall Mall, S.W. 1. Regent 2084.
Monk Engineering Co., High St., Coventry.
Coventry 807; "Assistance," Coventry.
Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MISCELLANEOUS—

British Oxygen Co., Ltd. (Hydrogen Gas), Elverton St., Westminster, S.W. 1.
Victoria 4706 (2 lines), 6717 (2 lines).

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

MOTOR CARS AND MOTOR BICYCLES—

Auto-Carriers (1911), Ltd., 181-182, Hercules Rd., Westminster Bridge Road, London, S.E. 1.

NIGHT LANDING LIGHTS—

Allen-Liversidge, Ltd., amalgamated with Imperial Light, Ltd., 106, Victoria St., S.W. 1.
Victoria 4155; "Aceterator," Sowest, London.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2.
Paddington 6332.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.
Shell-Mex Ltd., Shell Corner, Kingsway, W.C. 2.
Holborn 2303-4; "Shelzine," Westcent, London.

PHOSPHOR BRONZE AND GUNMETAL—

Clifford, Charles, & Son, Ltd., Fazeley Street Mills, Birmingham.
Central 3634 (4 lines); "Clifford," Birmingham.
Keeling, A. D., Ltd., Caroline Street, Birmingham.
Central 440 (3 lines); "Nickel," Birmingham.

PHOTOGRAPHIC APPARATUS—

Kodak, Ltd. (Wratten Div.), Kingsway, W.C. 2.

PROPELLERS—

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.
Metal Airscrew Co., Ltd., Regent House, Kingsway, W.C. 2.
Gerrard 5122; "Pliantness," Phone, London.

RADIATORS AND RADIATOR REPAIRS—

Serck Radiators, Ltd., Warwick Road, Greet, Birmingham.
Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

SPARKING PLUGS—

Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15. Putney 2132, 2133.
"Kaalgee," Phone, London.

SPRAYING PLANT—

Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1.
Holborn 2041; "Aerography," London.
Midland Fan Co., Ltd., 46, Aston Rd., Birmingham.
Central 3463; "Blast," Birmingham.

STABILIZERS—

Auto Controls, Ltd., 19, Regent Street, Piccadilly Circus, London, S.W. 1. Regent 3649.

TAPES AND WEBBING—

MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent. London.

TESTING—

Tait-Cox & James, c/o S. Heckstall Smith, F.R.Ae.S., 4, Golden Square, W. Gerrard 3489.

TIMBER—

Owen, Joseph, & Son, Boro High Street, S.E.
Hop 3811; "Bucheron," London.

TUBES, ALUMINIUM—

British Aluminium Co., Ltd., The, 109, Queen Victoria St., London.
City 2676; "Cryolite," Cent. London.

TYRES AND WHEELS—

Palmer Tyre, Ltd., Shaftesbury Avenue, W.C. 2.
Gerrard 1214; "Tyricord," Westcent, London.

VARNISHES AND COLOURS—

The British Emaillite Co., Ltd., Brentfield Road, Stonebridge Park, N.W. 10.
Willesden 2346 and 2347; "Ridleypren," London.
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FIRST AERO WEEKLY IN THE WORLD

FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

A JOURNAL DEVOTED TO THE INTERESTS, PRACTICE, AND PROGRESS OF AERIAL LOCOMOTION AND TRANSPORT.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.

Founder and Editor : STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Feb. 23	**Lecture, "Some possible Improvements in Aero Engine Installation," by G. R. Irvine, before Students' Section R.Ae.S.**
Mar. 2	**Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.**
Mar. 16	**Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.**
Mar. 26–April 2	**Nice Meeting**
Mar. 30	**Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.**
April 17	**R.Ae.C. Race Meeting, at Waddon**
June 5	**R.Ae.C. Race Meeting, at Waddon**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22 ...	**Coupe Deutsche (300 kil.)**

EDITORIAL COMMENT

Technical Papers at the Air Conference

IN this issue of FLIGHT we publish *résumés* of two technical papers read before the Air Conference during the afternoon session of the second day. The first is by Major F. M. Green, and deals with research from the designer's, constructor's and user's points of view. The second is by the Director of Research, Brig.-Gen. R. K. Bagnall-Wild, and gives a summary of the progress made in research since the last Air Conference. A third paper, by Major Scott, has, unfortunately, had to be held over until next week owing to lack of space. It has for its subject "Airships," and gives a brief outline of the position of airships today the world over. All three papers are of the greatest interest, and we should have liked to be able to publish them in full. That, however, has been found impossible, but it is hoped that in the extracts and *résumés* published elsewhere in this issue no points of primary importance have been omitted.

Taking the first two papers, it seems to us that Major Green was a little too pessimistic as regards the value to the designer of scale model tests in the wind channels. It is true that a scale effect exists, sometimes it may be of considerable magnitude, and on occasion it has been known to "go the wrong way," but generally speaking, a fair estimate can be made from model figures. What does the difference amount to after all is said and done? As Professor Bairstow pointed out, we no longer need wonder whether a machine will fly or not, and, if the actual performance attained differs from the estimated performance based on model figures by as much as 10 m.p.h., we are frankly surprised. Is it, therefore, quite fair to cast doubt upon the value of research data to designers of machines? We do not think it is. If Major Green had confined himself to stating that the scale effect exists, that at present its magnitude is somewhat uncertain, and that further research is wanted to settle definitely this question in such a manner that the designer can apply the avilable data direct, then we should have been quite with him. But in the face of all that the N.P.L. and others have done we think it is a little unkind to give the impression that the results are open to grave doubts. That they need to be used with a certain amount of discretion may be admitted, but the majority of designers at work to-day have had sufficient experience to enable them to use their discretion sufficiently to ensure that no machine is built which falls very far short of the estimated figures.

With regard to the question of stability, we think that here is a field for legitimate research, and one which should be explored vigorously at all costs. The problems of longitudinal stability are fairly well understood, but lateral stability and control at angles near the critical angle are still problems which require research. The value of being able to decide the problems is so great that whatever the cost the necessary funds should be provided.

Another item which, as the Director of Research pointed out, is one of the very greatest importance, is that of the aero engine. If, at one stroke, it were possible to produce an engine with 100 per cent. reliability, many, indeed most, of our troubles would be over. Night flying and flying in fog and clouds would present but few difficulties then, and if, coupled with such reliability, our ideal engines were at the same time more economical in fuel, safer from fire risk, and not very much heavier, we should be on the threshold of the new era of commercial aviation. By this we do not mean that civil aviation cannot attain commercial success with the present engines. We firmly believe that it can, but our ideal engine would bring that day very much nearer.

It appears to be fairly generally agreed among engine experts that the petrol engine has reached, for all practical purposes, the limits of its development as regards thermodynamic efficiency. If another 10 per cent. efficiency can be attained that is about all that can be expected, even theoretically. As Mr. Alan Chorlton pointed out, if we are to have any hopes of great improvement, we must attack the problem metallurgically rather than thermodynamically. There is as yet no means of estimating by how much the weight of an engine could be reduced by the use of lighter metals. Here then is a field for research which gives fair promise of important results. And it is not as if the discovery or invention of new metals were of use to the engine maker only. For each new metal, as its properties become known, new uses are constantly being found. So also in this case. While the immediate object might be steel or other alloys for aero engines, the production of such alloys would in all probability be hailed with satisfaction by aircraft makers also, to mention only one field which would profit by research not undertaken primarily on its own account.

The Diesel, or direct injection, engine as applied to aircraft is a problem which is being attacked all over the world, and here it appears that the best procedure is, as suggested by Professor Burstall, to carry out research on methods of injection and similar problems rather than to attempt to run before we have learned to walk, by building complete engines. In this field also, incidentally, the production of new and lighter metals would be of at least as great benefit as it would to engines of the present type, so that when the day comes, as assuredly it will, when we can produce direct-injection engines, the new metals would help materially in making them applicable to aircraft.

* * *

Standardising Airship Moorings, etc.

Elsewhere in this issue of FLIGHT will be found a report of the International Conference called, we believe, mainly on the initiative of that indefatigable worker for the cause of airships, Mr. Ashbolt, Agent-General for Tasmania, and Commander Boothby, R.N., to discuss the possibility of standardising, or at any rate agreeing upon, certain lines upon which to work the mooring, fuelling and gassing arrangements for airships. Representatives of a number of countries were present at the conference, and much good work was done, and certain recommendations made. If it is true that aircraft development will be largely international in character, then it is the more so as regards airships, which are primarily intended for long-distance, and therefore international, flying. At the present time, when no country is doing a great deal with commercial airships, it is not a very difficult matter to lay down certain rules and regulations for such details, whereas in a few years' time, when several countries have got started with their own particular arrangements, it would be much more difficult to get these altered than if certain arrangements had been agreed upon from the start. We therefore welcome this conference, and feel certain that it cannot fail to do a great deal of good, which will be appreciated, possibly, more in a few years' time than it can be at the present moment.

* * *

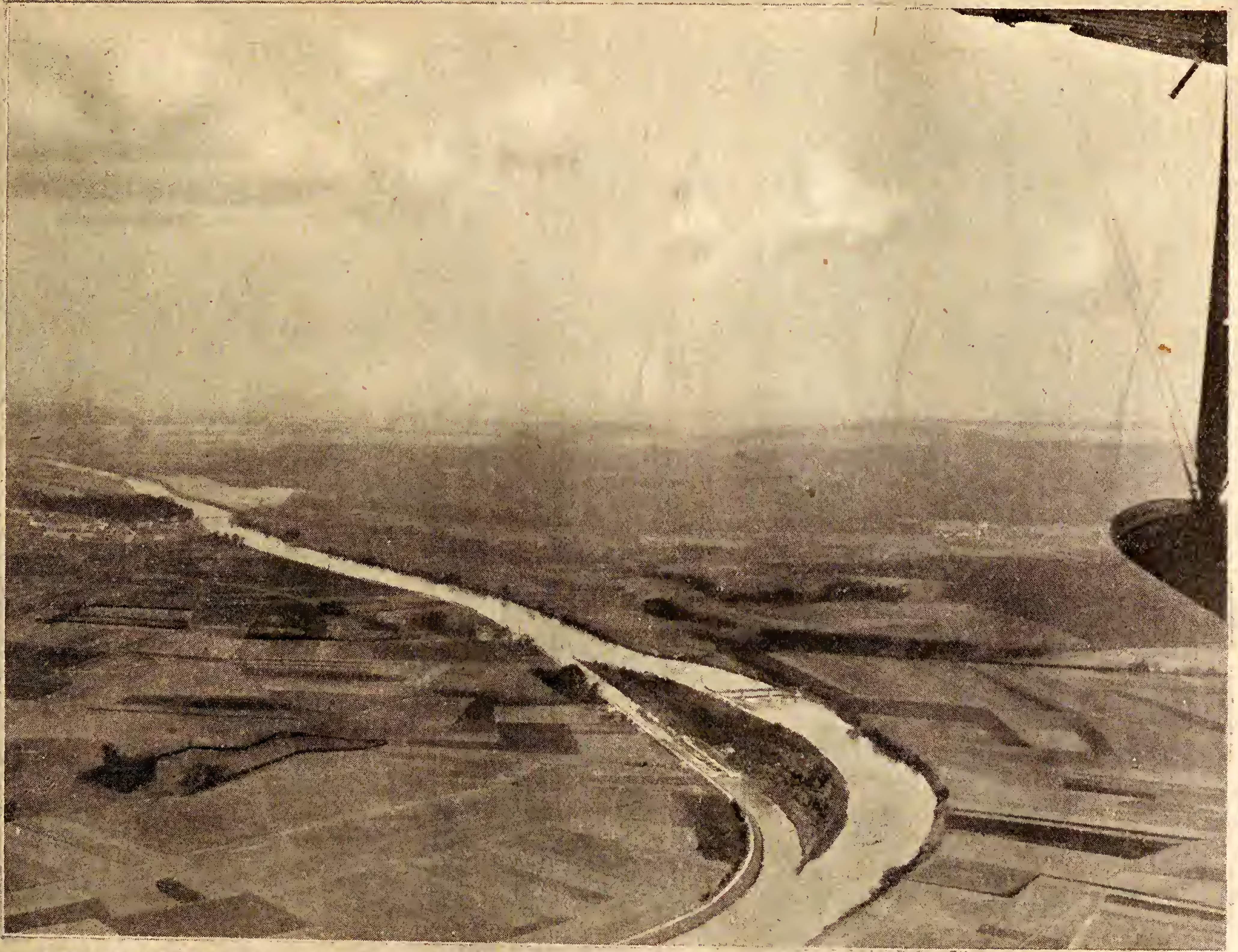
The 1,000 h.p. Napier

When the first 1,000 H.P. Napier "Cub" made its appearance just about one year ago, the fact was hailed with general satisfaction by reason of this country being the first to produce a really first-class single unit of this power. The second engine, incorporating certain improvements suggested by experience gained with the experimental engine, is now completed, and no time is being lost in installing it into a special aeroplane. As this 'plane is built for, and is the property of, the Air Ministry, nothing may be said about it, nor about the purpose for which it is intended. We have seen the machine and we have seen the engine (which is dealt with elsewhere this week), but not, it is true, in place in the machine, and we feel confident that the *ensemble* represents a combination which a good many nations would pay a great deal to possess. We must leave it at that, and hope that it may be found possible to spare one or two "Cubs" for experimenting with commercial machines with single engines of this power. No doubt the demand from the Air Force will be great, but the possibilities of the commercial utilisation of an engine of such power are equally great, and the existence of the "Cub" should open up a new field in commercial air activity. Our heartiest congratulations to the makers of the "Cub," and to the makers of the "mystery" machine upon the honour of being the first to be allotted an engine of 1,000 h.p.

* * *

The "Roma" Wrecked.

As we go to press news comes to hand of an unfortunate airship disaster, at Hampton Roads, Virginia, to the U.S. semi-rigid "Roma," which was recently purchased from Italy. It is feared that the loss of life is about 30, there being only 10 survivors—the exact number of persons on board is not stated. The cause of the accident is not at present quite clear, but apparently her elevator broke, causing the airship to dive and crash into one of the buildings of the Naval Base. Some high-tension electric cables ignited the gas.



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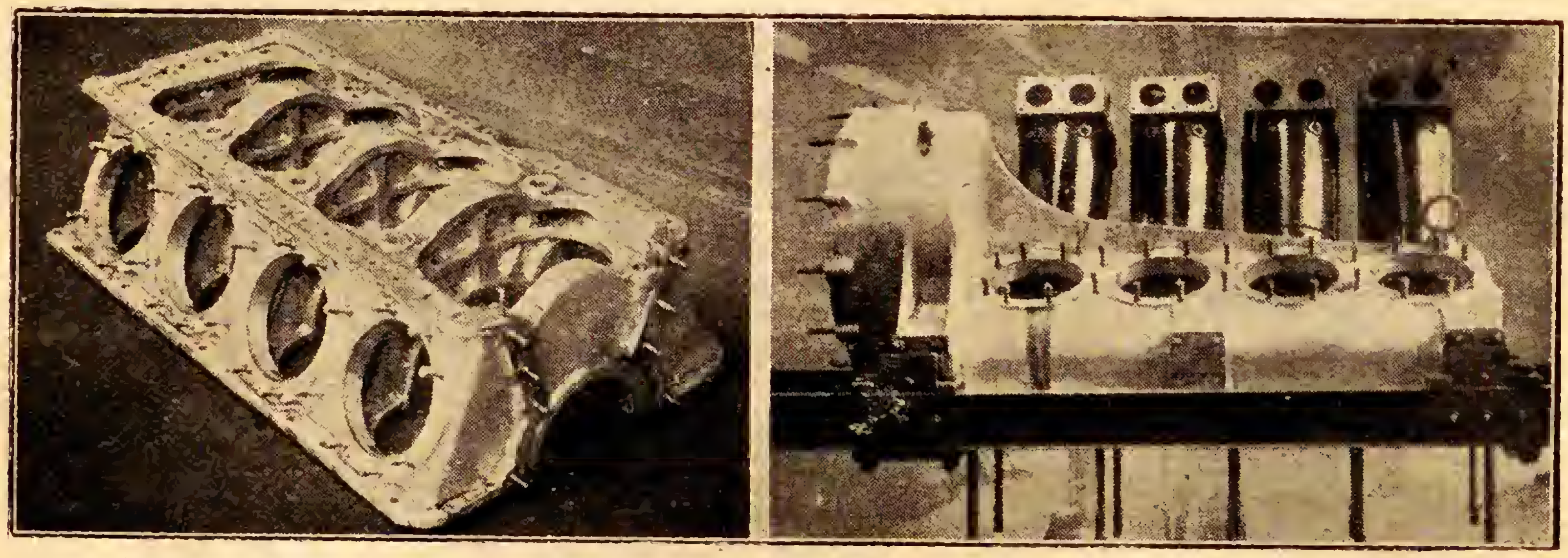
LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE:
No. 26.—The River Oise, near Beaumont

HARNESSING 1,000 HORSE POWER

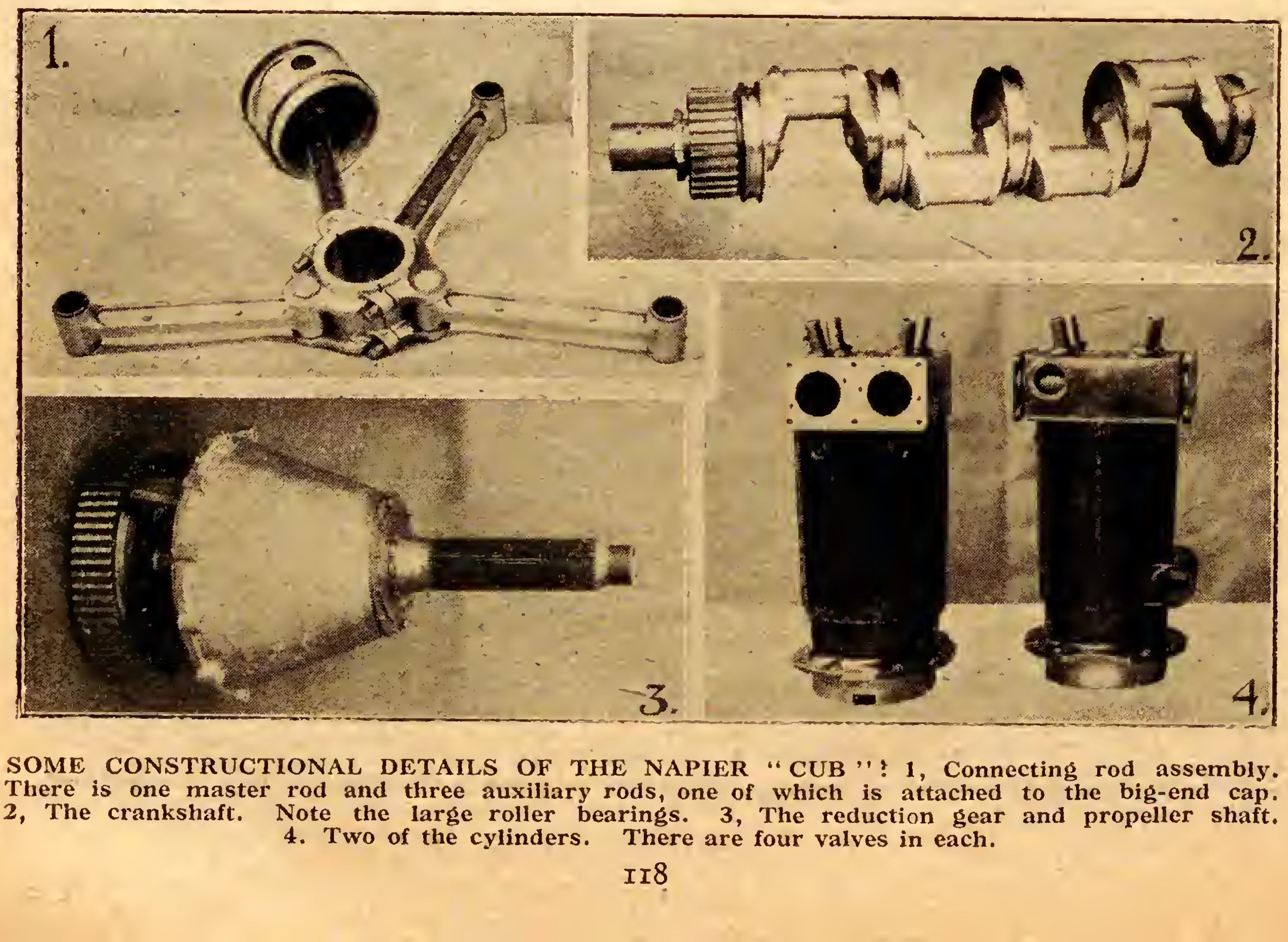
A Visit to the Napier Works

It is probably no exaggeration to say that since the early days of flying, when the 50 h.p. Gnome rotary enabled the aeroplanes of that day really to fly, instead of making long "hops," no engine has won such rapid, and yet lasting, popularity as has the Napier "Lion" of modern times. And while on the subject of the Gnome, it is interesting too, to note that the main, or at any rate, one of the most important causes for this popularity, is low weight per horse power developed. Compared with other engines of that time, the 50 h.p. Gnome, was a featherweight. Indeed, it was without doubt the engine which made flying practicable. In modern times history is repeating itself in the Napier "Lion," which has, if not made flying possible, at any rate, made it approach more closely to being a commercial proposition. In his paper, read before the recent Air Conference, the Director of Research (Brig.-Gen. Bagnall-Wild) paid a warm tribute to the Napier "Lion." "It is only now," he said, "with the Napier 'Lion' engine, that on the cross-Channel services, it is possible to run on an average load of but 60 per cent. of the maximum." That, in a nutshell, is the secret of the startling success of this engine. It should be added, however, that lightness in itself, although a vastly important desideratum, is not sufficient to "make" an engine. Reliability, smooth running, low fuel consumption, etc., are also of importance, but when, as in the Napier, these features are combined with light weight, the result is an engine that is difficult to beat.



THE NAPIER "CUB": On the left, the bottom half of the crankcase. Note the substantial stiffening webs. On the right, the top half of the crankcase, with four cylinders in place, on the rotatable bench used for erecting the engine.

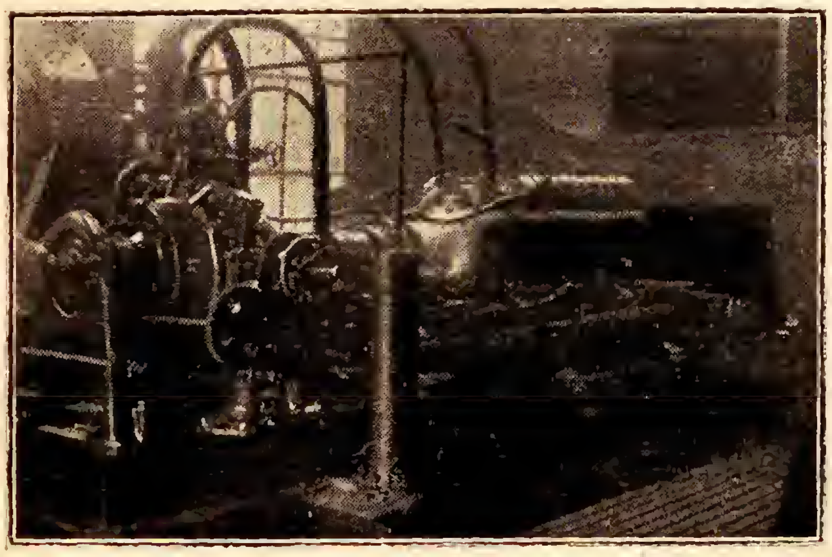
With that far-sightedness which has been characteristic of Napiers for a number of years, the firm was not content to rest on the laurels won with the Napier "Lion," and as soon as that engine had passed through its teething troubles, and been firmly established as a production job, the designers set to work to evolve a larger engine, incorporating many of the features which had been instrumental in making the



SOME CONSTRUCTIONAL DETAILS OF THE NAPIER "CUB": 1, Connecting rod assembly. There is one master rod and three auxiliary rods, one of which is attached to the big-end cap. 2, The crankshaft. Note the large roller bearings. 3, The reduction gear and propeller shaft. 4. Two of the cylinders. There are four valves in each.

"Lion" what it is, yet on account of its greater power differing essentially from that engine in many respects. The result was the 1,000 h.p. engine, which made its first appearance last year. Already that engine has won to the distinction of having a nickname, being affectionately known as the "Cub." This first 1,000 h.p. engine was illustrated and described in FLIGHT of February 10, 1921. On its first test that engine developed 1,057 b.h.p., and as its weight was approximately 2,200 lbs., it will be seen that it worthily maintained the Napier reputation for light weight.

Just recently the second "Cub," has been completed, and this was the occasion of a visit, by chiefs of the Air Ministry and other influential personalities, on February 16, to the huge Napier works at Acton. Among those received by Mr. H. T. Vane, C.B.E., Managing Director, and Sir Harry Brittain, K.B.E., Director, were:—Lord Gorell, C.B.E., M.C., Major Sir Phillip L. Greame, K.B.E., M.C., Major-General Sir Frederick Sykes, G.B.E., K.C.B., C.M.G., Sir Wm. Joynson-Hicks, M.P., Major-General Sir Sefton Brancker, K.C.B., Sir Wm. Bull, M.P., Lieut.-Col. Moore-Brabazon, M.C., M.P., and Mr. A. Baldwin Raper, M.P.



The 1,000 h.p. Napier "Cub" on the test bench, running at about 1,200 r.p.m. When the photograph was taken the engine had not been running long, and was not yet allowed to run at full power.

The visitors were conducted over the works in parties, each under an expert guide, and thus had an opportunity of witnessing the actual production of the Napier aero engines. From beginning to end the Napier engines are made with the most minute care, all materials being subjected to chemical and physical tests before being allowed to be incorporated in the engines. In a well-appointed laboratory, chemists were at work with their retorts, ovens and other paraphernalia of the "lab," and in another part Izod, Brinell and similar physical tests were being carried on.

In the shops the visitors saw the different parts being manufactured on the most up-to-date machinery, and erected and assembled on special jigs and benches. It is impossible, in the space available, to give an idea of the innumerable operations necessary before a finished engine emerges and is taken to the test house for its running tests. Suffice it to state that everywhere the greatest possible care is being taken to ensure the excellent workmanship and superb finish for which the Napier engines are rightly famous.

Rows upon rows of Napier "Lions" were ready for shipment, many of them to foreign governments. Others were roaring in the test house. But among all the activity, the most interesting part, from the visitors' point of view, was, undoubtedly, the manufacture and testing of the mighty "Cub." With its cylinders arranged somewhat in the manner of a letter X, although the arms are not evenly spaced, the upper rows being placed at a smaller angle to each other than that which separates the lower rows, the "Cub" is of astonishingly short length, considering its power. The large cylinders have sheet steel water jackets welded on, and each cylinder has two inlet and two exhaust valves.

The aluminium crank case on which the cylinders are mounted, is strongly webbed for rigidity, as shown in one of our photographs, and carries at its front end the housing for the large reduction gear, which is also shown in a photograph. The connecting rod assembly is of interest inasmuch as there is one master rod, to which are attached the three auxiliary rods, one of them to the cap of the big-end.

The crankshaft, as will be seen from one of the photographs, is of ample dimensions, and runs on very large roller bearings. The manner in which these are slipped over the webs and crank pins into position, and locked, is highly ingenious, and must have taken a great deal of thinking-out. Owing to the size of the roller bearings, the peripheral speed must be very high, but we understand that no trouble whatever has been experienced from this source. The large size was necessitated by the insistence of the designers to have a crankshaft of such diameter as to ensure rigidity, and consequent smoothness of running and absence of wear and tear. That this object has been attained appears certain.

In the test house, visitors were allowed to witness a "Cub" on its first test. Owing to the fact that the engine had only been running for a few hours, it was not allowed to develop its full power. When we saw it the revs. indicator remained steadily on 1,200 r.p.m., with a short "burst" at about 1,650 r.p.m. We understand that full power is developed at about 2,000 r.p.m.

So far the "Cub's" achievements rest on what it has done on the test bench, but in the near future, in fact, probably by the time these notes appear in print, it will be mounted in an aeroplane designed and built by a famous pioneer firm of aircraft constructors for the Air Ministry. That it will give this machine an astonishing performance, we have no shadow of doubt. Details are not permitted, but we may say that we have seen the machine, and in our opinion, the power plant is worthy of its machine, and *vice versa*. It is not too much to say that the advent of a 1,000 h.p. single-power unit will mark a new milestone in aerial development, and it is to be hoped that in the not too distant future this wonderful power plant will be given an opportunity of showing what it can do in a commercial machine. The number of passengers carried in a good high-performance modern aeroplane corresponds to a power expenditure of about 45–50 h.p./passenger. For the "Cub" this would mean about 20–22 passengers. Aeroplane designers forward. The Napier "Lion" has already done invaluable service to commercial aviation. We can express no better hope for the "Cub" than that it may worthily uphold the traditions of its smaller prototype.

Visiting the Napier aero engine works at Acton: Our photograph shows Mr. H. T. Vane, Managing Director of the firm, conducting a party over the very extensive works. From left to right are seen: Lord Gorell, Mr. Vane, Gen. Sir Sefton Brancker, Sir Harry Brittain, and Lieut.-Col. Moore-Brabazon.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

ANNUAL GENERAL MEETING

THE Annual General Meeting of the members of the Royal Aero Club of the United Kingdom will be held on Wednesday, March 29, 1922, at 3, Clifford Street, New Bond Street, London, W. 1, at 6 p.m.

Notices of motion for the Annual General Meeting must be received by the Secretary not less than twenty-one days before the meeting, and must be signed by at least five members.

COMMITTEE

In accordance with the Rules, the Committee shall consist of 18 members. Members are elected to serve for two years, half the committee retiring annually.

Retiring members are eligible for re-election.

The retiring members of the Committee are :—

Major-General Sir Sefton Brancker, K.C.B.
Ernest C. Bucknall.
G. B. Cockburn.
The Earl of Halsbury.
Col. F. Lindsay Lloyd, C.M.G., C.B.E.
Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P.
Lieut.-Col. M. O'Gorman, C.B.
Air-Commodore C. R. Samson, C.M.G., D.S.O., R.A.F.
Sir Mortimer Singer, K.B.E.

Any two members of the Club may nominate a member to serve on the Committee, provided the consent of the member has been previously obtained. The name of the member thus nominated, with the name of his proposer and seconder, must be sent in writing to the Secretary not less than fourteen days before the Annual General Meeting.

COMMITTEE MEETING

A meeting of the Committee was held on Wednesday last, February 15, 1922, when there were present : Brig.-Genl. Sir Capel Holden, K.C.B., F.R.S., in the Chair ; Wing-Commander W. D. Beatty, C.B.E., R.A.F. ; Mr. Ernest C. Bucknall ; Col. F. Lindsay Lloyd, C.M.G., C.B.E. ; Lieut.-Col. F. K. McClean ; Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P. ; Lieut.-Col. Alec Ogilvie ; Lieut.-Col. M. O'Gorman, C.B. ; Rear Admiral Sir Godfrey M. Paine, K.C.B., M.V.O. ; Mr. T. O. M. Sopwith, and the Secretary.

Election of Members.—The following new members were elected :—

D. W. F. Bonham-Carter.
C. J. Stone.

Civil Aviation Advisory Board.—Letter was read dated February 9, 1922, from the Air Council stating that it had been decided to establish a permanent Civil Aviation Advisory Board under the Chairmanship of the Under Secretary of State for Air, and requesting the Club to nominate a representative to serve on the board.

The Chairman of the Club (Brig.-Genl. Sir Capel Holden, K.C.B., F.R.S.) was appointed to represent the Club on the board.

International Air Conference, 1923.—The following were appointed to represent the Club on the Executive Committee to be formed, to organise the International Air Conference in London in 1923 :—

Col. F. Lindsay Lloyd, C.M.G., C.B.E.
Lieut.-Col. F. K. McClean.
Harold E. Perrin.

Schneider Cup, 1922.—The Secretary reported that the date for receiving entries had been extended to June 1, 1922.

F.A.I. Law Commission.—It was reported that the Law Commission of the F.A.I. would meet in Paris on March 13 and 14 to consider the various acts regulating Aerial Navigation in the different countries.

The Club's representative, Major E. H. Tindal Atkinson, being unable to attend it was decided to appoint Major R. H. Mayo to attend the Conference on behalf of the Club.

Flying Services Fund.—The report of the meeting of the Flying Services Fund Committee held on February 3, 1922, was received and adopted.

House Committee.—The report of the meeting of the House Committee held on February 13, 1922, was received and adopted.

Aviators' Certificates.—The following aviators' certificates were granted :—

7921 Nevill Vintcent (January 28, 1922).
7922 David William Frederick Bonham-Carter (December 14, 1921).
7923 Cecil John Stone (December 17, 1921).

Flying Services Fund.—A meeting of the Flying Services Fund Committee was held on Friday, February 3, 1922, when there were present : Lieut.-Col. Alan S. Dore, D.S.O., in the Chair ; Mr. Chester Fox, and the Secretary.

Eighteen applications for assistance were considered, and grants and allowances voted amounting to £220.

Gordon Bennett Balloon Race.—Entries for the Gordon Bennett Balloon Race, to be held in Geneva on August 6, 1922, close on Saturday, February 25, 1922. The following entries have so far been received :—

Lieut.-Col. John D. Dunville.
Mr. E. Allen.

THE FLYING SERVICES FUND COMMITTEE

(*Registered under the War Charities Act*, 1916.)

Administered by the Royal Aero Club.

For the benefit of Officers, Non-Commissioned Officers and Men of the Royal Air Force who are incapacitated while on duty, and for the widows and dependants of those who are killed or die from injuries or illness contracted while on duty.

Honorary Treasurer

The Right Hon. Lord Kinnaird.

Committee

H.R.H. The Duke of York, K.G. (Chairman).
Lieut.-Col. A. Dore, D.S.O.
Mr. Chester Fox.
Wing-Commander T. O'B. Hubbard, M.C., R.A.F.
Air-Commodore C. R. Samson, C.M.G., D.S.O., R.A.F.

Secretary

H. E. Perrin.

Bankers

Messrs. Barclays Bank, Ltd., 4, Pall Mall East, London, S.W. 1.

Subscriptions

	£	s.	d.
Total subscriptions received to June 20, 1921	17,252	0	4
H.R.H. The Duke of York, K.G.	21	0	0
Air League Orphan Fund	224	4	9
Total—February 20, 1922	£17,497	5	1

Offices : THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

At the King's Levee

AMONGST those who attended the Levee held by His Majesty the King at St. James's Palace on February 14 were Air-Marshal Sir Hugh Trenchard, C.B., D.S.O., K.C.B., Principal Air Aide-de-Camp, General-in-Waiting, Capt. the Rt. Hon. F. E. Guest, C.B.E., Secretary of State for Air, Air-Comm. O. Swann, C.B., and Wing-Comdr. H. R. Busteed, O.B.E., A.F.C. Amongst those presented to the King were the following :—Sqdn.-Ldr. J. T. Babington, D.S.O., Flight-Lieut. T. G. Bowler, Flight-Lieut. F. L. Butcher, Sqdn.-Ldr. A. G. Carr, O.B.E., Flight-Lieut. W. S. Caster, M.C., Flying Officer J. L. Hughes-Chamberlain, Sqdn.-Ldr. D. C. Evill, D.S.C., A.F.C., Flight-Lieut. A. Garrity, Sqdn.-Ldr. H. A. Hewat, Flight-Lieut. V. J. Jacobs, Flying Officer H. P. Leigh, Flight-Lieut. C. Musgrave, A.F.C., Flying Officer H. C. Pyper, Flying Officer I. M. Rodney, Wing-Comdr. H. W. Scott, Flight-Lieut. F. H. Sims, Flying Officer J. F. Titmas, Flying Officer E. A. Locke-Waters.

THE AIR CONFERENCE, 1922

[OWING to lack of space, it has not been found possible to print the last three papers read before the Air Conference as fully as we could have wished. In the abstracts and *résumés* which follow, we have endeavoured to retain all the more important points raised by the various lecturers, and at the end of the three technical papers will be found a brief report of the discussions which took place during the afternoon session of the second day of the Conference. We understand that the Air Ministry intends to publish the proceedings of the Air Conference in full, and that the official report will probably be published some time during March. We would recommend those who wish for fuller reports than those which we have been able to give to obtain a copy of the report.—ED.]

RESEARCH FROM THE DESIGNERS', CONSTRUCTORS' AND USERS' POINTS OF VIEW

By Major FRED M. GREEN, O.B.E., M.I.C.E., F.R.Ae.S.

IT is easy to make suggestions for research in every direction and to state a list of questions that would involve many years of work using all our existing facilities. In the hope of making this paper of some immediate value, I propose to confine myself to suggesting lines of research from which an immediate and substantial return may be expected. Research of this type is not always of fundamental importance to the science of aeronautics. I wish to say that I am definitely not in favour of abandoning the more abstract research, or indeed of relegating it to a second place in our programme, for in the long run it will probably yield results of infinitely greater importance than are likely to be the outcome of the special investigations I shall suggest; but from the designers', constructors' and users' point of view, it is in research of the latter type that the chief interest lies.

Immediate Problems Involved

Wing Surface.—From many points of view it is an advantage to use the least amount of wing surface that will give the results required. Smaller wings mean lower first cost, less weight, and less up-keep. The designer wants information as to the characteristics of various wing sections, and also of various shapes and arrangements of planes, and is at once face to face with the question of how to apply wind channel results on models to full size aeroplanes. It seems to me that this is the burning question of the day, and that until designers can be shown how to use wind channel results on wings, and until they can be convinced that the results can be used without the chance of serious error, it is of little use suggesting further wind channel research on new kinds of wings. It will be better to devote all the available energy and talent to clearing up this problem than to amass results, the value of which is unknown.

A great deal of full-scale work has been done in testing aeroplanes at the Royal Aircraft Establishment and at the Royal Air Force Experimental Stations at Martlesham Heath and elsewhere. Unfortunately these tests cannot by their very nature be as clear cut as wind channel tests, nor have the results the same kind of accuracy. A large number of corrections and allowances for various disturbing factors have to be made. The expense also of the work is very high. At the same time, the results obtained really do apply to wings of a scale in which we are interested, and the figures inspire in the designer more confidence than do wind channel results, which he does not know how to interpret. For many years experiments have been made with a view to obtaining the resistance of the aeroplane by measuring the thrust or pull of the airscrew. Considerable difficulties were at first found in getting accurate results. It will be of great value if this work is continued, and if full-scale tests on the same aeroplane fitted with different sorts of wings can be made and the results published as soon as possible after they are obtained. The results can be checked by making gliding experiments, although the thrust-meter method is likely to prove the more useful. The aeroplane used for this purpose need not be large or expensive, and it certainly seems that every effort should be made to establish a connection between full-scale and model results for some typical aerofoil such as R.A.F. 15.

Another question in which the designer is concerned in fixing the size of the wings, is how much of the maximum available lift the pilot will be able to use; that is to say, at how near the minimum speed will he be able to fly without risk of losing control. Research work on control at low speeds is certainly needed; part of this, I think, can well be carried out in the wind channel in close co-operation with full-scale experiments. The cause of the most usual form of flying accident, generally known as a spin, is bound up in this question, and it seems not unlikely that one of the greatest dangers of flight may be removed when we have more knowledge of the subject. The size of the controlling surfaces, namely the elevator, tail plane and wing flaps, are all affected by the characteristics of the planes, but again we must know the relation between model and full scale in such matters as the travel of the centre of pressure before we can use model results with certainty.

Power Required.—In estimating the power required for an aeroplane, it is necessary to add to the drag of the wings the resistance of the body, struts, wires, landing gear, and other parts external to the wings. This is work which can well be done in the wind channel, and there is every reason to believe that the results of such work can be applied to full scale work without much error. Knowing the total resistance of the aeroplane, the power required can be settled when we know the efficiency of the propeller. This is a matter on which research is needed, particularly on the efficiency of the propeller in relation to an aeroplane body. Another matter which affects the resistance of an aeroplane is the power used in cooling the engine. We are still uncertain whether it takes more power to cool an air or water-cooled engine, and in the case of radiators we are quite at variance as to their most economical arrangement.

Materials for Aeroplanes.—A good deal of work has been done on the characteristics of wood, and as this material is subject to such wide natural variations it does not seem that further research will be of much help. So long as wood is used, the making of good aeroplanes will be a matter of art rather than science. In the covering for aeroplane wings, nothing has yet been produced to compete seriously with linen or cotton fabric treated with suitable dope and protective covering. It certainly would be an advantage if this could be replaced by metallic covering, but such covering must not be of greater weight per square foot and must have reasonable resistance to tearing.

Metal Construction.—The substitution of metal for wood may enable us to effect improvements in weight. Using steel of 45 tons per square inch tensile strength, it is possible to make aeroplane structures of at least no greater weight than those of wood. The use of steels of higher tensile strength should enable us to make them lighter. The present difficulty is that in order to make parts suitable for aeroplanes the thickness of the material has to be small, and we have yet to find out the best methods of making and using thin sheet materials. Many of the fundamental principles have been established, and the development of this sort of work calls for research of rather a practical nature.

Calculations of Stresses.—The method of calculating the stresses in an aeroplane structure has been gradually improved. The present methods standardised by the Air Ministry more nearly represent the actual case than those used in most other branches of engineering. At the same time a number of assumptions are made for the purpose of simplifying calculations which are not strictly accurate, particularly in neglecting redundant members. It is generally assumed in the calculations that the incidence bracing takes no load. In actual flight it always does take a share of the load, and the result is generally to make the aeroplane somewhat stronger than calculations show.

Problems of the Engine Designer.—The success of an aeroplane depends largely upon the performance and reliability of the motor that drives it. The reliability of the motor is to a very large extent bound up with the reliability of the materials that are used in its construction, while the weight per horse power that can be obtained depends upon the stresses to which the materials can be safely worked. The properties of high tensile steels are fairly well known, but engine designers are forced to reckon on a tensile strength far below that which they know can be obtained.

Aluminium alloys enter largely into the construction of most aeroplane motors, principally in the cast state. Obtaining reliable castings is a difficult matter, and we have always to use castings of a weight considerably in excess of what is necessary for strength in order to compensate for their possible defects. We also use an alloy which is at least 10 per cent. heavier than we need, because the foundries find difficulty in making sound castings of known lighter alloys. The need for research seems to be obvious, but it must be a sort of research that will help to produce the castings required, and not merely to make sample test pieces of some particular material. Some of these aluminium alloys are required to maintain their strength when hot, and consequently their behaviour at temperatures above the normal must be investigated.

The amount of power that a petrol engine can give is frequently limited by the speed at which it can run. This in turn is sometimes limited by the risk of failure of the bearings. Very little indeed is known of the properties of plain bearings under the condition in which they have to work in an aeroplane motor. It is generally considered that the criterion of safety of a bearing is obtained by multiplying the average pressure by the rubbing speed, and if the result obtained is lower than a certain figure the bearing will be satisfactory. On the other hand, the designers of the Michell bearing assure us that the higher the rubbing speed the higher can be the load per square inch. Here we have two opinions which are diametrically opposed, and it certainly needs research in this direction to enable designers to fix their bearing surface with some degree of certainty. The properties of ball and roller bearings also need investigation, as there is much uncertainty amongst designers as to their most suitable form and the loads that can be carried.

Fuels.—The type of fuel that is used in a petrol motor has a considerable effect upon the working of the motor. We know that the addition of benzole to petrol enables us to increase the compression of the engine without fear of detonation, and that other materials can be added to give similar results. Research is needed to determine the most suitable fuel that can be obtained at a commercial price and in commercial quantities.

Research for Constructors

Aeroplanes.—One of the most important processes with which the constructor is concerned is the joining of materials together, particularly the gluing of wood and the soldering, brazing and welding of metals. There is still no waterproof glue that is altogether satisfactory, and although much work has been done on the subject there is room for further research. The methods of soldering, brazing and welding have always been largely shop processes. There is little information to be had on the subject, and as these three methods are constantly used by all aeroplane constructors, further knowledge would be of advantage. Fluxes in particular call for attention, especially to determine which are easily useable and do not set up corrosion.

There is another peculiar problem which constantly presents itself to the aeroplane maker. It is to make stiff light forms of various shapes suitable for fairing which are weatherproof and, if possible, fireproof. In the general way the strength of these parts is unimportant; the chief requirement is that they shall keep their shape.

Engines.—The making of aeroplane engines presents a variety of problems in the shops. In the general way it is much easier to machine parts to the required degree of accuracy than to be certain that the material of which they are constructed is of the required strength and free from faults. The need for steels of uniform quality and of higher tensile strength has already been mentioned. The constructor is particularly concerned with the correct heat treatment of the material that he receives. Included in the heat treatment of metals must be case hardening, particularly of intricate parts. The life of most aero engines could be improved considerably if certain parts were specially hardened. This is not done on account of the difficulty of knowing that the hardening will be carried out in a manner which will not injure the rest of the part. Here I think is a large field for investigation, but it is of a practical rather than a theoretical nature.

Research for the User

The requirements of the user in the matter of research naturally apply to the actual operation of aeroplanes. Many of his problems would be removed or at least made easier by the researches already indicated, but certain of them are apt to be ignored both by the designer and the constructor. One of the most important of these is safety from fire both in flight and in case of accident.

Safe landing in small aerodromes is likely always to be of interest to the user, who very naturally objects to paying more rent for his ground than is necessary for safety. The research already suggested in connection with control at low speeds is possibly the most important factor of landing in small aerodromes, and probably more advantage will be gained by a knowledge of this subject than by the use of wings of an abnormally high lift coefficient. Landing gears in the general way offer possibilities of improvement, but this is rather a matter of individual design than of any particular research.

Alighting on Water.—There are many countries in which it is difficult, if not impossible, to find ground suitable for aerodromes, but where there is plenty of water which can be used for the purpose. In some cases it is convenient to have aeroplanes which can make use either of land or water for alighting or getting off. We have a fair knowledge of properties of floats and hydroplane boats. There is no doubt that this knowledge might be extended by further research. In the construction of boats and floats we still have a lot to learn, but this will probably have to be a matter of direct experiment.

The user is much interested in the comfort of his passengers, and in this matter the silencing of the engine and of the airscrew is of importance. The silencing of engines is fairly well understood, but involves in general a rather heavy expenditure of weight. The silencing of airscrews is more difficult, and perhaps the problem could better be solved by placing the passengers in cabins which are more or less soundproof. The subject is one on which little is known, and research might indicate methods of improvement.

Meteorology.—The user is interested in weather prediction, more especially in anything that will affect visibility, such as fog and snow. He also wishes to have reasonable warning of dangerous extremes of weather, particularly in countries which are liable to violent storms. He is also interested in knowing the direction and strength of the wind at various heights, so that he may economise time and money by taking advantage of favouring air currents and in avoiding those which are unfavourable.

Navigation.—The question of navigation presents no difficulties so long as the visibility is good. There are many reasons why it is not convenient to fly always in sight of the ground. When the wind is favourable it will generally pay to fly high, and it is certainly more pleasant to be in the sunshine above the clouds where the air is almost always steady, than to be tossing about just beneath them.

There are many ways in which wireless telegraphy and telephony can help, but it is essential that the gear carried on the aeroplane shall be as light and as simple to use as possible. Wireless control of the aeroplane itself, from the ground, is certainly a possibility of the future, and it may be that the pilot of an air liner will give up the control of the aeroplane when within certain distance of his landing place to a ground pilot, who will bring the aeroplane into port.

Multi-Motor Aeroplanes.—In running an air service it is essential that forced landings of any sort shall be as infrequent as possible. If we could absolutely cut out the chance of motor failure we should practically achieve this end. Aeroplanes have been made in which the power unit has been divided up into any number of motors up to six, but for many reasons the single motor aeroplane is still, in practice, as reliable as the multi-engine machine. There is certainly room for research in this direction, and it will probably need close co-operation between the engine designer and the aeroplane designer if a solution is to be found.

Conclusion.—The high position that this country holds in the development of flying is, I think, due almost entirely to the wisdom of the Government that set up an Advisory Committee and instituted research work at the very beginning of flying. The work carried out at the National Physical Laboratory, the Royal Aircraft Establishment and the Testing Stations of the Royal Air Force, could not possibly be done by private enterprise, and it is by the information gained and the standard set by this work that the industry is enabled to produce aeroplanes which cannot be rivalled in any other country.

It is the opinion of the writer that help of this kind is of greater value than direct subsidy, and he earnestly hopes that even the pressing need for economy will not prevent research being carried out in the future in the same spirit as it has been carried out in the past.

THE PROGRESS OF RESEARCH

By Brig.-Genl. R. K. BAGNALL-WILD, C.M.G., C.B.E., F.R.Ae.S., Director of Research

ALTHOUGH extremely interesting, the restrictions of space prevent publication in full of the paper read before the Air Conference by the Director of Research. It is hoped, however, that in the following *résumé* no points of primary importance have been omitted. The Director of Research prefaced his paper with some general remarks upon research and experiment, pointing out that the Directorate of Research is an engineering as well as a scientific organisation. He mentioned the valuable work being done at our various universities in addition to that carried out at the N.P.L. and R.A.E., and the full-scale work and testing at Martlesham, Isle of Grain and certain other air stations.

Aero Engine Research

The General stated that the biggest technical problem affecting civil aviation is the development and perfecting of the aero engine, and called attention to the difference of the working conditions of a car engine and an aero engine. The former is not normally run at more than one-third of its full power, whereas until the advent of the Napier "Lion"—which has enabled machines to fly on an average loading of 60 per cent.—it was customary for aero engines to be run at from 80 to 100 per cent. of their full load. As regards future development, it was very encouraging to find that the new Director of Research does not entertain any great hopes of success being attained either with the internal combustion turbine or the steam turbine, encouraging because, we think, it would be a mistake to expend money and energy in pursuing research on subjects which give so little promise of success.

Direct Injection.—The lines upon which the Director of Research indicated that research is being conducted are on direct fuel injection and air-cooled cylinders. As regards the former, the General stated that experiments are in hand to determine whether it is better to replace the carburettor system by some method of direct injection, and that Dr. Ferranti is attempting this on a Tuxham two-stroke engine. At the R.A.E. experiments are being made, with Professor Hawkes' assistance, on the possibility of employing shale oil and operating engines on the Diesel cycle. A single cylinder engine from an ordinary Otto cycle aero engine is being used, and it is hoped to run up to an engine speed of 1,000 r.p.m. At the R.A.E. work is also proceeding on the solid injection of a fuel consisting of 95 per cent. of alcohol. The Director of Research summarised the advantages which it is considered should accrue from the use of direct injection, as follows: (1) high flash point fuel could be used, thereby reducing fire hazard; (2) cheaper fuel; (3) higher compression ratios, and therefore better fuel economy; (4) fuel supply to engine more positive than when it depends on small heads, and is liable to be upset by small particles of dirt; (5) the elimination of the ignition system would remove a source of unreliability and trouble; (6) as air only is compressed, the way is opened up to an economical two-stroke engine, with its advantages of more even torque for a given number of cylinders, and probably less weight per b.h.p. By using a suitable air compressor of greater capacity than that necessary for normal two-cycle working, a supercharging engine would be obtained as a straightforward development. In connection with supercharging, the General mentioned the air compressor turbine driven by the engine exhaust, and stated that experiments on superchargers are being conducted at the R.A.E. He also referred to the altitude test house at Farnborough, in which engines can be tested under conditions corresponding to those obtaining at great altitudes. Finally the lecturer referred to the assistance given to engine testing during flight by a method suggested by Professor Callendar, and stated that the use of this apparatus and of the new R.A.F. thrust meter should enable far more complete air tests to be carried out than have hitherto been possible.

Air Cooling.—Gen. Bagnall-Wild then referred to the question of air cooling and its advantages; mentioning that the staff at Farnborough have long been of opinion that this was a possible development, and we now have the Bristol "Jupiter" radial air-cooled and the Siddeley "Jaguar," also a radial air-cooled, while in some other tests a single cylinder, air-cooled, has given as much as 222 b.h.p. with a brake mean effective pressure of as much as 134 lbs./sq. in. There are, the lecturer stated, enthusiasts who consider that an air-cooled engine of 1,000 h.p. should not be impossible of attainment, and that with one or other form of cooling an aero engine of 2,400 h.p. at 750 r.p.m. should be possible.

While on the subject of air-cooling, the General mentioned that there is a point which is frequently overlooked when considering the relative weights of air-cooled and water-cooled engines. Although in the former type the weight of radiator and water is saved, the weight of air-cooled cylinders and pistons is greater than that of water-cooled. Thus it was found that, although the gain due to elimination of radiator, water, pipes and pump was about 0.7 lb. per h.p., the excess in cylinder and piston weight of the air-cooled amounted to 0.46 lb. per h.p., so that the net gain was only 0.24 lb.

As regards single-engine *versus* multi-engine arrangement, the Director of Research pointed out that, quite apart from other relative merits, the single-engine installation usually scores as regards the weight of its accessories. From a number of typical cases it was found that the accessories for a twin-engined arrangement weighed about 1.3 lb./h.p., and for the single-engined installation about 1.0 lb./h.p. For an air-cooled engine the figure for a single engine would be nearer 0.4 lb./h.p.

Silence.—On the question of silencing, the lecturer stated that the two main offenders appear to be the engine and propeller, of which the former is the easier to deal with. He was glad to be able to state that experiments had proved that the simplest form of all silencers had proved as effective as any. This consists of adding to the exhaust manifold a tube of about three inches diameter, perforated with some hundreds of holes each one-eighth of an inch in diameter. This tube runs almost the whole length of the aeroplane. As there are no baffles the back pressure is very slight, and the revolutions are reduced by about 5 r.p.m. only, while the weight, for a machine like the D.H. 9 or Bristol Fighter, is only about 25 lbs. The General did not see any probability of any extensive reduction in propeller noise, although experiments are in hand which may assist in reducing to some extent the noise made by the airscrew. While on the subject of aero-engine research, the General paid a warm tribute to the work of the late Maj. Norman, of the R.A.E., whose immense personal courage, especially in testing the effects and prevention of fire, was of the greatest value to air research work.

Navigation

Clouds and Fog.—The most difficult problem in connection with air navigation, the General stated, is the provision of means for enabling an aircraft to locate its aerodrome and alight safely on it in misty or foggy weather. Professor Lindemann had suggested that the best means of landing in a fog might be the provision of two pairs of kite balloons floating above the cloud layer, the first pair being at such an altitude as would enable a gliding machine passing between them also to glide between the second and lower pair, and, after an equal interval of time, to land on the aerodrome. In connection with flying in clouds or fog the lecturer referred to the gyro turn indicator, which has proved to be more sensitive and much more rapid in its indications than any other method tested so far. Unlike the constant azimuth gyro, this apparatus does not need to be delicately balanced as regards the position of its centre of gravity, and it is therefore remarkably fool-proof. As regards compasses, the lecturer mentioned that the work at Farnborough had indicated the great advantage of a long period, while the work of later inventors showed the advantage of damping the oscillations, even to the point of a periodicity.

For navigation, when flying out of sight of land, the necessary instruments to enable the position to be determined by the ordinary methods of nautical astronomy are now available, and the probable error should not be more than 10 miles, which is considered sufficient for ordinary air work.

Wireless.—A particularly promising form of wireless aid to navigation is the rotating wireless beacon, which offers freedom from the troublesome quadrantal error, but it depends for its ultimate accuracy upon a careful study of the conditions which determine the nature of the path followed by the waves.

Machines

Stability.—In connection with stability, the Director of Research stated that inherent stability, when attained, greatly reduces the need for automatic stability apparatus of a more or less complicated nature. He thought that, if possible, one of the wind tunnels at the N.P.L. should be devoted entirely to stability work, especially to problems of lateral stability.

While dealing with the Handley Page slotted wing, the Director of Research stated that on flying tests with a D.H. 9 *fuselage* and a slotted wing, the climb was 1 in 7.2 as against 1 in 10 when the machine was fitted with ordinary wings. He also referred to the "Alula" wing, but stated that so far wind-tunnel tests have not demonstrated this form of wing to be exceptionally good. Scale effect might prove unusual in this form of wing, and this point was, he said, being looked into.

He also referred to the question of metal propellers and variable pitch propellers, and to helicopters. Regarding the Brennan the General stated that this helicopter had flown to the extent of lifting the pilot and 250 lbs. of useful load.

The General referred to the Air Ministry tank tests, but did not give any information as to the results obtained.

Materials

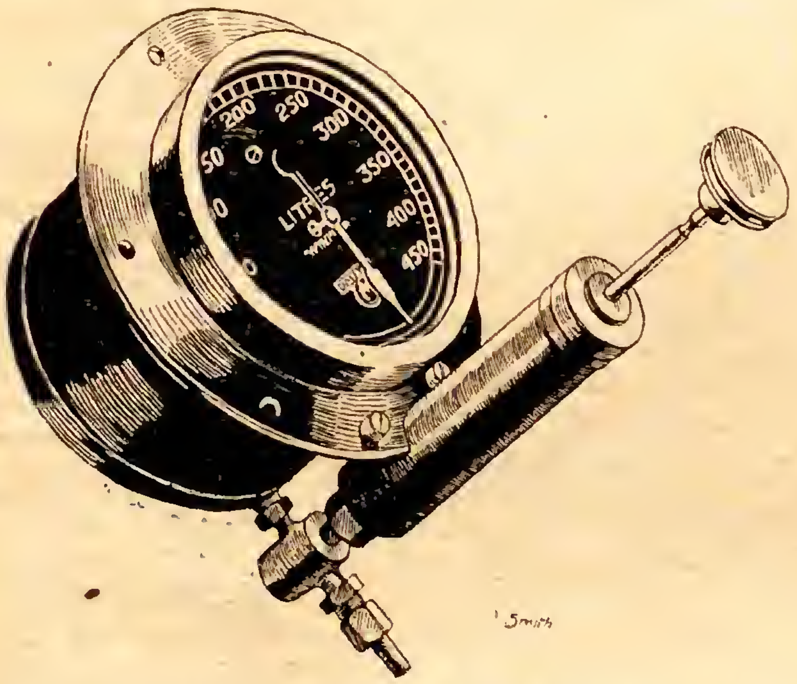
In dealing with the question of materials, the lecturer referred to the work of the Materials Sub-Committee, and stated that it had been shown that we should get into the habit of thinking of fatigue limits rather than of ultimate stress limits. The great difference between these two, he said, is seen in the effect of a tool mark or a scratch on, say, a crankshaft. Under an alternating stress the sensitive area is pulled to and fro until an appreciable portion of the shaft is weakened. Tests on the fatigue of materials are being carried out at the Universities at Leeds, Edinburgh, Bristol and Birmingham, in addition to researches at the National Physical Laboratory and elsewhere.

The Director of Research spoke in praising terms of the new Blaisdell "Petroflex" for petrol piping, and stated that fifty sets have been sent out to the East to be tested under conditions which have been found to ruin rubber piping in six months.

Turning to the question of timber supply, the lecturer stated that Canada is now supplying spruce so carefully selected that it seems not unlikely that over 80 per cent. will be found to comply with our best quality specifications.

THE SMITH PETROL LEVEL INDICATOR

It is, perhaps, a remarkable fact that in the past the very important question of providing a means of informing the pilot of an aeroplane as to the state of affairs within the petrol tank was either ignored entirely or else complied with in not an altogether satisfactory manner. We well remember the happy days when it was general practice to unscrew the cap of the petrol tank, insert a length of stick—together with any foreign matter adhering thereto—and ascertain the quantity of petrol *in situ* by the wet mark left on the stick after withdrawing it; whilst some of the devices put forward for indicating the petrol level were somewhat complicated and more or less unreliable.



THE SMITH PETROL LEVEL INDICATOR: General view of the instrument itself, which is given a neat black finish.

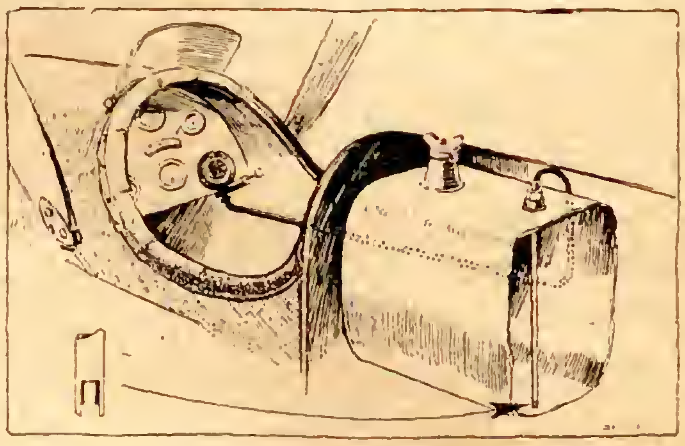
Now, however, thanks to the efforts of Messrs. S. Smith and Sons (M.A.), Ltd., of Central Works, Cricklewood, London, the well-known manufacturers of motor accessories and instruments, there exists an instrument, which may be fitted on the usual instrument board, that indicates the exact—or as near exact as really matters—amount of petrol in the tank at all times.

Apart from being extremely reliable—which is testified by the fact that it is a standard fitment on all Vickers machines, whilst most of the Air Ministry contracts now call for one of these instruments—the most important feature of the Smith petrol gauge is its extreme simplicity, both in operation and in construction.

It consists of two portions—the indicator itself, which is mounted on the instrument board or any other convenient position, and the piping and tank connection. The indicator is uniform in style and finish with the various other Smith instruments—air speed, engine revolutions, etc.—and contains a very sensitive pressure gauge working on much the same principle as the Smith air speed indicator; that is, it is fitted with a flexible diaphragm, made of specially doped silk, which forms one side of an air chamber, to which connection is made at the back of the gauge to a tube running from the bottom of the petrol tank. This tube is open at its lower extremity, and the connection with the indicator is made with the usual piping. The diaphragm is, of course, connected through suitable mechanism to the pointer of the indicator.

The operation of the gauge is as follows:—When the petrol tank is filled up with petrol a certain amount of the liquid rises up the pipe, compressing the air imprisoned within the tube, piping and air chamber of the indicator. This causes the silk diaphragm to expand, thereby moving the pointer round a given number of degrees proportional to the amount of petrol in the tank. It will be seen, of course, that the position of the instrument and the petrol tank relative to each other is a matter of minor importance; the tank itself can therefore be higher or lower than, or some distance away from, the actual gauge on the instrument board. This fact, together with the extreme simplicity of the whole system, is of very considerable advantage in an instrument of this kind, and the only trouble that can possibly occur is that after a bad landing there is just a chance that superfluous petrol might be forced up the pipe, causing the gauge to read higher than normal. This trouble is remedied, however, by arranging a small hand-pressure pump fitted at the base of the instrument, a few strokes of which expel all the petrol from the tube in the tank, allowing it to rise again to exactly the correct amount necessary to give an accurate reading on the instrument.

In the case of pressure-fed tanks a static pipe is fitted to the opposite side of the diaphragm and arranged to project into the top of the tank. With regard to the tube itself, the end of this is slotted so that the tube may be pressed hard against the bottom of the tank and ensure that if it is ever removed at any time for adjustment it will always be returned to exactly the same position.



THE SMITH PETROL LEVEL INDICATOR: Diagrammatic sketch showing the general "lay-out" of the system.

The method of calibration is as follows:—Messrs. Smith and Son send out instruments with a blank dial which is calibrated on the machine itself by filling up the tank with petrol, two, four or six gallons at a time, according to the size of the tank. The gauge is then returned to the makers, who engrave the dial and finish off the instrument. Naturally, any difference in the specific gravity of the petrol will affect the reading of the instrument, and it is, therefore, necessary when calibrating the gauge to note the grade of petrol that will be used on the machine.

In addition to being absolutely invaluable for aircraft work, the Smith type of gauge is adaptable for use on reservoirs, storage tanks, etc., and a big future is pretty well certain for it.

Enquiries should be sent to the manufacturers, Messrs. S. Smith and Sons (M.A.), Ltd., Aviation Department, Central Works, Cricklewood, N.W. 3, who will furnish blue prints and illustrations if requested.

Roland Rohlfs Joins Aeromarine Co.

Roland Rohlfs, the famous American pilot who has several flying records to his credit, has joined the Aeromarine Airways, Inc., and will take an active part in that company's flying-boat operations between Florida coast resorts and points in the West Indies and the Bahamas.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN FEBRUARY 5 AND FEBRUARY 18, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon-Paris	43	81	17	38	40	3 4	D.H. 4 G-EAWH (2h. 9m.)	B. (4), D.H. 4 (1), D.H. 18 (3), G. (5), H.P. (1), Sp. (6).
Paris-Croydon	43	77	10	35	40	2 34	D.H. 4 G-EAWH (1h. 54m.)	B. (4), D.H. 4 (1), D H. 18 (3), G. (5), H.P. (1), Sp. (6), V. (1).
Totals for 2 weeks ...	86	158	27	73	80			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez R. = Rumpler. Sa. = Salmson. Se. = S.E. 5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc. :—Co. des Grandes Expresses Aériennes; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

LONDON TERMINAL AERODROME

Monday Evening, February 20, 1922.

WE have had one or two "dud" days from a weather point of view, but, generally speaking, the whole business of the "airway" is looking up, and indications are not wanting that the worst of the winter "slump" is over.

Mr. Priestley, who is still engaged on business in connection with the winding up of Aircraft Transport and Travel, was at the aerodrome on Friday, and with Major De Havilland—over from Madrid on a visit—was examining the D.H.16's, which are still stored in a couple of the temporary hangars. It is rumoured that a Spanish company have purchased these machines for use on services which are to be started in Spain this spring.

It is understood, incidentally, that Mr. Priestley will be on the staff of the Daimler Hire Air Service when operations are commenced on April 3. This morning the contractors began work on the new offices for this air service. These are situated exactly opposite the Instone Air Line offices on the main approach to the aerodrome.

Preparations for a Busy Season

THERE is a general "hustle" throughout the aerodrome, both on the part of the transport firms and Air Ministry, to furbish everything up in readiness for the coming season. New offices are being erected on all sides. Old ones are being touched up and painted. Various alterations are being made to the drainage of the roads on the aerodrome. The entrance and exit gates are being set back, and the entrance widened to allow of a better view of approaching traffic as the cars enter and leave the aerodrome.

The old aerodrome on the hangar side of Plough Lane is being ploughed up for cultivation, and this has meant the relinquishing of the sports ground—a bitter pill for those

Air Mail in Australia: The Geraldton to Derby air mail service is extended periodically to Perth, W.A. Our photograph is of interest as a souvenir of the first flight made. The machine is a Bristol Tourer with Siddeley "Puma" engine, and the names of the four gentlemen standing in front are, from left to right: J. A. Dimmit, W. Australia Agent for C. C. Wakefield & Co.; Major N. Brearly, D.S.O., M.C., pilot; C. L. Westcott, and Mr. Durack, whose territory in N.W. Australia is of greater extent than the area of Great Britain. Mr. Durack was the first passenger carried.

who put so much labour into the making of the cricket pitch last summer.

In connection with the handing back of this land to the farmer, the last remnants of the airship mast are to disappear. These consist of something like 100 tons of concrete which was sunk into the ground to form a base for the mast, and also for the stay-wires. Up to the present a couple of men with sledge-hammers and chisels have been "nibbling" at it, but have made little impression, and, at the present rate of progress they will probably be still on the job when airships are resurrected—that is if they live long enough. It is suggested that dynamite is the only reasonable solution to the problem of removing this mass of concrete.

The meteorological office is erecting more instruments. An automatic wind-gauge is being constructed as near as possible to the present wind-balloonette, in order that all high objects on the aerodrome shall be grouped in as small a space as possible. This instrument, worked on the pitot tube principle, records continuously on a chart the wind speed and direction. In the enclosure round the meteorological hut a German range-finder, still in full war-paint and camouflage, has been fixed up, and, as far as can be gathered, this is to be used for pilot balloon work in finding the speed and direction of the upper winds.

A Further "Cut" in Freight Rates

Handley Page Transport have just reduced their freight rates, which are now as low as 5*d.* a pound for heavy parcels. It is expected that other firms will follow this "cut." There is to be a great "push" in connection with goods transport this year. All the companies, in fact, are making preparations to deal with a large amount of such traffic.

The Handley Page people have introduced luncheon baskets which, packed with good things, can be obtained by passengers before starting an air journey for consumption while in flight.

On Sunday two remarkably good flights were made by Messrs. Holmes and Courtney. Both were flying D.H.18's from Paris to London, and the weather was far from good. Wireless played a very important part in bringing them home, as they found on several occasions that they were being carried off their course by the wind.

Mr. Derwent Hall Caine's Renault-Avro, which the Surrey Flying Services are erecting, will be on its trial flights in the course of the next day or so.

The Marconi "Avro" was up during the week, and successful tests were made with the fixed "aerial" fitted to this machine. Representatives from the Air Ministry were "listening in" at the ground-station, and expressed themselves satisfied with the results obtained.

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THE ROYAL AIR FORCE

London Gazette, February 14, 1922

General Duties Branch

Flying Offr. L. Darvall, M.C., is granted a permanent commn., retaining his present substantive rank and seny.; Nov. 17, 1921.

The following are granted permanent commns., retaining their present substantive rank and seny.; Oct. 24, 1919. The notifications in *Gazette*, Oct. 24, 1919, appointing them to short service commns., are cancelled.

Flight Lieut.—A. W. Fletcher, D.F.C., A.F.C.

Flying Offrs.—J. R. Cassidy, E. C. Usher.

Flying Offr. H. J. Saker is granted a permanent commn., retaining his present substantive rank and seny.; March 30, 1920. *Gazettes*, March 30, 1920, May 4, 1920, and June 8, 1920, concerning this officer are cancelled. Flight Lieut. A. L. Messenger, A.F.C., is placed on half-pay, Scale B; Feb. 11. The following Flying Offrs. relinquish their temp. commns. on return to Army duty:—C. V. A. Bucknall (Lieut., The Inniskillings); Jan. 25. B. Ancott (Lieut., R.G.A.); Jan. 31. Sqdn. Ldr. G. F. H. Faithfull, O.B.E., is placed on the retired list, and is granted the rank of Lieut.-Col.; Feb. 15.

Stores Branch

Flying Offr. H. G. McKechnie resigns his permanent commn.; Feb. 15.

Medical Service

T. L. P. Harries, M.B., is granted a short service commn. as a Flight Lieut., with effect from, and with seny. of, Jan. 30. The following are granted temp. commns. in the ranks stated, with effect from, and with seny. of, the dates indicated:—Flight Lieut. W. G. Weston, M.B.; Jan. 30. Flying Offr. T. A. G. Hudson, B.A.; Jan. 27. Capt. H. H. Mallet, Army Dental Corps, is granted a temp. commn. as a Flight Lieut. while attd. for duty with the R.A.F.; Jan. 20. He will continue to receive emoluments from Army funds.

Erratum

Gazette of Jan. 27.—For G. P. F. Hill, read G. P. F. Hills.

London Gazette, February 17, 1922

General Duties Branch

Gp. Capt. P. R. C. Groves, C.B., C.M.G., is placed on the retired list, and is granted the hon. rank of Brig.-Gen.; Feb. 3.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

Air Vice-Marshal Sir E. L. Ellington, K.C.B., C.M.G., C.B.E., from Air Ministry to command Middle East Area on termination of appointment as Director-General of Supply and Research. 23.2.22.

Air Vice-Marshal Sir W. G. H. Salmond, K.C.M.G., C.B., D.S.O., from Middle East Area to Air Ministry, on appointment as Director-General of Supply and Research. 23.2.22.

Group Captain E. L. Gerrard, C.M.G., D.S.O., from R.A.F. Depôt (Inland Area) to command No. 1 Group Headquarters (Inland Area) *vice* Air-Commodore H. C. T. Dowding, C.M.G. 27.2.22.

Squadron Leader.—E. H. Sparling, A.F.C., from No. 5 Flying Training School (Inland Area) to Armament and Gunnery School (Cadre) (Inland Area). 18.2.22.

Flight Lieutenants.—A. McRitchie Moffatt, from Inspector of Recruiting (London) (Coastal Area) to Armament and Gunnery School (Cadre) (Inland Area). 18.2.22.

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Royal Air Force Sports Board

Arrangements for March.—1st, R.A.F. *v.* R. Navy, Hockey, Uxbridge (2.45 p.m.); 2nd, R.A.F. *v.* Queen's Park Rangers, Association, Shepherds Bush (3.0 p.m.); 4th, R.A.F. (Cadet) College *v.* Queen's College, Cambridge, Athletics, Cranwell; 6th, R.A.F. *v.* Brentford, Association, Brentford (3.0 p.m.); 9th, R.A.F. *v.* Army, Golf, Sunningdale; 11th, R.A.F. *v.* Army, Rugby, Leyton (3.0 p.m.); 15th, R.A.F. Cross Country Championships, Athletics, Uxbridge (3.0 p.m.); 22nd to 24th, R.A.F. Spring Meeting, Golf, Porters Park; 23rd, R.A.F. *v.* Army, Association, Aylesbury (3.30 p.m.); 24th, R.A.F. *v.* Army, Fencing, Bertrand's Academy, London 2.30 p.m.); 27th, Inter-Services Cross Country Championships, Athletics, Uxbridge (3.0 p.m.); 31st, R.A.F. Cadet College *v.* R.M.A., Skill at Arms, Woolwich.

R.A.F. Nursing Service: Opportunities for Service Abroad

The R.A.F. Nursing Service now offers opportunities for service abroad, and nurses wishing to join this service should therefore be willing, if required, to take their turn at service overseas, generally after a term of Home service.

Particulars regarding the particulars of service, regulations, etc., may be obtained on application to the Matron-in-Chief, Air Ministry, Kingsway, London, W.C. 2.

Definition and Nomenclature of Aircraft

The following definitions will, the Air Ministry announce, be used officially from March 1:—

(1) Aeroplane.—Any aircraft heavier than air, with fixed wings, driven mechanically.

(2) Aeroplane is a generic term and includes:—

(i) Amphibians,
(ii) Seaplanes,
(iii) Landplanes,

denoting, respectively, aeroplanes designed to alight on or take off from—

(i) Land or water,
(ii) Water,
(iii) Land.

(3) Seaplanes include Float Planes and Flying Boats, denoting, respectively, seaplanes fitted with floats or hull.

(4) Landplanes designed so as to facilitate their landing on a ship's deck will ordinarily be known as Ship Planes.

Three British Aviators Killed in Spain

An unfortunate accident occurred at Cuatro Vientos (Madrid) Aerodrome, on Tuesday, February 14, resulting in the death of three British aviators, Messrs. R. Milne, F. J. Ortweiler and Richardson. No details of the accident are as yet to hand, but it seems that they were testing the machine —a Bristol—which had been acquired by public subscription for the Spanish Army, and crashed from only a short distance from the ground. Milne, who represented the Bristol Co., and Richardson, who was working for the Spanish Government, were given an impressive funeral at the British Cemetery, Cuatro Vientos, King Alfonso being represented, and many notable people also being present. The Spanish Army sent a Guard of Honour, and a squadron of aeroplanes circled over the cemetery during the service. Ortweiler's body is being brought back for burial in England. His sporting flying in the last Aerial Derby, and Oxford and Cambridge race will be remembered by most of our readers.

THE INTERNATIONAL AIRSHIP CONFERENCE

AN International Air Conference, recently announced in FLIGHT, was held at Australia House on February 14-17, with the object of considering the question of standardising certain airship fittings and other matters connected with the commercial airship.

The Members of the Conference were :—

British Empire	Mr. A. H. Ashbolt, Agent-General for Tasmania (Chairman).
	Maj. Scott, A.F.C., R.A.F.
France ..	Capt Sablé (Air Attaché).
	Lt. de Vaisseau Joughland.
Germany ..	Maj. Stelling (Parseval Airship Co.).
	Commander Herrera (Zeppelin Co.).
Italy	Maj. Graziani (Air Attaché).
Russia ..	Mr. Akasheff.
Spain ..	Commander Herrera (Manager, Spanish-Argentine Airship Co.).
U.S.A. ..	Maj. H. C. Greiger (Army).
	Commander Dyer (Navy).
	Mr. E. Wallington Butt (Commercial).

Hon. Secretary—Commander F. L. M. Boothby.

The official report states that, in addition to the countries represented by delegates, Japan, Switzerland and Czecho-Slovakia intimated their acceptance of the principle and ask to be supplied with a copy of the report.

1. In accordance with the recognition by several nations of the immediate possibility of airship communication, this conference was called and invitations issued by the Chairman to the countries immediately concerned in this method of communication. It is essential to record the fact that the meeting was a strictly private one of experts of different nationalities to consider and discuss matters of common interest in airship communications. Consequently we have met as a Committee with the following terms of reference :—

To Report—

(*a*) On the desirability or otherwise of standardising certain fittings in connection with airships for International communication.

(*b*) If the principle is accepted to then determine what fittings should be so standardised.

(*c*) On any other matter common to international airship Services.

2. The full Committee met at Australia House on February 14 ; on the 15th a Technical Sub-Committee sat ; on February 16 the Conference visited the British Government Air Station at Pulham, inspected mooring mast arrangements, sheds and airships, and on February 17 the full Committee again met and adopted final resolutions.

3. The Committee is unanimously of opinion that the resolutions so adopted should be accepted by the nationalities concerned, and that all airships and airship stations built for international purposes should make provision for the recommendations contained in the resolutions given below :—

(1) That the principle of standardisation is accepted.

(2) That standardisation means such an arrangement as permits the airships of one nation to use the landing, mooring, gassing and refuelling arrangements of any other nation.

(3) That each country retains for itself the right to receive airships by either or all of the following methods :—

(*a*) At air sheds ; (*b*) by mooring on the ground ; (*c*) on water ; (*d*) by three-wire mooring arrangements ; (*e*) by mooring mast.

(4) That when airships are landing at shed, on the ground or on the water, that all trail ropes, pulley blocks used in connection therewith, and handling guys, be standardised.

(5) That any countries adopting the principle of mooring to masts, shall provide that such masts and ships be provided with standardised couplings, water, petrol and gas connections.

(6) That this Committee recommends to the next International Air Conference the formation of a Committee to determine the airworthiness of airships. It is recognised that the conditions of airship travel vary according to route and season of the year, consequently the impossibility of laying down a definite margin of fuel and ballast to be carried. The situation can best be met by the formation of a small permanent Committee to determine margins for each route according to its merits.

(7) That each country be asked to create an official register of airships in which will be listed all airships and air stations, indicating such airships and air stations as comply with the "International Standards" hereinafter arranged.

(8) That pending the decision of the Commission Internationale de Navigation Aérienne it is resolved that the Council of the Royal Aeronautical Society of London be asked to permit their Secretary to receive correspondence referring to "International Standards" and if desirable to authorise him to convene a further conference. In such event invitations will be forwarded to the countries interested through the Air Attachés of the Embassies in London.

(9) That Lloyd's and Insurance Companies in different countries be informed of the resolutions and standards adopted by the Conference with a suggestion that such standards be adopted by Lloyd's and Insurance Companies as the basis upon which minimum rates of insurance will be fixed.

Standards

(10) That the metric system of measurement be adopted.

(11) That all rigid, semi-rigid and non-rigid airships over 15,000 cubic metre capacity be required to carry :—

(*a*) A trail rope of not less than half the length of the ship, with a minimum of 100 metres.

(*b*) The forward side guy ropes to be of such a length as to reach not less than 40 metres below the lowest point of the airship.

(*c*) Eyes to which other guy ropes can be secured.

(*d*) Some method for hauling down the stern.

(12) Air stations are required to provide :—

(*a*) A landing block capable of taking the largest trail ropes carried by any airship.

(*b*) Side guys and toggles suitable for airships of any size.

(13) All gas, fuel, water and oil coupling pipes shall be fitted with "International" right-handed threads.

(14) In addition to facilities provided in sheds for refuelling airships similar facilities should also be available on the landing grounds.

(15) This Conference recommends the following sizes as most suitable for the flexible connection between airships and mooring masts or air station :—

Gas connection (inside measurement)	..	300 mm.
Water ,, ,, ,,	..	75 ,,
Fuel ,, ,, ,,	..	40 ,,

Airships containing pipes of dimensions other than those indicated, to have such arrangements installed as will enable their pipes to connect up with the standards recommended herein.

(16) All stations are to be fitted with female connections ; airships with male connections.

(17) Airships designed for mooring to mast must carry a cone gimballed on to the ship and rotating on its own axis. The size and shape of such cone to be that shown on the attached drawing. (Drawings are being prepared and will, it is hoped, be published in FLIGHT.—ED.) The wires passing through such cone shall not exceed a diameter of 18 mm. Such landing wire must be fitted at the outboard and with a splice, the eye of which shall be 230 mm. long. Also as shown on the drawing.

(18) The mooring mast station must provide a similar rope fitted with a quick coupling to take a loop at the outboard end of the trailing rope. The mast to be fitted to take the rope (up to 18 mm. diameter) together with the necessary coupling.

(19) Suggested signals for mast mooring :—

At Stations.	At Day.	At Night and in Fog.
The position of the mast mooring wire will be indicated by	A White Patch	By a White Light waved.
When the mooring wire ropes have been secured the ground will signal airship	By waving a White Flag	By a White Light flashed.
When the airship is ready to haul down the ship will so indicate	By a Green Flag	By a Green Light
To stop hauling the ship will indicate	By a Red Flag	By a Red Light.
To ease away the ship will indicate	By Red and Green Flags shown together	By Red and Green Lights shown together.

(20) That the standards arrived at remain in force for two years, when the whole question can be considered in the light of further experience then gained. If at any time any important development occurs or fresh inventions, or if by practical experience standards adopted are found dangerous, the Committee will immediately be convened to establish fresh standards.

At the conclusion of the conference a hearty vote of thanks was passed to Sir Joseph Cook, the High Commissioner for Australia, in granting the use of the rooms for the conference.

IN PARLIAMENT

Imperial Airship Service

Sir J. D. Rees, on February 14, asked the Secretary of State for India whether he can give the House any information regarding the proposed Imperial airship service in so far as it affects India; and whether the Government of India has taken or proposes to take any part in the suggested England, Egypt, India, and Australia service?

Mr. Montagu: I have been informed by the Government of India that they regret that the present financial position precludes them from making any contribution to the establishment of the experimental Imperial airship service which has been proposed.

Royal Air Force and the Stores Branch

Mr. Raper, on February 14, asked the Secretary of State for Air how many men are employed in the accountant's section of the Stores Branch, Royal Air Force; how many of this total quantity have been pilots and/or observers; how many are non-service men; and whether it would have been possible to have filled all vacancies in this section with ex-pilots and/or ex-observers?

Captain Guest: It is assumed that the question refers to officers granted commissions in the Stores Branch of the Royal Air Force for accountant duties; the men employed in this work are ordinary enlisted clerks of the Royal Air Force. On this assumption, the answer to the first question asked is 99 officers, to the second 10 officers, and to the third none. With regard to the last question, it was not considered desirable, in view of the need for obtaining officers with the best accountant experience in the interests of economy and efficiency, to restrict entry to ex-pilots and ex-observers, to the exclusion of other candidates from the three Services who possessed the necessary qualifications.

R.A.F. Aeroplanes and Engines

Mr. Raper, on February 15, asked the Secretary of State for Air what types of aeroplanes and engines are at present in use in the Royal Air Force, and how many of these types were designed before or during 1918?

Capt. Guest: As the answer is rather long I will, with my hon. friend's permission, circulate the information in the "Official Report."

The following is the answer:—

The following are the types of aeroplanes and engines at present in use in the Royal Air Force. With the exception of the "Vickers Vernon" "Vickers Ambulance," "Fairey 3.D. Seaplane," and "Westland Walrus" machines, all the above aeroplanes and engines were designed before or during 1918.

Aeroplanes.—Avro 504.K, Snipe, Bristol Fighter, D.H.9.A, D.H.10, Vickers Vimy, Vickers Vernon, Vickers Ambulance, F.2.A Flying Boat, F.5 Flying Boat, Fairey 3.D Seaplane, Westland Walrus, Sopwith Cuckoo, Panther, Ships Camel, Nieuport Nighthawk, Sopwith Salamander.

Engines.—B.R.II, B.R.I, Hispano-Suiza (Viper 1), Liberty, Mono, Napier Lion (II), Rolls Royce (Falcon 3), Rolls Royce (Eagle 8).

Irish Free State Air Force

Col. Gretton, on February 16, asked the Prime Minister whether under the terms of the Treaty the Irish Free State will be able to establish and maintain its own Air Force?

Mr. Churchill: Yes, Sir. I understand that the term "military defence force" in Article 10 of the Articles of Agreement includes an Air Force.

Col. Gretton: Has the Government had any recommendation made to them on this point?

Mr. Churchill: The naval and military clauses were carefully considered with the experts of those various Departments, and the Ministers concerned in dealing with them are the Ministers usually associated with the work of the Committee of Imperial Defence. The same is true of the arrangement made about the Air Force. It was not considered of sufficient importance to insist upon any specific stipulation in that case, and I think very sensibly so.

Mr. G. Terrell: Were these arrangements actually approved of by the technical authorities?

Mr. Churchill: It is not a fair thing to try and cite technical authorities, military or naval, as approving of matters which are wholly political and surrounded by controversy.

Capt. W. Benn: Hear, hear!

Mr. Churchill: I am very pleased to have that approval from a wholly unexpected and unsolicited quarter.

R.A.F. Deserters

Lieut.-Com. Kenworthy asked the Prime Minister whether men who were absentees or deserters from the Royal Flying Corps prior to the establishment of the Air Ministry are now liable to punishment; and, seeing that there is a conflict of opinion between the War Office and the Air Ministry as to the authority having jurisdiction and the action to be taken in such cases, if he is prepared to authorise a general amnesty?

Mr. Chamberlain: Deserters from the Royal Flying Corps prior to the establishment of the Air Ministry are still liable to punishment under the Army Act for their offence, and under the Air Force Act for their desertion from the Royal Air Force after the establishment of the Air Ministry. There is no conflict of opinion between the War Office and the Air Ministry as to the authority having jurisdiction and action in such cases. The answer to the last part of the question is in the negative.

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SIDE-WINDS

It is worthy of note in connection with the statement from the Chinese Chargé d'Affaires, read by Lord Weir, at the Air Conference, commenting on the reliability of the Vickers machines employed on the air mail service in China, that Smith's Speed and Distance Recording instruments shared in demonstrating the reliability of British-made goods.

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An interesting display of the E. R. Calthrop's Aerial Patents is on view until further notice at one of Messrs. Selfridge's showrooms. Photographs taken with a cinema camera serve to show very clearly every phase of a Guardian Angel Parachute descent. These, in conjunction with complete parachutes and components, form an excellent means of instructing the general public in matters "parachutic," whilst for the purpose of training the young idea, model parachutes are on sale at reasonable prices.

"Exide's" New London Depôt

Last week the Chloride Electrical Storage Co., Ltd., opened their new London showrooms and Service Station at 219–229 Shaftesbury Avenue, just off Oxford Street. There was a little house-warming function at which the guests were shown over the various departments, saw the large stocks of complete batteries and spare parts in the stores, had the different types of batteries shown to them, and saw the way in which users of Exide batteries are rendered real and efficient service.

"Exide Battery Service" was the text of a short address by Mr. D. P. Dunne, Director and Sales Manager, at the subsequent luncheon at the Holborn Restaurant. He said the new depôt had been opened to promptly satisfy the requirements of customers in the South of England and in the Midlands who desire new batteries or require batteries repaired, and from there they could supply their service agents in that area with all the materials or parts they require. He said that a shop for the sale of storage batteries on these lines was a novelty. Its success was not problematical; they knew that successful results were bound to follow upon battery service such as they could offer.

Everybody is free to use the Exide service organisation, whatever make of battery he may use. There was no membership card or card of admission, and their prices were fixed so that anybody using an Exide service depôt could get to know beforehand what the charges were, and they were the same from John o' Groat's to Land's End.

Mr. Dunne concluded by referring to some of the successful work done by Exide batteries during the War on aeroplanes, airships, tractors, electric cars, armoured cars, submarines, etc., and also detailed some other uses such as lighting of farms, miners' lamps, etc., and said it was Exide with its special and completely non-spillable container which had obtained an award from the Royal Commission on Awards to Inventors.

By way of a final word Mr. Dunne invited anyone seeking information regarding batteries to apply to the new depôt at 219, Shaftesbury Avenue, or to Clifton Junction, or to any "Exide" station, and thus sample one side of "Exide" service.

Further Tests with Aveline Stabiliser

The Messageries Aériennes are continuing their experiments with the Aveline stabiliser (a description of which appeared in Flight of Feb. 3, 1921). The firm is, we understand from Messrs. Auto Controls, Ltd., of 19, Regent Street, British Concessionaires of the apparatus, doing these tests free of charge, and the results obtained so far have been very encouraging. In a letter to the French *Section Technique*, the results are described, from which we quote the following: "On the 14th inst., new tests were made above Le Bourget; several of the Company's pilots were on board. The sky was overcast. The Goliath flew through the fog and emerged into clear air at 1,500 metres altitude, effecting the climb without difficulty and without intervention from the pilot. At 1,500 metres several turns were made, both left-hand and right-hand. The engines were then throttled down and the machine descended to within 50 metres from the ground, without the intervention of the pilot. During the descent the engines were several times opened up and throttled down, the machine automatically climbing when the engines were opened out and gliding when they were throttled down. Three times during the flight the pilots were changed, the machine flying entirely without pilot during these changes." The report further states that the Company is convinced that, in its present form, the stabiliser is capable of great services in traversing large banks of fog, and in taking off from aerodromes covered in fog.

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(*Continued from* p. xiv.)

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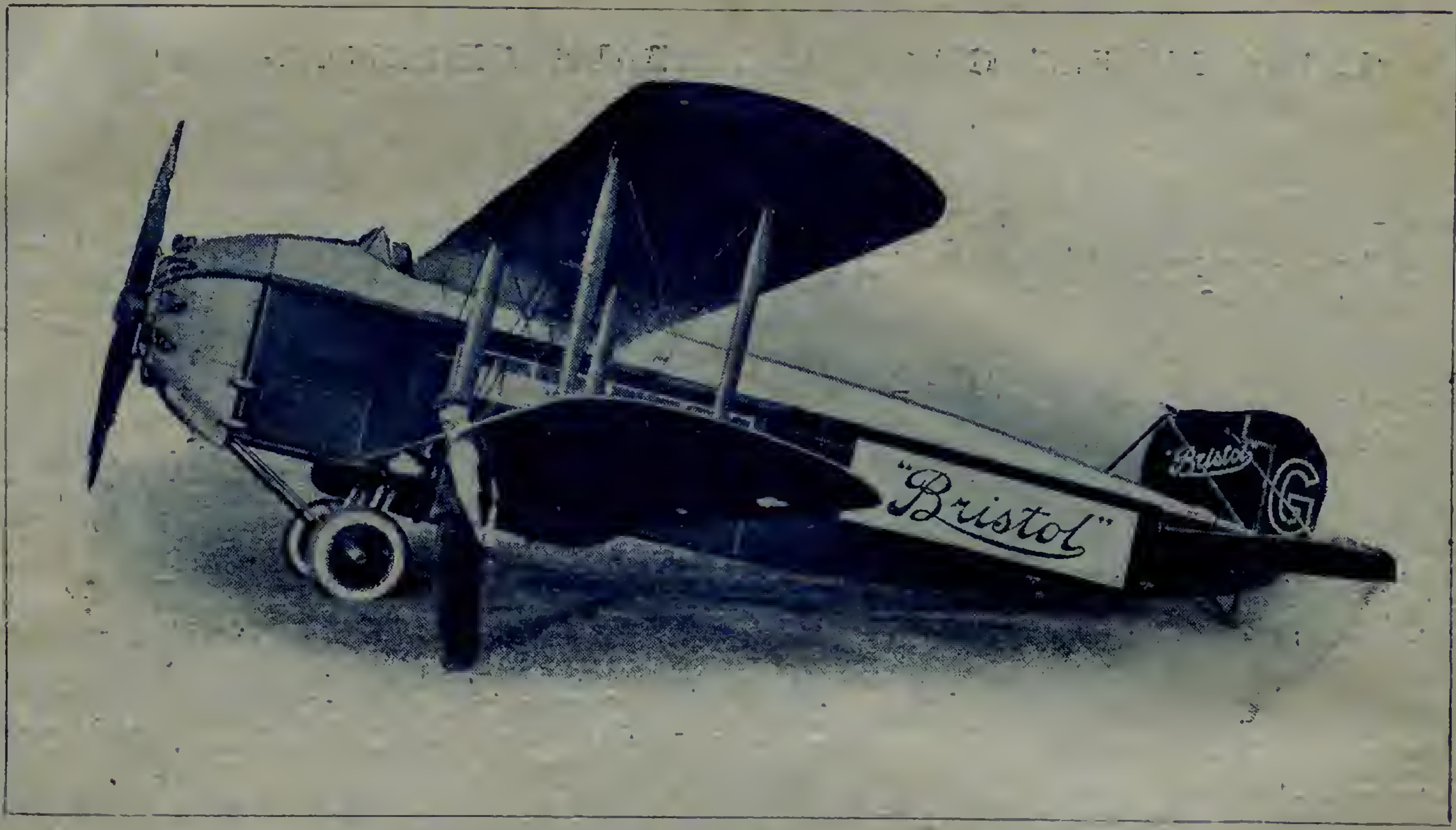

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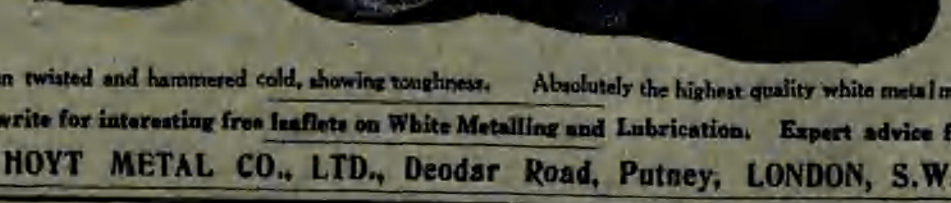

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

1922.	
Mar. 2	Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.
Mar. 16	Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.
Mar. 26–April 2	Nice Meeting
Mar. 30	Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.
Mar. 31	Lecture, "Aircraft Design" by F. P. Folland, before I.Ae.E.
April 17	R.Ae.C. Race Meeting, at Waddon
June 1	Entries close for Schneider Cup Race
June 5	R.Ae.C. Race Meeting, at Waddon
July 6–20	French Gliding Competition
Aug. 6	Gordon-Bennett Balloon Race, Geneva
Aug. 7	R.Ae.C. Race Meeting, at Waddon
Aug. (last fortnight)	Schneider Cup Seaplane Race, at Naples
Sept.	Tyrrhenian Cup, Italy
Sept.	Italian Grand Prix
Sept. or Oct.	R.Ae.C. Race Meeting, at Waddon
Sept. 22 ...	Coupe Deutsche (300 kil.)

EDITORIAL COMMENT

The Wreck of the "Roma"

MISFORTUNE appears to have been dogging the footsteps of airships during the last year or so. First came the accident to R.38, involving a heavy loss of life, and now the wreck of the semi-rigid airship "Roma" purchased from Italy by the United States Army. It is a curious coincidence that the report of the Accidents Investigation Sub-Committee should be issued almost simultaneously with the sad accident to the "Roma," which resulted in further increasing the death-roll of those whose pioneer work is paving the air-way for future generations. To the American Nation, no less than to the relatives of those who perished, our sympathy goes out in their sad bereavement. The loss of R.38 and her gallant crew, in which America shared, is still so fresh in mind that the wreck of the "Roma" is felt all the more keenly. Both calamities occurred at a time when the fate of airships was in the balance, and as far as this country is concerned it is to be feared that the loss of R.38 has not helped to make the exploitation of airships any the easier, for the time being at any rate. In America also, voices are not wanting which are crying "Enough," although these are silenced by plans which appear to be maturing to thoroughly test airships commercially in the United States. Moreover, it would appear as if both calamities might have been avoided.

Details relating to the cause of the accident to the "Roma" are still lacking, but from such reports as have reached this side it seems that the primary cause was the failure of the elevators, followed by a nose dive, which brought the airship into contact with some high-tension electric leads which, on breaking, set the hydrogen on fire. It appears reasonable to suppose that but for this fact the crew might have been saved, as the crash of the airship on the ground would probably not have set it on fire, or not, at any rate, until the crew would have had time to get clear.

Surprise has been expressed that the airship should dive into the ground when the tail broke. While at first this fact may appear somewhat surprising, a few moments' consideration will show that it was quite a natural sequel to the breaking of the tail. According to reports, the airship was proceeding at a good speed and at a comparatively low altitude, variously given as 1,000 and 1,500 ft. As the airship itself is approximately 400 ft. long, it will be seen that its height above the ground was not more than four lengths at the most, and that consequently the momentum of the airship would carry it on, especially as there may have been some slight delay in stopping the engines.

It is to be observed that the breaking of the R.38 also took place at a relatively low altitude, and that it is stated in the report that, as the forces are proportionate to the air density, the latter ship was not strong enough to withstand the stresses set up at high speeds and low altitude. If the "Roma" had been at 2,000 to 3,000 ft. at the time the tail broke the ship might probably have been saved, as it now seems fairly well established that she did not catch fire until striking the electric wires.

A further point of similarity between the two accidents is that both were, directly or indirectly, due to the forces on the tail. In the case of the "Roma" the tail gave way, while in R.38 the tail pressures resulted in breaking the longitudinal girders. In other words, both accidents were due to aerodynamic forces set up during manœuvres and not to any weakness existing when regarded statically. One is forced to the opinion that both accidents point to an urgent need for further research, both in the wind tunnels, on models, and on full-size airships in flight. It is known that all streamline shapes are unstable to a greater or smaller extent, and that an airship requires a good deal of control in order to keep her on any given course. While model experiments can, and do, give a great deal of information, full-scale research is also required, and it seems to us that, as the problems involved refer largely to first principles, it might well be worth while for the various nations to try to co-ordinate their research on subjects connected with airships. Otherwise there is bound to be a good deal of overlapping and duplication of work. We fully realise the difficulties, but with good will they should not be insurmountable. There is little doubt that, if some agreement could be reached as to which experiments each of the larger nations should undertake, much valuable time might be saved, and the rate of progress, which is otherwise bound to be slow, would be considerably accelerated.

◆ ◆ ◆

The Report on R.38

The Report of the Accidents Investigation Sub-Committee into the details which led to the accident to R.38 was issued during this week, and a brief *résumé* of the conclusions of the Committee is published elsewhere in this issue. Several facts emerge from the report. To begin with, it appears to be established that the accident was undoubtedly due to faulty design, and not, as has been maintained in some quarters, to manœuvres being undertaken which were really outside the scope of the tests. In fact, the use of rudders and elevators does not appear to have been other than what might have been necessary during a straight forward flight in bad weather.

The fundamental cause of the disaster appears to have been the failure of the designers to have taken into consideration stresses due to aerodynamic forces, as distinct from static forces. Judged on a basis of static forces R.38 was fairly strong, apparently, the weights being well distributed. And yet we are told that information existed which would have thrown grave doubt on the structure. Indeed, in the case of R.29 calculations as to the aerodynamic forces had been made, but they showed such a large resultant bending moment that, in the opinion of the designing staff, such a basis of design was precluded by considerations of weight. R.29 was then designed to factors of safety based on static stresses, and, as she showd no signs of failure, it was concluded that it was safe to design on a static basis, and the model results, uncorroborated as they were by full-scale experiments, were not thought to be reliable enough to be considered.

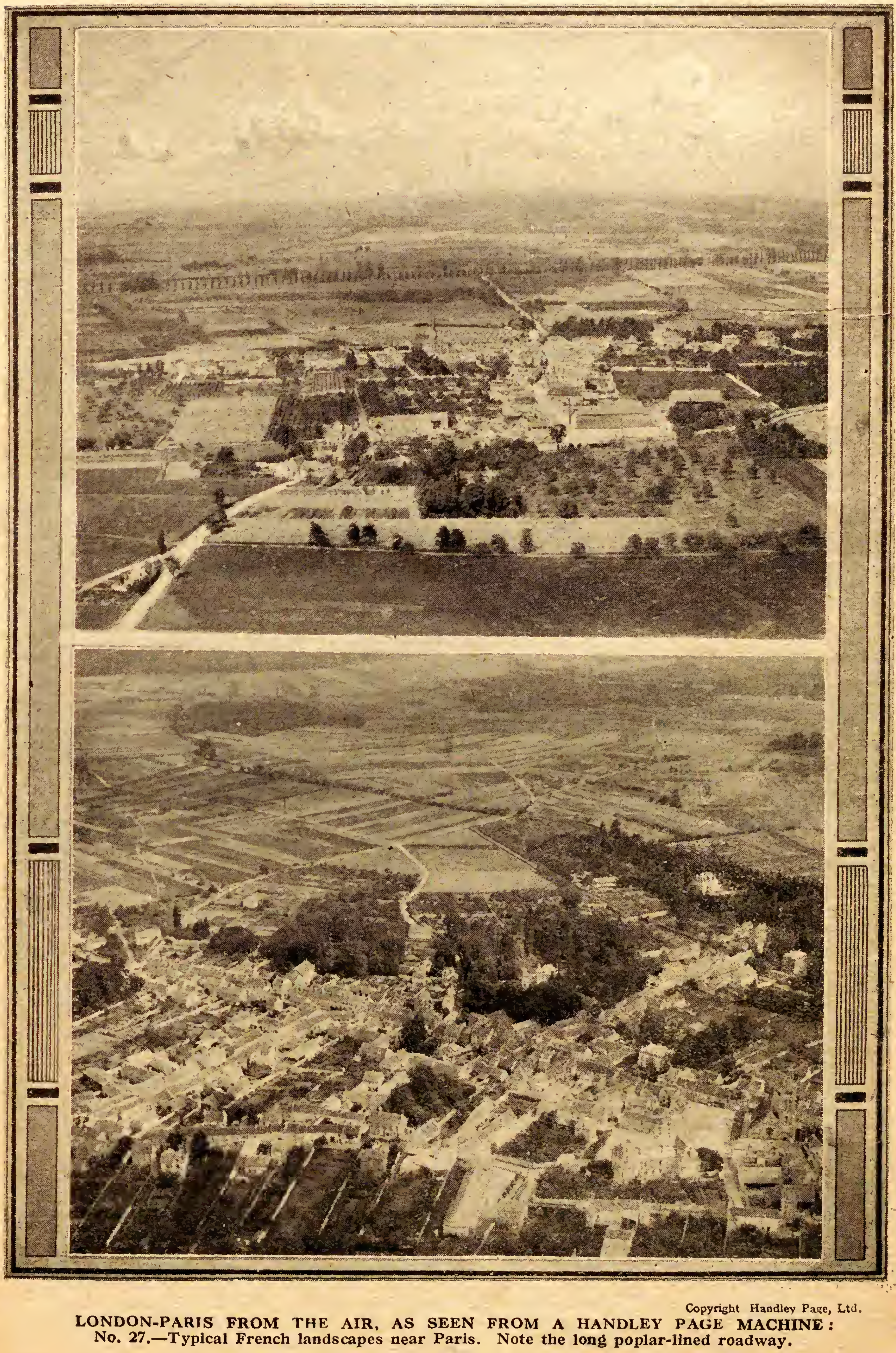
Certain sections of the report throw a striking sidelight on the way in which, under the name of economy, we have neglected to carry out experiments which would in all probability have furnished data that would have convinced the designers of R.38, and thus might have saved the many gallant lives whose value cannot be assessed in mere pounds, shillings and pence, not to mention a very valuable ship. For instance, in para. 21 of the Report it is stated that "For some time prior to the trials of the ship the design staff of R.38 had pressed for full-scale experiments which would determine the aerodynamic forces acting on the hull of an airship and on its fins and control surfaces, and had fitted the necessary apparatus into R.32, with a view to making a series of such tests. Owing to the early deletion of the ship, only incomplete observations were possible, but these showed unexpectedly high fin pressures. Apparatus for the same purpose was also fitted into R.33, but the ship was put out of commission before the tests were begun."

Comment is, we think, superfluous. Research is needed, both model and full-scale, and the existing ships could be utilised for experiments which would be of the greatest value in future design. In this manner we should be able, in the long run, to consider that we had got value for money expended. If they are allowed to "rot in their sheds," the money must be written off as a dead loss. We are a nation of shopkeepers, to be sure, but even from that not very exalted point of view the idea of making some use of the ships should appeal to us more than writing them off, even if we do have Ministers of the Crown suggesting that we should sit down with our hands in our lap for the next ten years or so.

◆ ◆ ◆

The Air Conference

Last week it became necessary for us to hold over the paper read before the Air Conference by Major Scott, and the discussions which took place during the afternoon session of the second day of the Conference. In the present issue these are published, and thus we close our review of an event which should have considerable effect in letting the man in the street, the business-man, the financier—in short, all who are not intimately connected with aviation—know the present position of aviation, what it has to offer, and at what price. That, as we see it, is the object of the Air Conference. It may be admitted that this object was not attained this year. The papers read were too long and too technical. Next year let us stick to matters of policy, matters of national and international interest, but for heaven's sake let us present a more united front to the outside world than we did in the Guildhall recently. The impression left on the non-technical section of the audience must have been that the aviation world does not know what it can do and cannot do, nor how much it will cost to do it.



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LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE:
No. 27.—Typical French landscapes near Paris. Note the long poplar-lined roadway.

THE AIR CONFERENCE, 1922

(*Concluded.*)

AIRSHIPS

By Major G. H. SCOTT, C.B.E., A.F.C., A.M.I.M.E.

MAJOR SCOTT's paper on airships was mainly a *résumé* of the present position of airships throughout the world, and much of the paper dealt with matters which are already well-known to readers of this journal. This is not in any way meant as a criticism of the paper. On the contrary, it was eminently fitting that our leading airship pilot (and one of our foremost airship experts) should place before an assembly such as the Air Conference the facts relating to the airship position, and without being too technical Major Scott managed to do so in a most admirable manner. If there was any fault at all to find with his paper it was in understating rather than overstating the case for airships. He chose to err, if error it was, on the conservative side. It may, therefore, be accepted that every statement made and every claim put forward by him can be substantiated now, without introducing any element of speculation.

In his introduction Major Scott expressed the view that, if a move is not made now, one will be forced upon us within the next couple of years, and he proceeded to explain the reasons which led him to that conclusion. In America the U.S. Navy Department have arranged with the Allies for the construction of a Zeppelin airship for America as part of America's share of aerial reparations. This ship, Major Scott stated, will embody the latest features of airship design and should be flying within 12 months. The U.S. Navy Department is also building in America the Z.R.1, modelled on a German airship, and the U.S. Army has recently purchased the Italian semi-rigid airship "Roma," which is the largest semi-rigid ship in the world. In addition to the purchase of airships, America is establishing large and elaborate airship bases, and a powerful commercial combine has in view the running of commercial airship services, trans-Continental at first, with the trans-Atlantic service as a later development.

In France there is also considerable airship activity. Three surrendered airship sheds are being re-erected, one near Paris, one near Marseilles, and one in Algiers.

Italy recently constructed a 1¼ million cubic ft. semi-rigid, which, as already stated, has been sold to America. They are now engaged on building a still larger airship of similar type, which will have a range of about 4,000 to 5,000 miles. Italy also has under consideration a commercial airship service from Rome to her North African colony Tripoli.

Germany has in various ways managed to keep her technical airship staffs together, and they are still in a position to design and construct airships. An arrangement is now being completed between Spanish commercial interests and the Zeppelin company to establish an airship service between Spain and the Argentine. This latest move was regarded by Major Scott as one which may well turn out to be of far-reaching importance, and may even result in giving Germany a commanding position in the airship world.

As regards Imperial air services, Major Scott pointed out that the work between main terminals in each country can only be carried out by airships, the terminals being fed by aeroplane branch lines.

On the technical side the lecturer stated that it can be affirmed with certainty that an airship can be built today whose performance in all directions can be established beforehand, and which will not introduce any experimental and untried features. The type of airship which Major Scott would suggest as suitable would have a capacity of 2,500,000 cubic ft., giving a gross lift of 75 tons and a useful lift for freight of 12 tons for non-stop journeys of 2,000 to 2,500 miles. This would enable 35 passengers and 7 tons of mail and other goods to be carried, without an intermediate stop, from England to Egypt. A journey of this distance could be completed in 50 hours, or at a speed made good of 50 m.p.h. The hull would be of a rugged construction, built for a long life and low maintenance cost, and should last in continuous service for at least five years. The airship would be built with a factor of safety at least equal to that of R.33 and R.34, which showed themselves capable of standing up to the worst weather conditions both in flight and at the mooring mast.

Major Scott stated that during the last year he had made a very careful study of the weather charts covering the route to India, and he had come to the conclusion that the leg of the route from England to Egypt could be run with a regularity comparable with that of steamships, and the distance covered regularly in 50 hours. There is no reason to doubt that an equal regularity could be maintained between Egypt and India. Allowing a stop of half a day in Egypt, India would be reached in 4½ to 5 days, giving a time-saving of approximately 10 days, or 66⅔ per cent. over existing means of transport. The last stage of the route, from India to Australia, is somewhat more uncertain, and the lecturer did not feel justified, with the limited meteorological data at present available, in assuming the same regularity over this portion of the route, although he thought there is absolutely no reason to doubt that this stage could be flown. Even with the service terminating in India, the saving in time to Australia would amount to about 33⅓ per cent. over the fastest steamship times.

The lecturer then turned his attention to a more detailed reference to the various parts of an airship. A 2½ million cubic ft. hull could be built without introducing any experimental feature. By employing the German way of attaching the goldbeaters' skin to the fabric of the gas bags, using a gelatine glue instead of the rubber solution which we have been employing for the purpose, gas bags can be made which will give satisfactory results under all climatic conditions. Major Scott stated that as yet no British engine designed specially for airship work has been developed, and referred to the German Maybach, which has given most satisfactory results. He thought that a probable development in the near future will be the introduction of heavy-oil engines, which would tend to reduce running costs.

Under the heading of safety the lecturer stated that there are two dangers—fire and weather conditions. The fire danger falls into two classes—danger due to petrol and danger due to hydrogen. Of the two the petrol danger is the more serious. The introduction of the heavy-oil engine would almost entirely remove this danger. Regarding the danger due to hydrogen, Major Scott stated that in all cases of fire in an airship, excepting those due to enemy action, the ignition of the hydrogen had been a secondary cause only.

Although it is generally imagined that an airship is in considerable danger from lightning, Major Scott pointed out that this is not the case, and that the danger is due to the violent air currents obtaining under such weather conditions. Even with present meteorological organisation, it is, however, comparatively easy to avoid thunderstorms, he said. Snow may constitute a danger if it collects on the airship, but by rising about 1,000 ft. above the level where damp snow or sleet are met with the airship will get into dry snow, which blows off and does not collect.

The results of experiments made with mast-mooring were summarised by Major Scott as follows: (1) the airship can remain at a mooring mast comfortably in winds up to 60 m.p.h., riding through hail and snow squalls; (2) it can leave the mast in a 40 m.p.h. wind; (3) it can land at a mast in winds up to 32 m.p.h.; (4) necessary running repairs can be undertaken with safety at the mast.

In the foregoing estimates of performance, etc., Major Scott pointed out that he had not taken into consideration any future developments. One of the more important of these, and which is now in sight, is the utilisation of waste hydrogen as fuel. Experiments indicate that by this means a considerable economy in fuel may be expected, the direct result of which will be to increase the commercial load of the 2½ million cubic ft. airship by something in the order of 40 per cent. over a 2,000 or 2,500 mile journey.

Finally Major Scott gave his views on the value of the airship for Imperial defence. Although admitting that during the War the airship was largely immobile, Major Scott stated that with the development of the mooring mast this is no longer so, and that therefore concentration at any point would be secured at a maximum of speed. The lecturer admitted the vulnerability of the airship from the military point of view, but referred to this being diminished or eliminated by the use of helium or by the use of an outer envelope of non-inflammable gas. Even the present limitation due to vulnerability, Major Scott maintained, will only apply when an airship is operating over waters controlled by the enemy. Over the large sea areas and along the main trade routes, attack by enemy heavier-than-air craft will necessitate the use of aircraft carriers, and if the enemy does not control these waters, his aircraft carriers will not be able to operate with any hope of success. Also Major Scott thought that the airship would provide a good gun-platform with heavier armament than the attacking aeroplane would possess, and should therefore be able to give a good account of itself.

In conclusion Major Scott pointed out that the reason for the comparative failure of the airship in the War was due to the absence of mooring masts, and he pleaded for the establishment of the necessary ground organisation in the Dominions and India, justifying his plea as follows: "The establishment of the necessary ground organisation in the Dominions and India is, therefore, of primary importance not only to improve Imperial communications and to develop commercial possibilities, but in no less degree to utilise the airship to the utmost for Imperial defence. The erection of these bases for an Imperial airship service, to repeat the point in another way, would immediately make the airship of considerable value for Service purposes, and, conversely, the establishment of bases for Service airships would also be of great assistance in furthering commercial airship projects."

THE DISCUSSIONS

THE afternoon session of the second day of the Air Conference was devoted to a discussion of the technical papers read during the afternoon session of the first day. Lord Weir was in the chair, and asked Capt. Geoffrey de Havilland to open the discussion.

Capt. de Havilland agreed with Major Green that the duplication of stressed parts was of great importance. The danger from fire, he thought, can be eliminated by suitable placing of the tanks, careful design of petrol leads, and the use of fireproof bulkheads. From the point of view of the comfort of passengers the elimination of noise was important. As regards the question of single-engine *versus* multi-engine machines, he was of the opinion that the single-engined machine had proved at least as safe and reliable as the twin-engined. He could not quite agree that at present the all-metal machine was practical, and thought the time for it had not yet arrived. The life of a wood machine was, he said, longer than generally believed, and wood had the advantage that for experimental work it afforded cheapness of construction. The life of a wooden machine could, he thought, be tested very cheaply, and it might be useful to carry out such tests. It was sometimes claimed that the fabric-covered wings got soggy, and that, in consequence, the machine lost its performance. He did not believe that this deterioration in performance was as serious as generally thought. Among the subjects for research and experiment he mentioned control at low speeds, and high-lift wings. One difficulty which firms encountered at present was that as soon as a machine was finished it was taken away from the constructor, and he thus got no opportunity of testing it thoroughly. He would plead for support from the Government to enable firms to do more full-scale flying tests.

Lieut.-Col. Mervyn O'Gorman disagreed with Lord Gorell on the question of technical qualifications. He did not think that it could ever be undesirable to possess technical qualifications, and pointed out how in the future firms who purchase their machines must have a man who understands the technical side if they are to get the best machines for their particular purpose. The designer must also know the user's point of view, and *vice versa*. In view of the enormous value of scientific knowledge, he would plead for making the training of cadets sufficiently technical.

Prof. L. Bairstow quoted the American National Advisory Committee recommendations for extensive research, and associated himself with the views therein expressed. With reference to Major Green's remarks relating to the application of model results to full-scale machines, he thought the reply would come from our Universities and from the mathematicians. As regards the lack of contact between designers and research, he associated himself with the views expressed by Col. O'Gorman. He referred to the progress made in applying research data to practical design, and maintained that today we should be surprised if a machine differed by as much as 10 m.p.h. from the performance predicted from model tests. Prof. Bairstow also regretted the present system of taking a machine away from a designer as soon as it was finished, and pointed out that this did not give the designer an opportunity to become thoroughly acquainted with its behaviour. He referred to the statement which too often appeared after an aeroplane crash, "that it was due to bad piloting and stalling of the machine." He thought this unfair to the pilots, as a machine was extraordinarily tricky to handle at low speeds, speeds somewhere near the stalling point. On the question of airships he associated himself with Major Scott in the opinion that a serviceable airship can be produced today which will not introduce any untried features in its design.

Prof. Burstall, of Birmingham University, said that with regard to aircraft he could speak of the engine only with authority. He thought that the petrol engine, as we know it today, had practically reached the limit of its development, and the next step appeared to be direct injection of the fuel. He had had a good deal of experience in this subject, and they had found that, working on the Diesel cycle, air injection was the most economical. The necessary apparatus was, however, too heavy for aircraft use, and the most promising form appeared to be solid injection. Here one was faced with the difficulty of getting the fuel properly atomised, and it had been found that engines could not be got to run at anything but relatively low speeds. What was really wanted, he thought, before we go to the expense of building engines, was more basic research on fuel injection. He mentioned some interesting experiments with photographing the spray as it entered the cylinder, and thought that work of this kind could teach us a great deal, while it would be very much cheaper than building complete experimental engines.

Sir Richard Glazebrook thought that the urgent need for and full importance of research was not realised in high quarters. He mentioned that a man engaged on research work, as apart from experimentation, should be left absolutely free to work at the times and in the manner which suited him. As regards Major Green's remarks on scale effect, he did not think that he (Major Green) quite realised all that had been done lately. With reference to safety, what was wanted was more research on stability, chiefly lateral, and circling flight. For this work both wind tunnel and full-scale work was needed. Research on the distribution of air pressure was also needed. Sir Richard then outlined the work of the N.P.L. for February. In the big channel: first, stability on models, then airscrew tests, then stability work, then tests on international models so as to find means of co-ordinating and obtaining agreement between the results obtained in the various countries' wind channels, then pressure distribution. With regard to airships, Sir Richard realised the need for economy, but he pointed out that the need for research on airships was very pressing. He said he was giving away no secrets if he stated that information existed which would have thrown grave doubts on the strength of R.38 had it been used, although it was not of a sufficiently conclusive nature to be entirely trusted by the designers. He agreed with Prof. Bairstow and Major Scott that a commercial airship could be built without introducing experimental features, but if a light airship such as R.38 was contemplated, then further research would be necessary before we could confidently approach the actual construction. He suggested that a sum, which need not be very large, be set aside for full-scale experiments on existing ships.

Mr. Alan Chorlton, of Beardmore's, said that at the last Air Conference he suggested a division of work. The neglect to do this had, he thought, been unfortunate, and he again suggested a better division. With regard to Major Green's difficulty in bringing into agreement the apparently opposing views on bearings, he thought that it would be found to be mainly a question of temperatures. On the question of engines, Mr. Chorlton pointed out the need for lightness, and said that we had had ample proof of the advantage of lightness. The light engine was the engine which had got all the business. For further improvement he thought we should attack the problem metallurgically rather than thermodynamically. He concluded by pointing out the desirability of getting the great industrial firms into closer touch with the Directorate of Research.

Prof. E. Melvill Jones, of Cambridge University, pointed out the danger of a widening of the gap between the scientific side of aeronautics and the flying people. He pleaded for a good technical training of officers, and also suggested that the Air Ministry should consider an arrangement for a small reserve, chosen from the Universities, to be given one or one and a half year's flying experience in the R.A.F. Much had been said about safety and regularity, yet he was surprised to find that such very valuable instruments as turn indicators were not fitted on the cross-Channel machines. He thought they certainly ought to be fitted. On the question of airships he said that it had been stated that there was no great future for aircraft except over long routes. It had also been said that the airship was the craft for long-distance flying routes. It seemed to him that logically the chain of argument was complete, and that it was in favour of airships. And yet we were just turning airships down. He suggested that, whatever happened, we should at any rate keep one or two ships for research. With regard to Capt. Guest's statement that it would be as cheap to wait some years and then make a fresh start, Prof. Jones pointed out that in that case we should have to rely entirely upon the experience gained by others, a procedure which, to put it on its highest plane, would seem to amount to brain-picking, and was scarcely dignified.

Mr. J. D. North said that he was left with the impression after hearing Capt. Guest speak that aviation was in a state of anæmia. After all he had heard by now, he was inclined to think it was indigestion, for which Gen. Brancker had that morning administered a strong dose of ginger. As regards metal construction of aircraft he would support Major Green. All-metal machines could now be built which were 10 per cent. lighter than wooden machines, and were no more expensive. Improvements were now in sight which would make the metal machine 25 per cent. lighter than the wood machine.

Mr. H. P. Folland was surprised that after three years of peace, machines were practically the same as when the War finished. He thought we should strike out along new lines, and expressed the opinion that with his large double triplane, which unfortunately came to a premature end, the Italian constructor Caproni was probably on the right track. He did not agree with either Capt. de Havilland or Mr. North, but thought that at present a machine should have its main members of steel and fairings and lightly-loaded members in wood. With reference to research, he referred to the helicopter experiments, and pointed out that before all else a helicopter engine must be reliable. He therefore thought it would be better to spend that money on engine experiments instead. He wanted comparative tests on bodies with water-cooled and air-cooled engines, air-cooled engines in pusher machines, etc. The present commercial types were really military machines with limousine bodies. With the system of designing machines to specifications in competition with other firms, a specification will produce almost identical machines from the different firms. He thought there was need for some international rules on landing speed, factors of safety, petrol systems, etc. At present foreign firms can fly with lower factors of safety, and thus effect a saving on structure weight which increases the commercial load. This is a handicap to British constructors.

Capt. G. R. Hill said that as regards safety the figure of ·000 something passenger killed per thousand carried conveyed nothing to him. He had recalculated the figure, and found that, by comparison, it was equivalent to 300 people being killed in the London tubes every day. The public were quite right in regarding flying as rather dangerous. Something would have to be done. Progress is being made, but only slowly. He had a scheme for providing aeroplanes with two engines, either of which would be sufficient to bring the machine home.

Major Hely Pounds was also one of those who were surprised at the statements made by Capt. Guest, and thought it extraordinary that a suggestion to disband our personnel and re-establish it again after a number of years should come from a minister of the Crown. As regards the lack of public interest, that was, he thought, merely a matter of window-dressing. Subsidies were justified if the public was benefited by the services for which the subsidies were being paid. As regards the supply of timber, he suggested that the authorities should get in touch with the Dominions so as to make full use of any suitable timbers that might be available. Now was the time to look into the matter, as it took about 40 years to grow a tree of sufficient size to be of real value.

Major Blake referred humorously to the time *not* saved by the air mail. What was wanted, he said, was a guaranteed load. There were many cross-country routes in the United Kingdom suitable for air services. The England to Ireland route was one. He thought that it would soon be possible to fly at night. With regard to the carriage of goods by air, he had recently had an offer of 6*d*. per pound. He did not quite understand how Capt. Hill arrived at his basis for 300 passengers killed on the tubes, as during the last six months on the cross-Channel services not a single passenger was killed or injured.

Mr. F. Handley Page said that as regards research and design he thought that the method of sending out specifications of what was wanted, as is done for military machines, should also be applied to commercial machines. In his opinion progress was likely to be along the lines of machines requiring less power to fly, and he pleaded for more competitions for civil machines. He agreed with Gen. Bagnall-Wild that if normally used at only a small percentage of their maximum power, aero engines would be found at least as reliable as car engines, and thought improvement would come with improvements in the machines themselves rather than in the engines. Major Green had referred to landing in small fields. This was mainly a question of the amount of control available.

Brig.-Gen. Sir Sefton Brancker said that he had a definite suggestion to make, namely, the desirability of stable commercial aeroplanes. With such machines we could fly in any weather. As regards the statement of the D. of R. in his paper that inherent stability would do away with the necessity for automatic stabilisers, he did not quite agree, as he thought that a stable machine had to move considerably before the righting forces came into play, whereas with automatic stabilisers the correction was applied before the machine had deviated perceptibly from its normal attitude. He was strongly in favour of metal construction, especially for work in the East, where metal construction was desirable, and metal airscrews almost a necessity. He again referred to the advantage of air-cooled engines, and said that a really reliable air-cooled engine was wanted. We should also have to abolish rubber, not only for petrol pipes, but for the tyres as well, he thought. On the subject of statistics, he was no more impressed by Capt. Hill's 300 corpses per day than he was by the ·0002 ones per thousand passengers carried.

Capt. Guest, Secretary of State for Air, said that he had come in for a good deal of criticism, but was not criticism the object of the Air Conference? It gave an opportunity for the thrashing out of views. He thought the thanks of the aviation world were due to all the many who had spent two days of strenuous attentiveness at the Guildhall, and assured his hearers that all the suggestions made would receive very serious consideration. He mentioned the fight for its existence which the Air Ministry had been through during the last four months. With regard to his pessimism as concerns European aviation, he said that what he had in mind was Imperial aviation in preference to European aviation. On the question of airships, he intended to keep a pivotal staff of airship experts against the time when we should be in a position to afford the building and running of airships. Finally he pointed out that there is not a man in the Air Ministry but what he is keen on aviation and a great believer in it. But when you are speaking to the A.M., he said, you are speaking to the converted. He wanted to see people outside the Air Ministry and aviation world interested in the subject.

Lord Weir, in closing the Air Conference, said he thought the assembly had two duties. One was to thank the Press for all it had done, and the other to thank the Lord Mayor for the loan of the Guildhall for the Conference.

* * *

Official Opening of the R.A.F. Club

On Friday of last week the Duke of York, accompanied by Wing-Comdr. Louis Greig, officially opened the Royal Air Force Club. He was received by Brig.-Gen. R. H. More, the chairman, Lord Cowdray, Air-Marshal Sir Hugh Trenchard and members of the committee.

The Duke made a tour of inspection of the new premises, including the kitchens, the rackets courts and the ball-room, and at the conclusion of the inspection Lord Cowdray handed to his Royal Highness a box containing the deed of gift of the Club, which Lord Cowdray has presented to the R.A.F. After declaring the Club open, the Duke handed the deed to General More, representing the trustees, and on behalf of the officers of the Force expressed their great appreciation of Lord Cowdray's generosity.

French Air Mail Fees Cut in Half

As from Wednesday of this week, the surtax in France on letters sent by air mail from Paris to London has been reduced from 50 centimes to 25. Good!

An Air Service in Queensland

Arrangements are reported from Queensland for the opening of an air service between Cloncurry and Charleville, a distance of 570 miles, with a 250 miles extension to Mungindi, a railhead on the New South Wales border. Both passengers and mails are to be carried.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

EASTER AVIATION MEETING

THE Royal Aero Club will hold an Aeroplane Race Meeting at Waddon Aerodrome, Croydon, on Easter Monday, April 17, 1922. The programme of events includes the following Races:—

Club Handicap.—For machines "Avro" type, engine power not to exceed 150 h.p.

Distance approximately 24 miles.

Entrant of the Winner will receive £20. If five starters, the second will receive £10.

Second Waddon Handicap.—For machines with a speed of not less than 100 m.p.h.

Distance approximately 32 miles.

Entrant of the Winner will receive £20. If five starters, the second will receive £10.

Second Croydon Handicap.—For machines with a speed of less than 100 m.p.h.

Distance approximately 24 miles.

Entrant of the Winner will receive £20. If five starters, the second will receive £10.

First Spring Handicap.—For machines occupying the first three places in the Waddon and Croydon Handicaps.

Distance approximately 32 miles.

Entrant of the Winner will receive £40. If five starters, the second will receive £20.

In addition to these events there will be a Balloon Sniping Competition open to Members of the Royal Aero Club, and a parachute descent.

The entry fee for each of the Handicap Races is £1. This fee, together with entry form, must reach the Royal Aero Club, 3, Clifford Street, London, W. 1, not later than 5 p.m. on Friday, April 7, 1922.

Club Flying Machines.—The following Club flying machines are available for the Races:—

B.E.*2e* (Two-seater) 90 h.p. R.A.F.
Avro (Two-seater) 110 h.p. Le Rhone.
Avro (Two-seater) 110 h.p. Le Rhone.
Avro (Two-seater) 110 h.p. Le Rhone.

Qualified pilots wishing to take part in the Races may hire any of these machines from the Royal Aero Club at £3 for each event, which will include cost of petrol and oil and insurance of machine.

Applications for the hire of these machines should be made direct to the Secretary of the Club.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

NOTICES TO AIRMEN

Spain: Cuatro Vientos Aerial Lighthouse

THE following details have been received regarding an aerial lighthouse which has been installed at Cuatro Vientos aerodrome, Madrid

The lighthouse is situated on a cylindrical tower erected on a stone building near the south-west corner of the aerodrome buildings, at a height of 25 m. (82 ft.) above the aerodrome level.

The illuminant is acetylene gas, and the light emits between 4,000 and 5,000 c.p., concentrated in a beam 4° above the horizontal, and visible for 25 kms. (15 miles approximately). The characteristics are the Morse letters H T I, with equal intervals between the letters so that they may be read in any order, as follows:—

Four flashes of ½ sec. each; eclipse of 2 secs.; one flash of 3 secs.; eclipse of 2 secs.; two flashes of ½ sec. each; eclipse of 2 secs.

The light is put into operation only when machines are expected. Pilots who intend to make a night landing at Cuatro Vientos should, therefore, give due notice to the Commandant of the aerodrome.

(No. 19 of 1922.)

Belgium: Erection of Wireless Masts at Ostend Aerodrome

THREE wireless masts, 12 m. (40 ft.) in height, have been erected in the north-east corner of the Ostend aerodrome.

These masts are marked by day by two red flags, and by night and in fog by two red lights.

(No. 20 of 1922.)

France: Aerial Lighthouses, Etc.

PREVIOUS Notices to Airmen relating to France are amplified and amended in regard to

1. *Aerial Lighthouses* at (i) Strasbourg (Neuhof); (ii) Valenciennes; (iii) Le Bourget, St. Inglevert, Lyons (Le Bron), Nimes, Bordeaux (Teynac).

2. Emergency landing-grounds at Carcassonne (Salvaza) and Orleans (Saran). (No. 21 of 1922.)

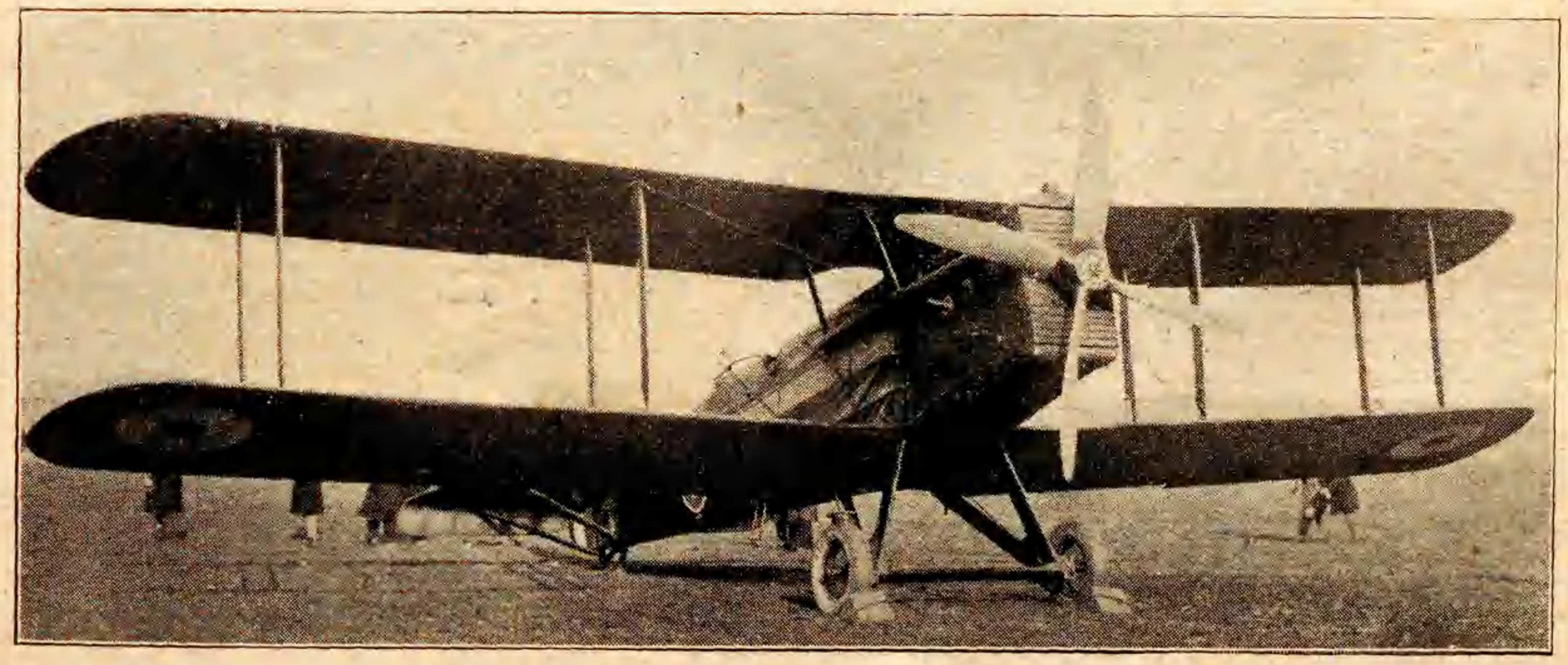
Aerodromes for Civil Use: Amendments.

NOTICE to Airmen No. 1 of 1922 (Consolidated List of Aerodromes) is amended as follows:—

LIST C.—LICENSED CIVIL AERODROMES.

The following should be deleted:—Portobello, Craigentinny; Radcliffe, Lancs. (No. 22 of 1922.)

◆ ◆ ◆ ◆



THE D.H. 14 DAY-BOMBER ROLLS-ROYCE "CONDOR" ENGINE: A description and scale drawings of this machine were published in our issue of January 13, 1921. The machine paid a visit to Croydon on the day of the Air Conference.

LONDON TERMINAL AERODROME

Monday Evening, February 27, 1922.

UNABATED activity prevails in the erection of new offices. Grands Express have got the roof on their new waiting-room, and the Daimler Hire offices are rapidly taking shape. In the Instone Air Line's premises interior work is being hurried forward, now that the outside is finished and receiving its final coat of varnish.

The Bristol 10-seater made its maiden trip to Paris on Saturday with five passengers and a heavy load of parcels and mail. Mr. Olley was the pilot, and, owing to the strong wind, which reached gale force at times, the journey occupied 3 hours 25 minutes. In spite of this, and the bad "bumps," the passengers were very pleased with their journey, and spoke highly of the comfort of the machine. This machine is, of course, operated by the Handley Page Transport.

Mr. Cogni informs me that the Handley Page torpedo-carrier was successfully tested at Cricklewood yesterday, and further tests have been made today. Mr. Wilcockson, who piloted this machine, is, I understand, very pleased with it.

Business on the "airways" is becoming quite brisk, and Handley Page Transport are getting as much traffic as, at present, they are able to cope with. They are looking forward to the time when they will have the four new W.8.b's., with Rolls-Royce engines, which are now building at Cricklewood.

A Fleet of Vickers "Vulcans"

THE Instone Air Line are, I understand, to have a fleet of new machines built by Vickers, which are to be known as the Vickers "Vulcans." These will be of two distinct kinds, one equipped for goods only, and the other for passengers.

Mr. Didier tells me that the S.N.E.T.A. are opening up the London–Brussels service again on April 1, and will have a fleet of half-a-dozen "Goliaths" with Maybach engines. The "Goliath" is, apparently, appealing to the foreign firms. With the exception of the Napier-engined Vickers "Vimy," the entire fleet of the Grands Express—some twelve in number—consists of "Goliaths." The Messageries Aériennes have also bought some "Goliaths" which are to be fitted with Renault engines; and now comes the news that the Belgians are to run "Goliaths." It is probable that there will be more "Goliaths" than any other type of 'plane on the continental "airways" this year.

The Messageries Aériennes' "Goliath," fitted with the Aveline stability device, has been making demonstration flights at Croydon again this week. On one occasion representatives from the Air Ministry went for a flight, and were much interested and impressed by the steadiness of the aeroplane when controlled by this "mechanical brain."

Still talking of "Goliaths," the Grands Express have now named their machines. "Londres," "Paris" and "Verdun" have all been seen at Croydon this week.

An "Air Special's" Struggle with the Wind

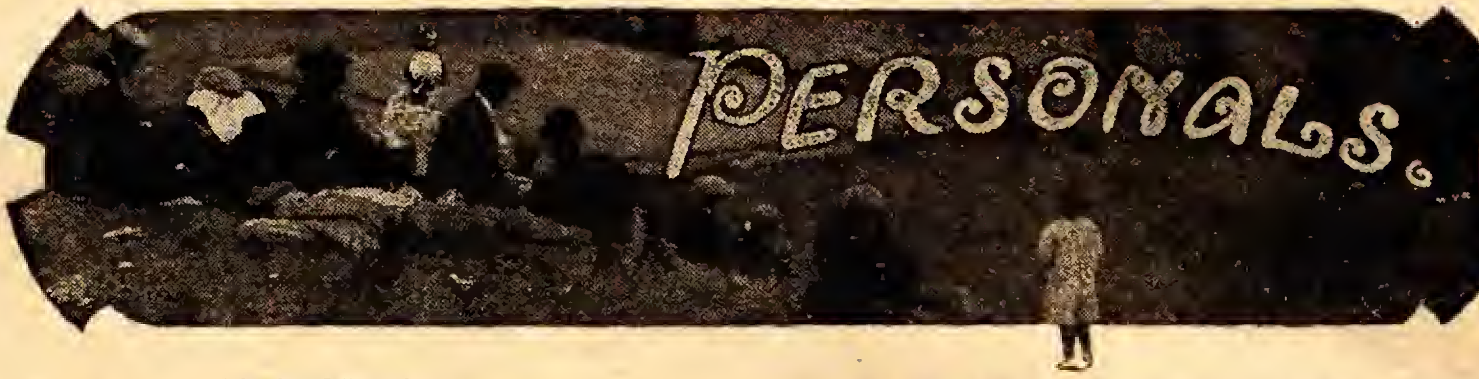
A SPECIAL F.2 left Amsterdam for Croydon on Saturday with Mr. Duke as pilot. There was a very strong head-wind. In fact, at the height the monoplane was flying, it would be somewhere in the region of 50 miles-an-hour, and Mr. Duke was four hours flying from Amsterdam to Lympne—where he was forced to stay the night owing to darkness.

He left for Croydon on Sunday morning, and again had a stiff head-wind, taking 50 minutes to do the journey.

After arriving at Croydon, and while "taxying" the monoplane round to the sheds, a sudden gust of wind caught the machine and tipped it over on its nose, the wing being rather badly damaged.

The new weather display board is now in full working order, and is a distinct improvement on the old idea, the reports being easy to read, while they give a better idea of the general weather.

Further details of the unfortunate ending to Mr. Alan J. Cobham's air-taxi tour of Europe and northern Africa are now to hand. After flying for nearly 7,000 miles on the same D.H.9, and with the same "Puma" engine—acting as his own mechanic and landing in all sorts of unknown places—Mr. Cobham was approaching Venice at a low altitude in foggy weather, and was actually in sight of the aerodrome, with which he was familiar, when a dense fog-bank, accompanied by drizzle and rain, dropped suddenly on the machine and blotted everything out. About 100 yards ahead was a stone embankment, while high trees surrounded the aerodrome. There were ships and buoys in the harbour, and high piles out at sea, but, just as the fog dropped, Mr. Cobham noticed that the sea was clear for a few hundred yards on his right. Turning to the right, and seeing nothing at all, Mr. Cobham flattened out and "felt his way" down on to the water, making a successful "landing." All the baggage was lifted on to the top plane, and the passenger and pilot then clambered up beside it, and quietly waited for a boat to take them off.



PERSONALS.

To be Married

A marriage has been arranged, and will shortly take place, between Flying Officer DENYS A. COX, R.A.F., seventh son of the Rev. W. E. Cox and Mrs. Cox, of Bishopsteignton, and JANE, elder daughter of the late Major JOHN HALL BROWN, of Ceylon, and Mrs. Hall Brown, of Bishopsteignton.

The engagement is announced in Shanghai of Capt. REGINALD E. GREENSMITH, R.A.F., son of Mr. George Greensmith and Mrs. Greensmith, of 155, Sloane Street, S.W. 1, and LUCY, youngest daughter of Mr. THOMAS CRAVEN and Mrs. CRAVEN, of Shanghai.

The engagement is announced of V. TOPPING, M.Sc., Lieut. R.A.F., of Toronto, and AGNES HELEN, eldest daughter of the late ARTHUR F. WHITE and Mrs. WHITE, Cookham Dene, Chislehurst.

Killed

FREDERICK JOHN ORTWEILER, M.C., B.A., who died at Madrid on February 14 as the result of a flying accident, aged 23, was the eldest son of Mr. and Mrs. S. ORTWEILER, 13, Cavendish Road, Brondesbury. Date of interment will be announced later.

Item

Air Vice-Marshal Sir E. L. ELLINGTON left London on February 23 for Marseilles, there to join the S.S. *Kaisar-i-Hind* for Port Said.

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Death of Levavasseur

IT is with sincere regret that we have to announce this week the death, on February 23, of Monsieur Levavasseur at the age of 58, after a brief illness. M. Levavasseur was interested in aviation from the earliest days, and it was his designing genius which created the beautiful Antoinette monoplane with Antoinette engine on which the late M. Latham won fame in and after 1907. Recently M. Levavasseur came prominently before the public in connection with his variable area aeroplane, which was acquired by the French Government. It is stated that, like so many pioneers, M. Levavasseur died a poor man, having spent his whole fortune on experiments in connection with flying.

Honours

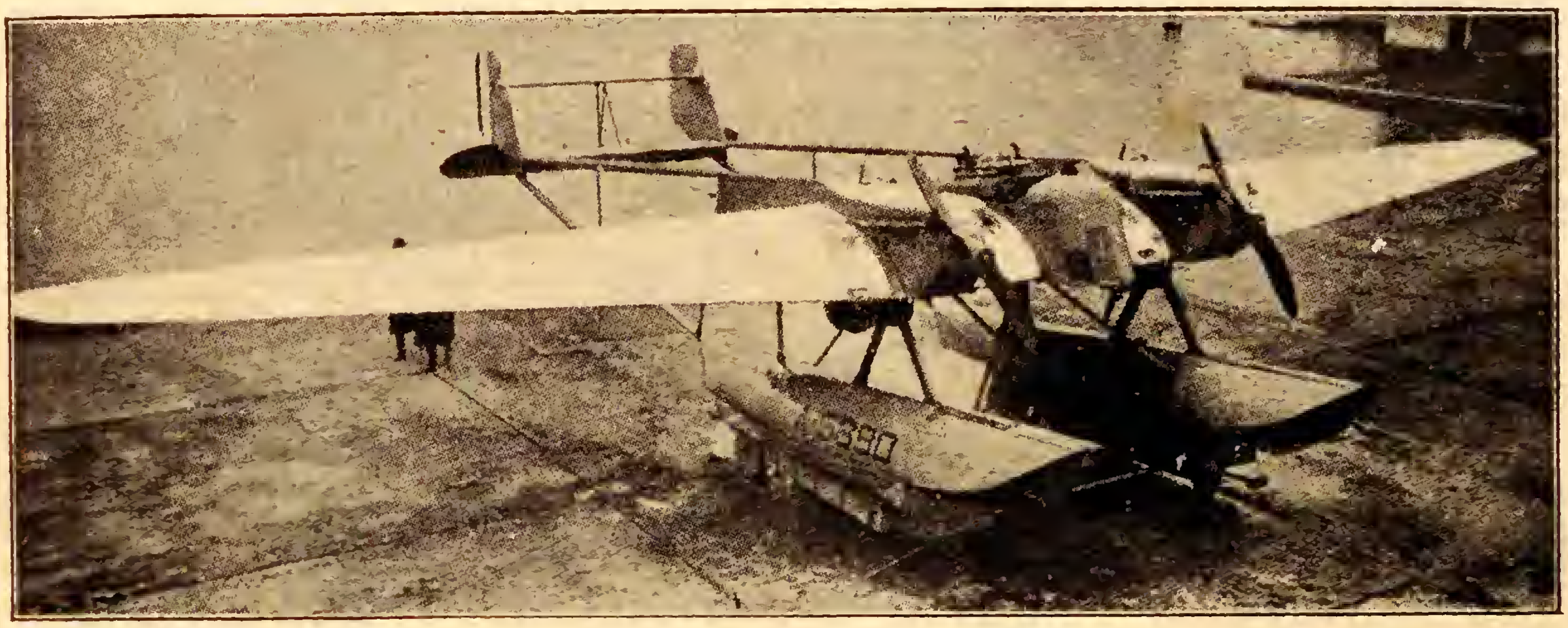
IN the *London Gazette* of February 21, the Air Ministry announces that H.M. the King has granted unrestricted permission for the wearing of the undermentioned decoration conferred by the King of Italy on the following officer for valuable service in connection with the War:—

The Order of the Crown (*Officer*):—Maj. G. de Lacy Wooldridge, O.B.E.

THE CURTISS TWIN-ENGINED TORPEDO SEAPLANE

A Cantilever Monoplane of Novel Design

The Curtiss Aeroplane and Motor Corporation of Garden City, L.I., U.S.A., has just completed a very interesting type of torpedo 'plane known as the Curtiss C.T. Through the courtesy of our American contemporary *Aviation*, we are able to give our readers the following brief particulars and illustrations of this machine. It is, perhaps, one of the most advanced designs yet produced in the " States," and, judging from general appearances, it certainly seems to be a " business proposition."



THE CURTISS C.T. TWIN-ENGINED TORPEDO SEAPLANE : Three-quarter front view showing how the tail is carried by outrigger tail booms.

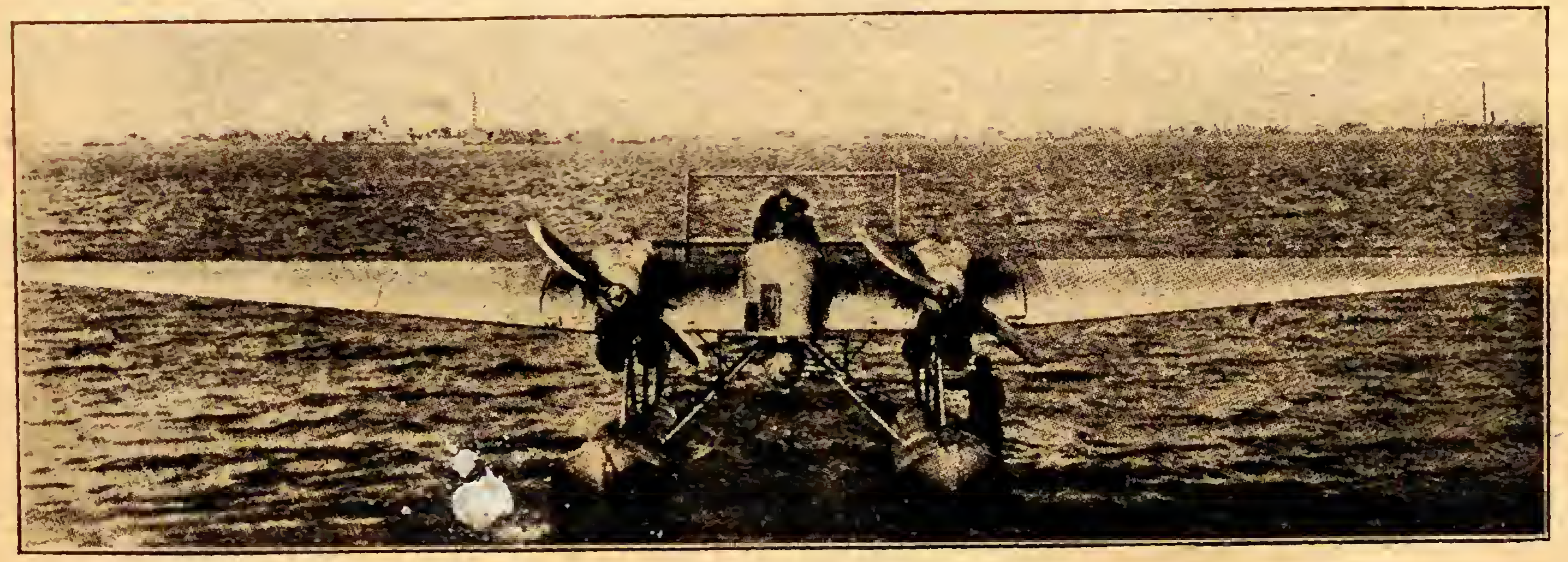
This machine has been built for the U.S. Navy, and was developed by the engineers of the Curtiss Co. working under the supervision of the Naval Bureau of Aeronautics. The problem before the designers was to develop a machine large enough to carry a full-size torpedo, yet be able to manœuvre quickly and accurately around a hostile fleet, and find without detection the proper position for launching the torpedo. Unlike the big bombing 'planes, which drop their bombs from a great height, when they are more or less free from anti-aircraft fire, the torpedo 'plane must deliver its projectile from within a few feet of surface of the water. Therefore, it is essential that the machine be as inconspicuous as possible, and in this respect it is claimed for the C.T. seaplane that, owing to its distinctive design, it more nearly meets these requirements than most other aircraft, for at a distance of about two miles it is said to be practically invisible.

The Curtiss C.T. is a cantilever monoplane with its two engines mounted practically in the wings. These engines, which are Curtiss C.D. 12 of 385 h.p. each (described in Flight for Jan. 5 last), are installed in small *nacelles* projecting forward but slightly beyond the leading edge, located on either side of a main central *nacelle* on the centre section of the wings. The pilot, gunner and bomber are located in the central *nacelle*. Cooling is by two Lamblin radiators mounted under the engine *nacelles* below the wing. The engine instruments are mounted on the side of the *nacelle* in plain view of the pilot. Wood construction is used practically throughout, but in future models it is expected that metal construction will be employed.

The wings are covered with fabric, and taper both in chord and camber from root to tip. They have a span of 65 ft., and the chord at the root is 16 ft. when the maximum thickness is 30 ins.—giving a maximum wing depth of 15.6 per cent. The under-carriage consists of two long floats, one under each engine ; they are sufficiently far apart to obviate the need for wing-tip floats, whilst their length likewise dispenses with tail floats.

The *empennage* is supported on outrigger booms, one of a pair running from the rear end of the float and the other from the rear of the engine *nacelle*—the pairs being parallel. There are two vertical fins and two balanced rudders, and a one-piece balanced elevator. The rudders and fins are directly in the slipstream of the airscrews, and the rudder control is rather interesting. There is only one control horn on each rudder, in the space between the latter. The tips of the balanced portions are connected together by a wire, so that a pull on one control horn is transmitted *via* this wire to the other rudder.

This machine has a high speed of 112 m.p.h., and with



THE CURTISS C.T. TWIN-ENGINED TORPEDO SEAPLANE : A cantilever monoplane with a large pontoon float under each engine ; note the torpedo mounted below the central nacelle.

one engine running it loses only about 100 ft. per minute. It is expected that with the metal construction the machine will be able to fly level on one engine. The useful load is about 3,800 lbs., consisting of fuel, oil, crew, and a standard torpedo or bomb load.

There are several very ingenious "gadgets" on this machine, amongst which may be mentioned the stands for the mechanics when working on the engines. These are "shelves" that pull in and out of the wing on each side of the engine *nacelles*. Hand grips on the sides of the central *nacelle* and steps on the under-carriage struts provide easy access and exit.

THE INSTITUTION OF AERONAUTICAL ENGINEERS

Notices.—The Council of the Institution of Aeronautical Engineers have received an invitation from the Students' Section of the Royal Aeronautical Society inviting all Members of the Institution to their Lectures. The Council desire to express their thanks, and extend a very cordial invitation to all members of the Students' Section to attend all the Fixtures of the Institution, and to take part in the discussions.

Visit to Napier Works.—On February 15, 1922, Members of the Institution paid a visit to the Napier Works at Acton. They were met by Mr. Mead of the Technical Staff, who conducted them round the works. After inspecting the manufacture of the Napier "Lions" and "Cubs," the visitors were conducted to the test house, where several engines were in progress of testing. One of them was arranged to drive two propellers by shafts out to the inter-plane struts.

Presidential Address.—On February 23, 1922, there was a General Meeting at the Society of Arts, followed by a Presidential Address, and a paper by the new President, Lieut.-Col. Moore-Brabazon, M.C., M.P., entitled "The Early Days of Aviation." The President started by explaining that we must bring to mind the atmosphere of those days, and the fact that one wanted an awful lot of faith to carry on with the work. Anybody who thought of building an aeroplane was ranked in the same category as someone trying to solve perpetual motion, which two problems seemed to go together, and that himself and others were looked on as amiable lunatics.

In all problems which had to be faced from the beginning, an enormous amount of sympathy and encouragement was needed from the public; you did not do your best if you were being laughed at the whole time. The treatment of Cody, who was at one time the standing joke of the Press, was something of which the nation ought to be heartily ashamed.

He said that if all the work, trials, and disappointments of those early days helped towards the development of that really wonderful exhibition of flying by the Royal Flying Corps during the War, then those early days were not in vain. As in the Grecian torch race, it was the privilege of some to light the torch, carry it awhile in the race, and then hand it to others who outpaced them, might they (the pioneers of aviation), in their turn, hand it on, living, bright and unflickering, while they, themselves, disappeared in the darkness.

The lecturer showed lantern slides of many old machines, such as the 1907 Voisin, and the 1908 Short, and told the members and visitors many interesting details of the men and machines of those days.

The discussion was one of great interest, the speakers being :—Lieut.-Col. Frank McLean, Major Hume, Commander Perrin, Capt. Sayers, Mr. H. P. Folland.

The Chairman, Mr. Molesworth, in summing up and proposing the vote of thanks to the lecturer, touched on the difficulties of the experimental work at Brooklands.

Fixtures.—March 4: Visit to the Instone Air Line, at the Croydon Aerodrome; members to meet at the Aerodrome at 3 p.m. March 22: Visit to The De Havilland Works of the De Havilland Aircraft Co., Ltd., Stag Lane Aerodrome, Edgware, at 3 p.m.; members to meet at the Works.

Paper, "Seaplane Design," by Mr. W. O. Manning, at the Engineers' Club, Coventry Street, at 8 p.m.

March 31: Paper, "Aircraft Design," read by Mr. Folland, Royal Society of Arts, at 8 p.m.

L. HOWARD FLANDERS,
Secretary

IN PARLIAMENT

Air Operations in Iraq

MR. L. MALONE on February 22, asked the Secretary of State for Air the amount of bombs dropped in Iraq during the past twelve months, the number of bombing operations in which either smoke or shell bombs have been carried, and the names of the towns and villages so attacked?

Captain Guest: Exact information in regard to the particulars asked for is not available. No smoke bombs have been used. Such bombing operations as have taken place have been over unsettled outlying districts, the objective usually being tribal concentrations or encampments which would have no name on the map. A great part of air operations in Iraq consists of mere demonstrations, not involving the dropping of bombs.

Thames Air Station

MR. GILBERT asked whether it has now been definitely decided to use the Thames as an air station; for what air services it is proposed to use the station; whether it is proposed to use the same the whole year round or only during the summer months; can he state approximately when it will be opened; what arrangements have been made for landing passengers, and if it is proposed to set up a Customs Office in order to deal with luggage and merchandise brought to this station?

Captain Guest: The answer to the first part of the question is, that it is the intention of the Air Ministry to carry out further experimental flights for a few weeks, to and from the Thames above Westminster Bridge, in the near future. No definite decision has, however, yet been reached to use this area as the terminal of a regular service, and I regret, therefore, that no serviceable information can be given in reply to the remaining parts of the question.

Aircraft Disposal

SIR W. JOYNSON-HICKS, on February 23, asked the Secretary of State for Air whether the contract between the Disposals Board and the Aircraft Disposals Company expires in the middle of March; and whether the Air Ministry has been consulted as to its renewal?

Captain Guest: I understand that the Disposal and Liquidation Commission are considering the revision of their agreement with the Aircraft Disposal Co. The Air Council have given their views to the Commission on the points which concern the Council. The matter is now in the hands of the Disposal and Liquidation Commission, and any further question on the subject should, therefore, be addressed to the Financial Secretary to the Treasury.

Mileage Flown by R.A.F.

MR. MALONE asked the Secretary of State for Air the mileage flown by service aircraft, by classified types if available, during 1920 and 1921, showing what part of this mileage was flown in the British Isles and what part was flown on active service?

Captain Guest: Figures for 1920 are not availble. For 1921 the total mileage flown by service aircraft was, approximately, 5 million miles, of which 53 per cent. was flown in the British Isles and 47 per cent overseas. I cannot give figures for the various types.

Aircraft.

MR. MALONE asked the Secretary of State for Air the numbers and types of aircraft (landplanes and seaplanes) in flying trim now in possession of the Air Ministry, and showing how many are situated in the British Isles?

Captain Guest: There are 1,938 machines on the establishment of the Royal Air Force, of which 773 are actually in active use in squadrons and training units, and are supposed to be serviceable. The remainder are held as reserve. Of the 773 in active use, about 70 to 75 per cent. may be reckoned upon as serviceable, that is, in flying trim; but the number varies, of course very considerably, from day to day and from hour to hour.

The types are as follows:—Snipe, Avro, Bristol Fighter, D.H.9.A., D.H. 10, Vickers Vimy, F.2.A. and F.5., Vickers Ambulance, Vickers Vernon, Fairey 3 D., Fairey 3 C., Westland Walrus, Sopwith Cuckoo, Panther, and Sopwith Camel.

R.A.F. Personnel

MR. MALONE, on February 27, asked the Secretary of State for Air the number of officers and men in the Royal Air Force, showing how many are fully qualified pilots and how many are employed in the British Isles?

Captain Guest: The answer to the first part of the question is: officers 2,926, airmen 26,207. Of the total number of officers, 2,398 are on the General List and 528 are on the list for non-flying duties, namely stores, medical, etc. As regards the second part of the question, all officers on the General List are liable to employment on flying duties if medically fit, and, at present, 1,862 are fully qualified pilots. The remainder, namely, 536, are not qualified pilots, and consist partly of observers and partly of technical officers who were retained for the interim period only, including 200 naval warrant officers completing their time to qualify for pension. The answer to the third part of the question is 2,089 officers, 19,506 men and boys. These figures include officers, airmen and boys under training.

American Bankers Make a Record Air Trip

A PARTY of important Wall Street financiers, headed by Charles E. Mitchell, President of the National City Bank, and Percy G. Rockefeller, arrived at Key West recently *en route* for Havana. Upon learning that the trip across the Gulf by steamer required about 8 to 10 hours, they chartered one of the Aeromarine 11-passenger flying boats (the "Ponce de Lion") and made the flight to Havana in 70 minutes—establishing a record for this voyage. Owing to the large amount of luggage belonging to the party, another flying boat was employed to carry it, and the entire party with their luggage arrived in Havana before the steamer had left its dock at Key West. The latter part of the trip was made in a driving rain-storm, but, thanks to the luxuriously appointed enclosed cabin, the passengers were in no way discomforted.

THE ACCIDENT TO H.M. AIRSHIP "R.38"

Report of Accident Investigation Sub-Committee Issued

THE official Report on the investigations into the details which contributed to the loss of "R.38" have now been issued by the Air Ministry. The Report itself covers 27 typewritten foolscap pages, and at the end of the Report are eight appendices, bringing the total of the subject-matter up to 57 typewritten pages. The technical appendices are illustrated by 10 diagrams showing construction, aerodynamic loading, bending moments and shear force diagrams of the ill-fated airship. The membership of the Sub-Committee for the purpose of the investigation on "R.38" was as follows:—Lieut.-Col. Mervyn O'Gorman, C.B. (Chairman), Prof. L. Bairstow, C.B.E., F.R.S., Wing-Comdr. T. R. Cave-Browne-Cave, C.B.E., R.A.F., Mr. G. B. Cockburn, Mr. M. A. Doyle, Sir R. T. Glazebrook, K.C.B., F.R.S., Lieut.-Col. E. Gold, D.S.O., F.R.S., Sqdn.-Ldr. R. M. Hill, M.C., A.F.C., R.A.F., Sir J. E. Petavel, K.B.E., F.R.S., Maj. G. H. Scott, C.B.E., R.A.F., Dr. A. J. Sutton Pippard, A.M.Inst.C.E., F.R.Ae.S., Mr. H. B. Irving, Secretary (Assistant Secretary, Aeronautical Research Committee).

In attendance—Comdr. H. T. Dyer and Mr. C. P. Burgess, of the United States Navy.

The main conclusions arrived at by the Committee are set out in the following summary:—

The Committee have examined the essential witnesses and have studied the reports of the Court of Inquiry and of the Admiralty Committee appointed to investigate the history of the design and early stages of construction, and in addition have pursued their own investigations. They have arrived at the following conclusions:—

a. That the accident was due to structural weakness in the design of the airship.

b. That during the final flight no loads were imposed in excess of those which might have occurred during the normal navigation of the ship in weather which might reasonably be encountered.

c. That, having regard to her size and speed, "R.38" was considerably weaker than previous British rigid airships.

d. That the provision of specially powerful control surfaces of new design virtually accentuated this weakness.

e. That during design no calculations were made of the stresses due to the aerodynamic forces to which the ship would be subjected.

f. That in consequence, the calculations made by the design staff, taking specific account only of the forces and moments due to the distribution of weight and buoyancy, including gas pressures, were misleading.

g. That, owing to instability of the airship, the movements of the controls necessary to keep her on any particular course were large and rapid.

h. That the structure was not improbably weakened by the cumulative effect of reversals of stress of magnitude approaching the failing stress.

j. That in the construction of such an airship, reference to first principles in design is necessary, and that for progressive development of airships in size and speed, it was not sufficient to place exclusive reliance on a comparison with existing ships using the routine methods adopted for "R.38."

k. That the existing methods of calculation at present in use for determining the scantlings of structural members of an airship are insufficiently accurate for this purpose and that more exact methods should be developed.*

l. That research by both model and full-scale experiment is essential to determine and verify the forces to which an airship is subjected.

m. That the terms of the requirements laid down in time of war for "R.38" were drastic and imposed too severe a task on the designers.

n. That when the design was originally laid down information as to aerodynamic forces existed, which should have led to a detailed consideration of the effects of these forces and to consultation with the Advisory Committee for Aeronautics as to the dangerous loads foreshadowed by the model experiments on aerodynamic pressures then available.

o. That faulty material did not contribute to the accident.

p. That on the assumptions made, the structure was designed with great skill and the necessary calculations were carefully carried out by methods admitted as sufficiently accurate in other branches of engineering practice.

q. That the weather at the time did not contribute to the accident.

(Signed) MERVYN O'GORMAN, Chairman,
Accidents Investigation Sub-Committee.

January 30, 1922.

The first part of the report gives a brief history of the airship and its three first flights. The fourth and fatal flight, which commenced on August 23, is dealt with next. In dealing with the basis of design of R.38, the committee states in the report that "In the stress calculations which were made by the design staff, the airship was assumed throughout to be in the static buoyant condition: the stresses which would be imposed due to the additional air pressures when in flight were not calculated." It is further stated that, in October, 1919, when the airship was transferred to the Air Ministry, no marked reduction of the requirements was made, although the military urgency had disappeared, and the report proceeds to give an indication of the results that could have been attained at a slight sacrifice in disposable lift. Thus it is stated that, if the strength of the main longitudinals had been doubled, without altering the type of girder, the disposable lift would have been reduced by less than four tons, which would have reduced the ceiling by about 2,800 ft.

On the subject of the very great importance of the stresses set up by aerodynamic forces, the report points out that under certain conditions which are to be expected in flight, stresses due to aerodynamic forces may be produced in the structure which will considerably exceed those due to the weights and buoyancy, and that the provision of even a large margin of strength against the latter is no guarantee that the structure will withstand the stresses induced by a quite normal manœuvre. Treating the ship as a continuous beam, the bending moment when the ship is flying pitched at 10 degrees is found to be slightly less than the moment which, according to the calculations of the design staff, would have caused failure. The factor of safety is found to be not the figure four which had been intended, but only about one. It is further pointed out that these calculations were made for conditions which may occur in flight, but that it is improbable that the conditions chosen represent the worst possible. It thus appears to be clearly established that R.38 had an insufficient margin of strength to withstand the stresses due to manœuvres which might be necessitated during normal flight, or be directly due to bad weather.

With regard to the opinion that failure of certain amidship girders, during the third flight of the airship, was due to the effect of the slip-stream from one of the propellers on the structure, the Committee does not agree with this view, but hold that the buckling then reported, was due to the existence of dangerous stresses set up by the "hunting" of the airship at high speeds and its correction with the elevators.

The Appendices

Appendix I contains leading particulars and scheme of construction of R.38. In Appendix II is given a brief history of the airship up to and including the time of the third test flight. The respects in which R.38 differed from previous British and German airships are pointed out, from which it appears that circumferential and "catenary" wiring were employed in place of netting to contain the gas bags, which were 15 metres long, filling entirely the space between two main frames. The corridor support wires fitted in the later German ships were omitted in R.38. The fins were of triangular section and of the cantilever type. Her controls were very powerful, but, probably as a result of the proportion of fin and control surfaces, she proved more difficult to control than R.33.

Appendix III is a note by Lieut.-Col. E. Gold, A.D.M.O., on the weather conditions at the time of the accident to R.38, while in Appendix IV is contained a report on investigations relating to the aerodynamic forces and moments on airships. The latter appendix is divided into three parts, of which Part I gives the reports available at the time R.38 design was first started (August, 1918). Part II gives the reports which became available between October, 1919 (when the ship was transferred to the Air Ministry), and the date of the first trial of the airship. In Part III is given a list of the reports which became available since the first trial flight.

The relative strengths of R.38 and R.33 are dealt with in Appendix V, which indicates that the strength required in R.38 was of the order of double that required in R.33, whereas, in fact, the resistance to bending offered by the two ships was about the same.

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* The Air Ministry have recently approved the formation of a Panel of the Aeronautical Research Committee having as terms of reference to consider the validity of the methods at present in use for calculating the strength of rigid airships and to endeavour to indicate other methods which would enable a closer basis of design to be obtained.

Prof. L. Bairstow, in Appendix VI, deals very fully with the question of the aerodynamic loading of R.38, from which it appears that the factor of safety of the ship under conditions known to have existed was not above 2, and, under conditions which might easily have occurred, not above 1.

The manœuvres during the last half hour of flight are described in Appendix VII, and from this it appears that the tests which were in progress were necessary, and that the control movements employed were not unduly violent. The last Appendix, VIII, by R. A. Frazer, B.A., B.Sc., and H. Bateman, B.Sc., A.C.G.I., D.I.C., contains an estimate of the lateral force on the upper rudder of R.38, together with a diagram and curves.

THE "ROMA" DISASTER

Since the brief reference in our last issue to the regrettable disaster which overtook the U.S. (ex-Italian) dirigible "Roma," on the 21st ult., some further particulars have come to hand. These, however, are still somewhat vague and uncertain as to the actual happenings during this fatal flight.

The total number on board is given as 45, out of which there are only 11 survivors, the majority of whom are more or less severely injured or burned. Capt. Mabry, commandant of the "Roma" and principal pilot, is among the dead, and it would seem that he stuck to his post to the end, as his charred body was found later with the hands still grasping the control wheel.

Some of the survivors had most extraordinary escapes, one, Lieut. Burt, jumping out of the ship the moment after the explosion, landed in some soft mud 30 ft. below, and was practically unhurt. As to the cause of the accident, accounts vary somewhat in certain details, but the following report from *The Times* correspondent furnishes about the best explanation we have seen:—

"It seems that the airship became unmanageable when at an elevation of about 1,500 ft. Observers below then saw a huge kitelike structure under the tail cone swing loose at an angle of 45°. For a moment it seemed that the 'Roma' was about to capsize. It took a nose-dive and fell rapidly to the ground. Some of those watching the catastrophe declare that the flames burst from the gasbag, but this is not confirmed by survivors, though two of the dead were afterwards found grasping fire extinguishers.

"From various parts of the airship came hurtling to the ground a shower of sandbags, followed by two or three bodies of men who jumped. The airship skirted the chimney stacks of buildings at the Army base, and fell plump upon some high-tension wires. A terrific explosion followed and the mammoth gasbag turned over on the cabins, whose occupants were precipitated into the roaring flames."

Thus it would appear that the breaking of the rudder was the original cause of the accident, and it is the opinion of many that had the "Roma" been a little higher when the control broke down, the dirigible would have cleared the buildings and come down in the water—Hampton Roads—off the station, and probably most, if not all, of the crew would have been saved. Others state that if the "Roma" had been filled with helium gas instead of hydrogen the contact with the electric wires would not have caused the outbreak of fire with its terrible results, and the "Roma" would only have crashed on to the buildings with nothing like such serious loss of life. However, full investigations into the disaster are being made by experts, and no doubt further light will be thrown on this unfortunate affair.

The Secretary of State for Air has sent a telegram in the following terms to the United States Secretary for War, through the British Air Attaché at Washington:—

"On behalf of the Air Council I offer to you and to the United States Army our profound condolences on the deplorable loss of the airship "Roma," with so many valuable lives. (Signed) Frederick Guest, Secretary of State for Air."

METHODS OF AEROPLANE FLYING INSTRUCTION

Under above title a paper was read before the Royal Aeronautical Society on February 16, 1922, by Squadron-Leader C. F. A. Portal, D.S.O., M.C. The lecturer commenced by outlining the two main methods of teaching which were in vogue in 1915. One of these consisted in using dual-control machines, in which the pupil was taken up, with his hands on the controls but not actually controlling the machine. After a number of flights of this nature, the pupil was sent up for his first solo flight, and it was not until he went into the air alone that he began to acquire any real knowledge. The second type of school started straight away with solo machines, but the power of the engines with which these were fitted was carefully graduated, commencing with one of such low power that the machine could not be coaxed into the air with it. From this machine, having got used to engine and machine controls (and incidentally the noise of the engine), the pupil was put on machines with higher power, doing "hops" "straights" and, finally, landings and turns.

The lecturer then outlined the present system of tuition, which has resulted from the "Instructional Revolution" of 1916. One of the most important innovations is, perhaps, the introduction of the telephone, by means of which the instructor can tell the pupil of any mistake made in controlling a machine. The Avro was chosen as the standard elementary training machine, and the present system was devised for this machine, although it is applicable to almost any other single-engined tractor.

Briefly, the procedure is as follows: The pupil is put into the back seat, the instructor occupying the front seat. A telephone connects the two. The machine is then taken up to a height of about 1,000 ft., and the instructor proceeds to explain the use of the controls, demonstrating their effect as he goes along. The next step is to give the pupil entire control, telling him to keep the top of the engine cowl level with the horizon, the two wing tips level with one another, and the nose of the machine pointed to some land mark. At first, the pupil rarely manages to do all of these things, but gradually he acquires mastery to the extent of being able to fly straight and level. He is then shown the climbing and gliding angles of the machine, and told to note mentally the apparent distance between the top of the cowling and the horizon. The next lesson consists in teaching the pupil to do turns. Then follow flights, in which he is taught to do loops, rolls, spins, etc. Up to this point about five hours have been spent in the air. Finally, the pupil is taught to get off and land correctly, and not until he can do so is he sent up for his first solo flight, which, needless to say, is not nowadays the nerve-racking affair it used to be in the old days. After further practice solo, the pupil has to practice "forced" landings, and gradually he becomes proficient.

THE ROYAL AIR FORCE MEMORIAL FUND

A meeting of the Executive Committee of the Fund was held at 7, Iddesleigh House, Caxton Street, on February 15, Lord Hugh Cecil in the chair.

A draft statement of accounts was submitted by the Fund's auditors, Messrs. Blackburns, Barton, Mayhew and Co., for the year 1921.

The Committee were unanimously of opinion that the accounts as presented were very satisfactory in so far as the evident use of the Fund in the relief of distress, and in the furtherance of the objects with which it was started, had been carried out during the year in question. All the objects with which the Fund started, with the exception of one, have been or are being carried out, the one exception being that the scholarships for the sons of officers who fell in the War have not yet materialised, in view of the fact that one of the two houses at Ascot so kindly presented to the Fund by Mrs. Salting has not yet been sold.

Another point which the Committee regard as highly satisfactory is the fact that the activities of the Fund as regards the distribution of assistance to the needy of all ranks who fought with the Air Force during the War has very greatly increased, and is proof of the usefulness of the Fund. The grants made during five months of 1920 roughly amounted to £900, whereas during the year 1921 this sum rose to £4,500.

As regards the War Memorial on the Thames Embankment, it was reported that active work had begun on the stonework in the contractor's yard, and that Mr. Reid Dick, selected by the architect, Sir Reginald Blomfield, R.A., was actively engaged on the modelling of the bronze eagle and globe. The architect hopes to keep the cost of the Monument within £7,000, which is considerably less than was first estimated.

A proposal to hold an R.A.F. ball at some London hotel, as was done in 1920, was postponed for consideration later on in the season.

THE ROYAL AIR FORCE

London Gazette, February 21, 1922

General Duties Branch

Observer Offr. C. D. Palmer (Lieut., A. and S. Highrs.) is granted a permanent commn., retaining his present substantive rank and seny.; Nov. 17, 1921. Flying Offr. A. C. Sanderson, D.F.C., is granted a permanent commn., retaining his present substantive rank and seny.; May 10, 1920. *Gazette* May 18, 1920, appointing him to a short service commn. is cancelled. Lieut. T. W. Shortridge (R. Innis. Fus.) is granted a temp. commn. as a Flying Offr. on seconding for four years' duty with R.A.F.; Jan. 19. Pilot Offr. on probation J. B. H. Rogers is confirmed in his rank; Feb. 8. Flying Offr. S. A. H. Bowyer resigns his short service commn., and is granted the rank of Capt.; Feb. 8 (substituted for *Gazette*, Feb. 7.) Flying Offr. G. Croft is placed on the retd. list; Feb. 22.

Stores Branch

Flight Lieut. F. G. M. Williams is granted a permanent commn., retaining his present substantive rank and seny.; Jan. 2. Flying Offr. C. J. Polden is granted a permanent commn., retaining his present substantive rank and seny., with effect from Sept. 12, 1919, and is transfd. to Stores Branch, with effect from Dec. 17, 1921. *Gazette*, Sept. 12, 1919, appointing him to a short service commn., is cancelled. Pilot Offr. S. Bingham is granted a permanent commn. as a Flying Offr., with effect from, and with seny. of, Sept. 12, 1919, and is transfd. to the Stores Branch, with effect from June 17, 1920. *Gazette*, Sept. 12, 1919, appointing him to a short service commn., is cancelled.

Medical Service

T. M. Walker is granted a temp. commn. as a Flight Lieut., with effect from, and with seny. of Feb. 9.

Nursing Service

The follg. are confirmed in their appointments as Staff Nurses.—Miss E. M. Clements; Aug. 2, 1921. Miss M. A. MacVicar, Aug. 3, 1921. Miss E. S. Browbank; Aug. 9.

Memoranda

Pilot Offr. A. M. Anderson, D.F.C., to be Observer Offr.; Oct. 18, 1919 (since resigned). Hon. Sec. Lieut. C. S. McKay relinquishes his hony. commn. on joining the T.A.; Nov. 21, 1921. Lieut. A. Frickett relinquishes his temp. commn. on account of ill-health contracted on active service, and is permitted to retain his rank; Feb. 22. Lieut. H. P. L. Gardner relinquishes his temp. commn. on return to Army duty; March 14, 1919 (substituted for *Gazette*, June 24, 1919)(since relinquished).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

Flight Lieuts.—S. M. Kinkead, D.S.O., D.S.C., D.F.C., from No. 24 Squadron (Inland Area) to No. 30 Squadron (Iraq Group). 31.1.22. C. G. Hetherington, M.B.E., from Headquarters, No. 11 (Irish) Wing to School of Photography. 1.2.22. (The notice appointing this officer to School of Technical Training (Men) with effect from 1.2.22 is cancelled.) C. J. W. Darwin, D.S.O., from R.A.F. Cadet College (Ground Wing), Cranwell, to Headquarters, R.A.F., Cranwell. 1.2.22. W. B. Farrington, D.S.O., from Boys' Wing, Cranwell, to Headquarters, R.A.F., Cranwell. 1.2.22. A. L. Messenger, A.F.C., from No. 3 Flying Training School (Cadre) (Inland Area) to Half-pay List, pending embarkation overseas. 11.2.22. I. Cullen, A.F.C., from No. 5 Flying Training School (Inland Area) to Armament and Gunnery School (Cadre) (Inland Area). 1.3.22. D. H. W. Williamson from R.A.F. Depôt (Inland Area) to Electrical and Wireless School (Inland Area). 3.2.22. E. Drudge, M.B.E., from Half-pay List to Headquarters, Iraq Group. 4.2.22. H. H. Mallett to R.A.F. Depôt (Inland Area), on attachment from Army Dental Corps. 1.2.22. H. E. F. Wyncoll, O.B.E., M.C., from No. 7 Group Headquarters (Inland Area) to R.A.F. School (India). 2.2.22. H. V. German from Half-pay List to Headquarters, Iraq Group, for duty at R.A.F. Prison (on formation). 2.2.22. R. E. Nicholl from Central Flying School to Headquarters, Iraq Group. 2.2.22. F. St. John Woollard, A.F.C., from No. 5 Flying Training School (Inland Area) to No. 4 Flying Training School (Middle East Area). 3.2.22. A. H. Pearce, D.F.C., from Headquarters, R.A.F. (India), to Iraq Group Headquarters (Middle East Area). 12.1.22. W. S. Magrath from No. 84 Squadron (Middle East Area) to No. 14 Squadron (Middle East Area). 30.11.21. Hon. R. A. Cochrane, A.F.C., from Headquarters (Middle East Area) to No. 45 Squadron (Middle East Area). 7.1.22. W. H. Dunn from No. 5 Squadron (India) to R.A.F. School (India). 14.12.21. E. A. Fawcus from R.A.F. Depôt (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). 13.2.22. G. D. Nelson, D.S.C., A.F.C., from No. 1 School of Technical Training (Boys) (Halton) to Air Ministry (Directorate of Training and Organisation). 27.2.22. E. J. Cooper, D.S.C., from School of Naval Co-operation and Aerial Navigation (Coastal Area) to No. 230 Squadron (Coastal Area). 8.2.22. R. W. G. West from No. 1 Squadron (Middle East Area) to Armament and Gunnery School (Inland Area). 24.12.21. O. A. Armer, from Electrical and Wireless School (Inland Area) to R.A.F. Depôt (Inland Area). 7.2.22. A. Fitz-Roy Somerset-Leeke, from Iraq Group Headquarters (Middle East Area) to Aircraft Park, Iraq (Middle East Area). 29.12.21.

Short Service Commissions—Period of Service

It is notified for general information that all officers who applied for Short Service Commissions, under the conditions of Air Ministry Weekly Order No. 781 of 1919, after November 17, 1920, were informed that the period of active service had been extended to four years.

The Gazettements were carried out as follows :—

(*a*) From the inception of the Short Service Commission scheme all appointments notified in the *London Gazette* up to and including the issue of January 25, 1921, were for three years on the active service list, unless otherwise stated.

(*b*) All appointments notified after January 25, 1921, were for four years, unless otherwise stated.

The engagements of all officers entered under the conditions of Air Publication 793 are for four years on the active list.

Firearms Act, 1920

Attention is drawn to the provision of the Firearms Act, 1920, which places certain restrictions upon the purchase, possession and use of firearms. The following observations are for the guidance of officers and airmen :—

1. *Firearms and Ammunition required for Duty.*—No restrictions are imposed, nor is certification required, for the possession or use by R.A.F. officers and airmen of any firearms or ammunition in the performance of their official duty.

2. *Purchase by Officers of Revolvers and Revolver Ammunition.*—R.A.F. officers require to obtain a certificate from the police in order to buy a revolver or ammunition for their personal use. The Home Office have agreed and have notified the police that no fee will be charged to a commissioned officer for the grant of such a certificate if he produces to the Chief Officer of Police a certificate from his commanding officer that he requires the revolver or ammunition in his capacity of officer.

3. *Section 6 of the Firearms Act*, 1920, prohibits the manufacture, sale, possession, etc., of any weapon designed for the discharge of any noxious liquids, gases or other noxious elements. Such a weapon is a prohibited weapon, and R.A.F. officers are not entitled to private possession of such weapons, although it may, as part of their official duty in an R.A.F. establishment, fall to them to experiment with or use such weapons. To avoid the penalties of this section, therefore, any R.A.F. officer who desires to purchase or possess such weapons or to keep or take them outside R.A.F. establishments should apply to the Air Ministry for permission to do so. Such permission will not be granted without good cause.

4. Further instructions will be issued in regard to the importation into and exportation from the United Kingdom of firearms, ammunition, etc.

Seaplane Floating Dock Tests

Built under arrangement with the Admiralty at Sheerness Dockyard, the Seaplane Floating Dock, designed for the Royal Air Force, and floated on September 4 last year, has been subjected to trials off Sheerness before being handed over to the Air Ministry. The tests included towing trials and anchor trials, and the dock was also submerged, a seaplane being docked on the pontoon. The tests were satisfactory in every respect, and the dock was towed back to Sheerness yard to be completed for delivery. The dock is fitted for the reception of two seaplanes of the latest type. The trials were under the superintendence of representatives of the Admiralty and Royal Air Force, and were conducted by officials of Sheerness Dockyard.

Safety Fuel Tank Competition

The final tests of the tanks selected by the Judges Committee in the Air Ministry Competition for safety tanks for aircraft took place at the Royal Aircraft Establishment, Farnborough, this week on February 20 and 22.

On the first day the trials consisted of acceleration and crashing tests, and on the second day of firing tests.

Twenty-six entries were received for the competition, which, it will be remembered, was being held in order to obtain, if possible, a tank which will withstand the shock to which it may be subjected in an aeroplane crash without either bursting or leaking, thus eliminating almost entirely the possibility of fire, and which will also withstand the effects of enemy action by machine gun and shell fire.

As a result of the preliminary tests, which began on December 5, the following tanks, which are of radically different types, were selected to undergo the final tests :—

"Boothby" gas armoured tank, submitted by Commander F. L. M. Boothby.

"Imber" self-sealing tank, submitted by Messrs. Imber Anti-fire Tanks, Ltd.

Tank submitted by India Rubber and Gutta Percha Co., Ltd.

The crashing tests are similar to those to which the tanks were subjected during the preliminary trials, in addition to special tests to determine the resistance to acceleration.

In the firing tests the tanks were subjected to machine gun fire with ammunition capable of penetrating the ordinary type of mild steel fuel tank and of exploding and igniting the fuel either on contact or after penetration.

THE LONDON AERO-MODELS ASSOCIATION

A General Purposes Committee Meeting of the above Association was held at 20, Great Windmill Street, Piccadilly, W. 1, and the programme of competitions for the ensuing three months was decided upon.

The first of these competitions will take place on March 25 at the above address, and applications for entry forms, etc., should be addressed to Mr. A. Rippon, 52, Fairbridge Road, Holloway, N. 19, who has kindly consented to act as Competition Secretary for the ensuing year. This first competition is an indoor bench test for propellers of a diameter of 12 ins. and a pitch of 18 ins. All propellers entered must be bored at the boss with a ⅛-in. hole. The power used will be compressed air, a plant having been very kindly lent by Mr. F. J. Camm and a Michelin air cylinder by Mr. Felix Kelly. Mr. A. B. Clark will act as judge. This competition will be open for carved propellers only, the number of blades being limited to two. The propellers registering the best thrust will be awarded first, second and third prizes in order of merit. The prizes for this competition have been very kindly presented by Mr. H. J. Best, to whom a hearty vote of thanks was proposed and carried unanimously.

Particulars of other competitions will be announced in due course, and it is hoped that all members will earnestly endeavour to enter for this, the first competition of the New Year. Country members' propellers may be sent to Headquarters at 20, Great Windmill Street, Piccadilly, W. 1, where they will be looked after and returned after the test. Country members should pay carriage.

A. E. Jones, Hon. Secretary.

◆ ◆ ◆ ◆

A Model Club for Brighton and Hove

As a result of the announcement in respect to the above, which appeared in our issue for February 16 last, we are pleased to hear from Mr. A. L. Churcher that the desired Club is now well in the making—the loan of a workshop and meeting rooms having been obtained. It is proposed to hold the first General Meeting on March 8 next (7.30 p.m.) at 12a, Goldstone Street, Hove, when it is hoped that those interested will make an effort to be present.

Airship Developments in the United States

So far from the dreadful disaster to the "Roma" having set back airship progress in America, developments on the most extensive scale are since reported from Washington. The United States Chamber of Commerce announces the formation of an important corporation for exploiting commercial air navigation in the United States by regular lines of dirigibles of the Zeppelin type. The corporation is named "The General Air Service," and definite plans, the report states, for the construction of craft in Germany have been formed.

It is expected to place two ships in operation in the summer of 1923. The route to be operated with these first airships is the Chicago–New York line. Mr. Benedict Crowell, of Cleveland, former Assistant United States War Secretary, also head of the American Aviation Mission to Europe, and president of the United States Aero Club, is stated to be the first president of the corporation. Other backers are Mr. Marshall Field, Mr. L. V. Benet, president of the Hotchkiss Company, Col. Charles De Forest Chandler, Mr. E. N. Herr, president of the Westinghouse Company, Mr. Theodore Pratt, of the Standard Oil Co., Mr. Franklin D. Roosevelt, Mr. Benjamin Thaw, of Pittsburg, and Mr. David Goodrich, of New York.

The first Chicago–New York line will eventually be extended to the Pacific coast, and later bigger craft will be utilised for lines to South America and Europe. The first aircraft will be of 4,000,000 cubic ft. capacity, and although manufactured in Germany, it will be erected in America. It will accommodate 100 passengers and 30 tons of freightage. Johann Schuette, of the Schuette Lanz Co., Germany, is now in the States with a corps of engineers on his second visit working out details of construction and routes. Schuette declares that virtually there will be transferred later a large part of the German Zeppelin-making business to the United States.

Iraq Group an Independent Command

The Iraq Group which has formed part of the Middle East Area became an independent command with effect from 1st February, 1922.

The Officer Commanding, Iraq Group, is directly responsible to the Air Ministry for the command and administration of the Air Force units located in Iraq.

SIDE-WINDS

An interesting set of six post cards, reproduced from photographs taken during the Ross-Smith flight to Australia, were produced by the Photochrom Co., Ltd., of 7–10, Old Bailey, London, E.C. 4, in connection with the Lowell Thomas "Travelogues" or lectures on the above flight given recently. We understand that these cards are now on sale in the ordinary way, and a set may be obtained from the Photochrom Co., at the above address, on receipt of 6*d*., plus postage.

⁂ ⁂ ⁂ ⁂

PUBLICATIONS RECEIVED

The Airplane Engine. By Lionel S. Marks, B.Sc., M.M.E. London and New York: McGraw-Hill Book Co., Inc. Price 30*s*. net.

Technical Note No. 83. The Theory of the Screw Propeller. By A. Betz. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

⁂ ⁂ ⁂ ⁂

NEW COMPANIES REGISTERED

BUCKINGHAM ENGINEERING CO., LTD., Holyhead Road, Coventry. Capital £10,000 in £1 shares. Under agreement with J. F. Buckingham, and W. Maddocks, manufacturers of and dealers in aircraft, motor-cars, etc. T. C. John, first sole permanent director.

R.A.F.C. CO., LTD., 128, Piccadilly, W.—Capital £1,000, in £1 shares Objects, to hold premises acquired by nominees on behalf of the company and intended to be occupied by the Royal Air Force Club at 128, Piccadilly, and 6, Park Lane, W. First directors: A. Colls, J. L. Walsh, and W. J. H. Harcourt.

THE TRIPLEX SAFETY GLASS CO., LTD., Fitzalan House, Arundel Street, Strand, W.C.—Capital £85,000, in £1 shares. Under agreement with the Central and Western Corporation, Ltd. First directors, Col. Sir Harry Waechler, Bt., C.M.G., H. N. Hoare, D.S.O., E. J. F. C. Allen, R. G. M. Delpech and W. R. Lyttleton.

⁂ ⁂ ⁂ ⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: **cyl. = cylinder; I.C. = internal combustion; m. = motors**

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published February 23, 1922

30,050. F. J. Smith and W. Hibbert. I.C. rotary engines. (174,434.)

Published March 2, 1922

34,925. Sperry Gyroscope Co. Gyroscopic compasses. (155,257.)

35,759. Soc. des Moteurs Salmson (Système Canton-Unne). Means for securing rotary members of contractile material to metallic hubs. (157,892.)

APPLIED FOR IN 1921

Published February 23, 1922

6,818. Zeppelinwerke Ges. *Fuselages* or hulls of aircraft. (164,305.)

Published March 2, 1922

3,936. H. Junkers. Aeroplanes. (158,848.)

If you require anything pertaining to aviation, study "Flight's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued*

(Continued from p. xiv.)

LEATHER CLOTH—

New Pegamoid Ltd., 134, Queen Victoria St., E.C.
City 9704 (2 lines).
"Pegamoid," Phone, London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cheery," Cent. London.

MACHINING—

Arnott & Harrison, Ltd., Hythe Road, Willesden Junction. Willesden 2297.
Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.
Grahame-White Company, Ltd., Hendon, N.W. 9.
Kingsbury 120.
London Office: 12, Regent Street, Pall Mall, S.W. 1. Regent 2084.
Monk Engineering Co., High St., Coventry.
Coventry 807; "Assistance," Coventry.
Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

MOTOR CARS AND MOTOR BICYCLES—

Auto-Carriers (1911), Ltd., 181-182, Hercules Rd., Westminster Bridge Road, London, S.E. 1.

NIGHT LANDING LIGHTS—

Allen-Liversidge, Ltd., amalgamated with Imperial Light, Ltd., 106, Victoria St., S.W. 1.
Victoria 4155; "Aceterator," Sowest, London.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2.
Paddington 6332.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.
Shell-Mex Ltd., Shell Corner, Kingsway, W.C. 2.
Holborn 2303-4; "Shelzine," Westcent, London.

PHOSPHOR BRONZE AND GUNMETAL—

Clifford, Charles, & Son, Ltd., Fazeley Street Mills, Birmingham.
Central 3634 (4 lines); "Clifford," Birmingham.
Keeling, A. D., Ltd., Caroline Street, Birmingham.
Central 440 (3 lines); "Nickel," Birmingham.

PHOTOGRAPHIC APPARATUS—

Kodak, Ltd. (Wratten Div.), Kingsway, W.C. 2.

PROPELLERS—

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.
Metal Airscrew Co., Ltd., Regent House, Kingsway, W.C. 2.
Gerrard 5122; "Pliantness," Phone, London.

RADIATORS AND RADIATOR REPAIRS—

Serck Radiators, Ltd., Warwick Road, Greet, Birmingham.
Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

SPARKING PLUGS—

Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15. Putney 2132, 2133.
"Kaalgee," Phone, London.

SPRAYING PLANT—

Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1.
Holborn 2041; "Aerography," London.
Midland Fan Co., Ltd., 46, Aston Rd., Birmingham.
Central 3463; "Blast," Birmingham.

STABILIZERS—

Auto Controls, Ltd., 19, Regent Street, Piccadilly Circus, London, S.W. 1. Regent 3649.

TAPES AND WEBBING—

MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent. London.

TESTING—

Tait-Cox & James, c/o S. Heckstall Smith, F.R.Ae.S., 4, Golden Square, W. Gerrard 3489.

TIMBER—

Owen, Joseph, & Son, Boro' High Street, S.E.
Hop 3811; "Bucheron," London.

TUBES, ALUMINIUM—

British Aluminium Co., Ltd., The, 109, Queen Victoria St., London.
City 2676; "Cryolite," Cent. London.

TYRES AND WHEELS—

Palmer Tyre, Ltd., Shaftesbury Avenue, W.C. 2.
Gerrard 1214; "Tyricord," Westcent, London.

VARNISHES AND COLOURS—

The British Emaillite Co., Ltd., Brentfield Road, Stonebridge Park, N.W. 10.
Willesden 2346 and 2347;
"Ridleypren," London.
Naylor Bros., Ltd., Slough, Bucks.
Slough 228; "Naylor," Slough.

WELDINGS, REPAIRS—

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Gerrard 8173; "Bariquamar," Reg, London.

WIND SHIELDS—

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Telephones: Gerrard 8165. Richmond 1293.
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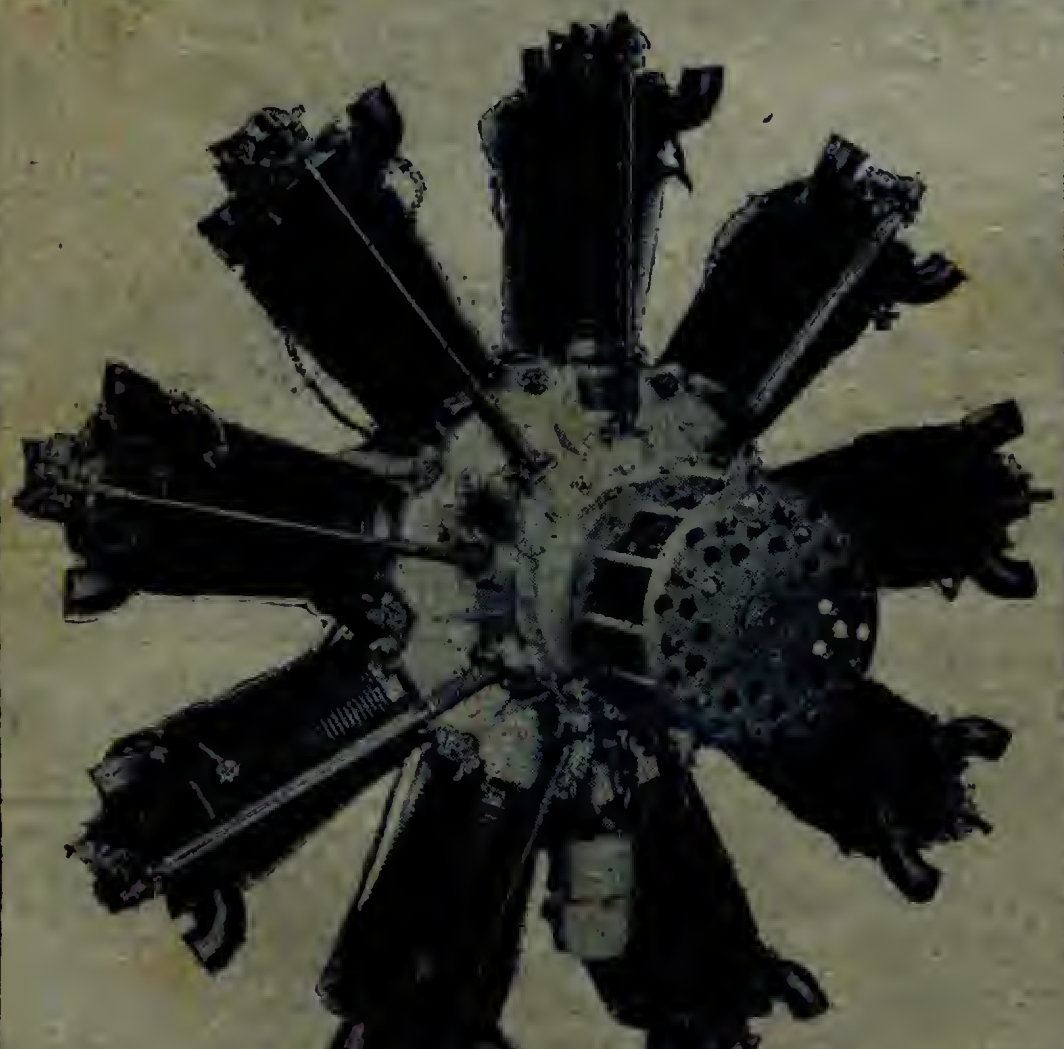

"The Times"

Trade Supplement of January 21st, 1922, referring to the

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states:—

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A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Mar. 16	Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.
Mar. 26–April 2	Nice Meeting
Mar. 30	Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.
Mar. 31	Lecture, "Aircraft Design" by F. P. Folland, before I.Ae.E.
April 17	R.Ae.C. Race Meeting, at Waddon
June 1	Entries close for Schneider Cup Race
June 5	R.Ae.C. Race Meeting, at Waddon
July 6–20	French Gliding Competition
Aug. 6	Gordon-Bennett Balloon Race, Geneva
Aug. 7	R.Ae.C. Race Meeting, at Waddon
Aug. (last fortnight)	Schneider Cup Seaplane Race, at Naples
Sept.	Tyrrhenian Cup, Italy
Sept.	Italian Grand Prix
Sept. or Oct.	R.Ae.C. Race Meeting, at Waddon
Sept. 22 ...	Coupe Deutsche (300 kil.)

EDITORIAL COMMENT

The Doom of Airships

IT appears that the reprieve for airships which the Secretary of State for Air announced recently at the Air Conference to have been extended until June is about to be terminated. It is understood that negotiations are now in progress for handing over the entire fleet of airships, material, sheds, gas plants, etc., to the Disposal Board. Once these negotiations are concluded, the whole airship material will pass out of the hands of the Air Ministry and, presumably, be put up for sale by the Disposal Board, either in their present state or as scrap. In either event the price which the airships and plant will command will probably be but a fraction of the cost to the nation of the work which all this material represents—the figure of 40 million has been mentioned. That is the loss in money. The experience gained with these ships cannot be assessed in money values, but it is very great, and at one time we were entitled to claim to have at least caught up with, if not overtaken, the world's leading nations as regards airship designing and construction skill. Possibly the fatal accident to America's "Roma" may have hastened the Air Ministry's decision. The Ministry has never been sympathetic towards airships, Capt. Guest's statements to the contrary notwithstanding, and this decision, coming so shortly after that regrettable accident to the "Roma," has every appearance of being the result of an effort to derive public support from the state of mind which may be expected to obtain among the general public after such a catastrophe. Possibly, the Air Ministry has counted on even airship enthusiasts being somewhat subdued after the publication of the "R.38" report and the newspaper accounts of the "Roma" accident.

Nevertheless, even in America, the general tendency is to regard these lamentable accidents in their true light, and except for certain sections of the community, which are always ready to say: "There you are, you see," America is more determined than ever not to be deterred from carrying on the pioneer work of developing the airship.

Here the Air Ministry has a certain amount of excuse, and has made the most of it—in the fact that all but Australia declined the suggested arrangement for carrying on experimental airship services to India and the Antipodes. But even if these schemes were found unworkable at the present time, there is another aspect of the question of which the Air Ministry appears to have failed to take account. If there is any lesson to be learned from the two accidents to airships it is surely that research is wanted, not only on models in the wind tunnel, but also, and more so, on actual airships. Under the mantle of economy two of the older airships were prevented from participating in experimental and research work for which they were quite suitable. The necessary apparatus had already been installed in one, but only inconclusive results had been obtained when the ship was withdrawn.

Now, if we are to benefit at all from the money, work and lives spent on airships, we have an opportunity to do so by recommissioning one or two of the present ships, keeping at any rate sufficient personnel to operate them and sufficient matériel to keep them in the air, and proceed with such experiments as are known to be required before the design of an improved ship can be laid down with the certainty that there will be no weak spots and no broken girders when manœuvring the ship. The static safety of "R.38" was admirable, but the strength against aerodynamic forces was too small. It is clearly indicated in the report of the Accidents Investigations Sub-Committee along which lines research is needed. Such research could be carried out with relatively little outlay, and the results would be of the very greatest value to future work on airships. Without it the road to further progress is barred, and we shall have to restrict ourselves to such ships as that outlined by Major Scott in his paper before the Air Conference, which, although capable of good work, do not represent the best that can be done.

In his paper Major Scott was very moderate in his claims, and if there is any fault to find with his excellent paper it is mainly that he errs on the side of modesty, and as he himself pointed out, the Germans would probably undertake, and guarantee, to exceed by a considerable margin the performance and weight figures given by Major Scott. It therefore seems not a little unfortunate that, so far as can be seen, nothing at all is likely to be done with the existing airships. Even if they were only retained in commission for research purposes, we should at least get some results from the money expended on them up to the present time. Otherwise that money will have been entirely wasted. Not only so, but if the policy outlined by Captain Guest represents the Government view, we have no hesitation in saying that it means the renunciation by this country of all future claim to a place in the world as airship constructors. That we can leave airships alone for ten years, and then start *de novo* as Captain Guest suggested, is simply absurd. It cannot be done. By that time other countries will have made enormous progress, will have the experience, and, moreover, will have established themselves as airship manufacturing nations in the world's estimate. Who will then dream of coming to England for airships? No, if it is good-bye now, it is probably good-bye for all time. Let the Government well ponder the problem before too late.

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Soaring in Descending Air Currents

In our correspondence column will be found a most interesting account of a rough-and-ready experiment carried out on board one of the P. & O. boats to determine what sort of air currents seagulls make use of in gliding behind the stern of a steamer under way. The amazing result was that it was found that in the region in which the gulls were gliding there was actually a *descending* air current, and not, as generally supposed, an ascending current. If the observation is correct, and there is no reason to doubt it, it seems to indicate that the birds make use of the turbulence in the air and not of its general direction. This fact, if it be a fact, is of the greatest interest in connection with soaring flight problems, and we shall welcome communications relating to this subject.

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Testing Aerofoils in Free Flight

Among the many problems with which the aircraft designer is confronted, probably one of those which cause most annoyance and uncertainty is the application of the results of model tests to full-size machines. In order to approach as close as possible to a correct solution, test runs in wind tunnels have to be run at very high velocities owing to the small size of the models tested. Even then there is frequently some disagreement between the model results and the full-size figures. This difference is known as the "scale effect." In America, and also to a certain extent in this country, work is progressing on methods of test which will establish the scale effect. In America, the problem is being attacked in several ways. First of all, at Langley Field a compressed air wind tunnel is being constructed in which the air is compressed to about 20 atmospheres, while the wind speed is as high as 25 metres per second. The Reynolds number will therefore be the same as that for a full-size machine. At McCook Field another tunnel is being constructed, in which the air speed is to be 200 m.p.h. This tunnel has a diameter of 1·6 metres, and although the models will be small, indeed will have to be on account of the forces to be expected at 200 m.p.h., the product VL will be approximately the same as for an actual machine.

In the meantime, experiments have been made with towing a model aerofoil underneath an aeroplane in flight, and the preliminary experiments, although of a fairly rough-and-ready nature, indicate that it should be possible to test aerofoils of considerable size at a flying speed of 100 m.p.h. or more with good accuracy. This should enable tests to be carried out, not only at the same Reynolds number, but at the same size and speed as the full-size machine, and thus provide further data on Scale Effect. A report of this free flight method of testing is published elsewhere in this issue.

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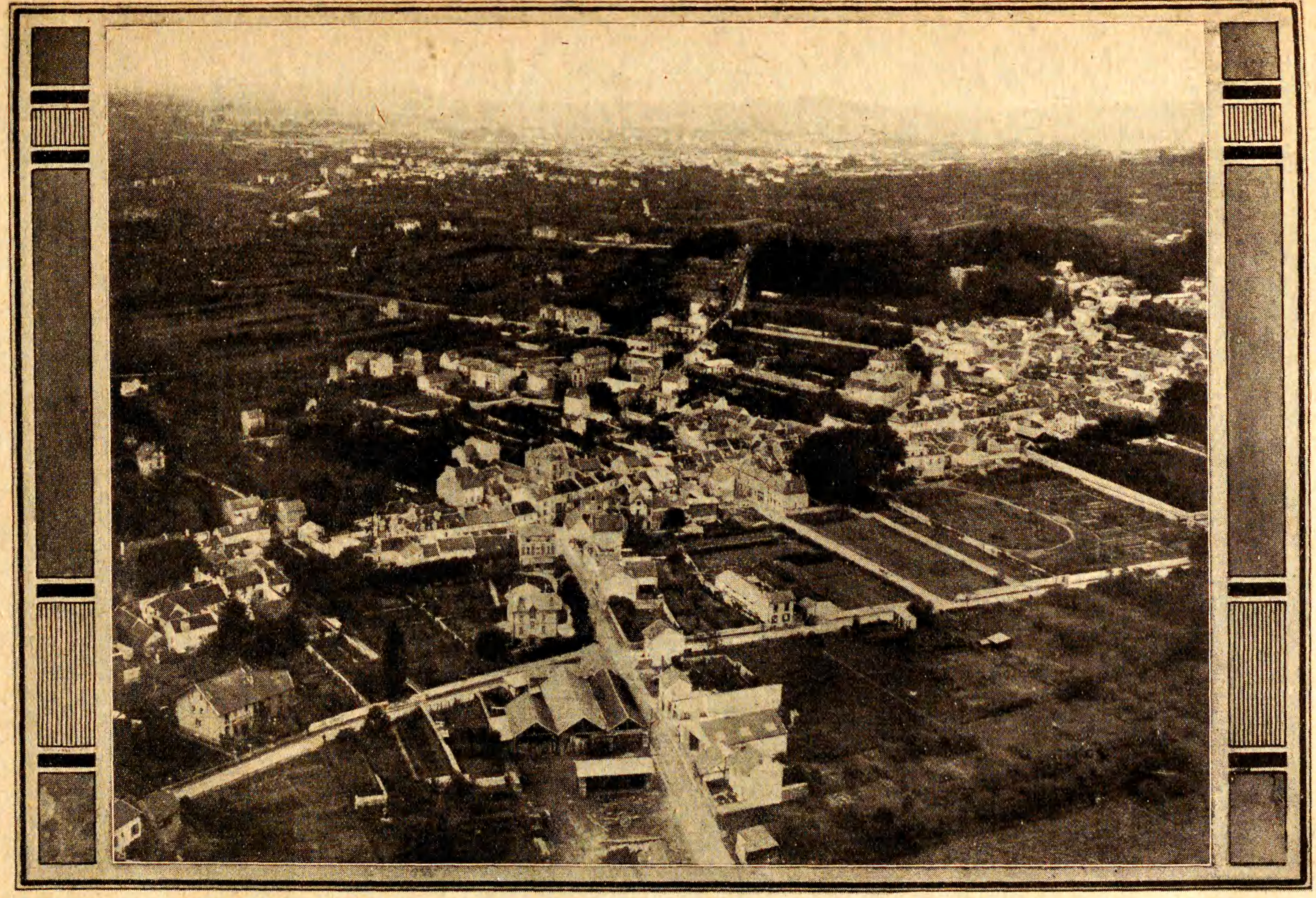
France's Great 1924 Competition.

FROM France it is reported that the prize of one million francs offered by the French Society for Aeronautical Propaganda for the "best" aero engine will probably be augmented by another million offered by the French Air Minister. But few details are to hand at the time of going to press, but it appears that the competition will be for engines of 350–450 h.p., and weighing not more than 2 lbs./h.p. It is understood that competing engines will have to pass a reliability run of 240 hours, in stretches of eight hours each, and that the total time taken in completing the 240 hours must not exceed 100 days. The competition will start on March 1, 1924, and entries must be received before December 1, 1923.



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LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE:
No. 28.—Amongst the Suburbs of Paris.

A NEW METHOD FOR TESTING AEROFOILS IN FREE FLIGHT*

A Preliminary Investigation

By F. H. NORTON

Introduction.—From the very beginning of the science of aeronautics there has been desired a satisfactory method for making tests on aerofoils and other aerodynamic bodies under the identical conditions of their use on the aeroplane. The wind tunnel and the whirling arm will give velocities equivalent to those of flight, but the size of the wings that may be tested in this way is only a tenth or twentieth part of the full-sized ones. Attempts have been made to test full-sized wings when mounted upon a car or automobile, but, due to the interference of the ground and to irregular winds, the results have not been satisfactory, and these methods have now been practically abandoned.

An attempt is made here to provide a method for testing full-sized, or nearly full-sized, aerofoils at aeroplane speeds and under the same conditions of turbulence that are encountered by the aeroplane. The present investigation is, of course, only of the most preliminary character, so that the accuracy of the results is not high. The method, however, has been carefully studied, especially in regard to its inherent errors and the time required for making tests. Sufficient experience has been gained to justify the design of a new balance for use on a larger aeroplane.

Methods and Apparatus.—The apparatus used for measuring the tension in the supporting wires is shown in Fig. 1. A heavy steel tube passes laterally through the *fuselage*, and is connected by a pair of levers to a spring scale on the instrument board. On the centre of the tube a windlass is attached for reeling up the wires passing to the wing. The two forward wires run outward from the windlass over pulleys at the end of the tube, while the third wire runs backward and down through the *fuselage*. The angle of attack of the wing is changed by reeling in or out the rear wire while the others are held stationary.

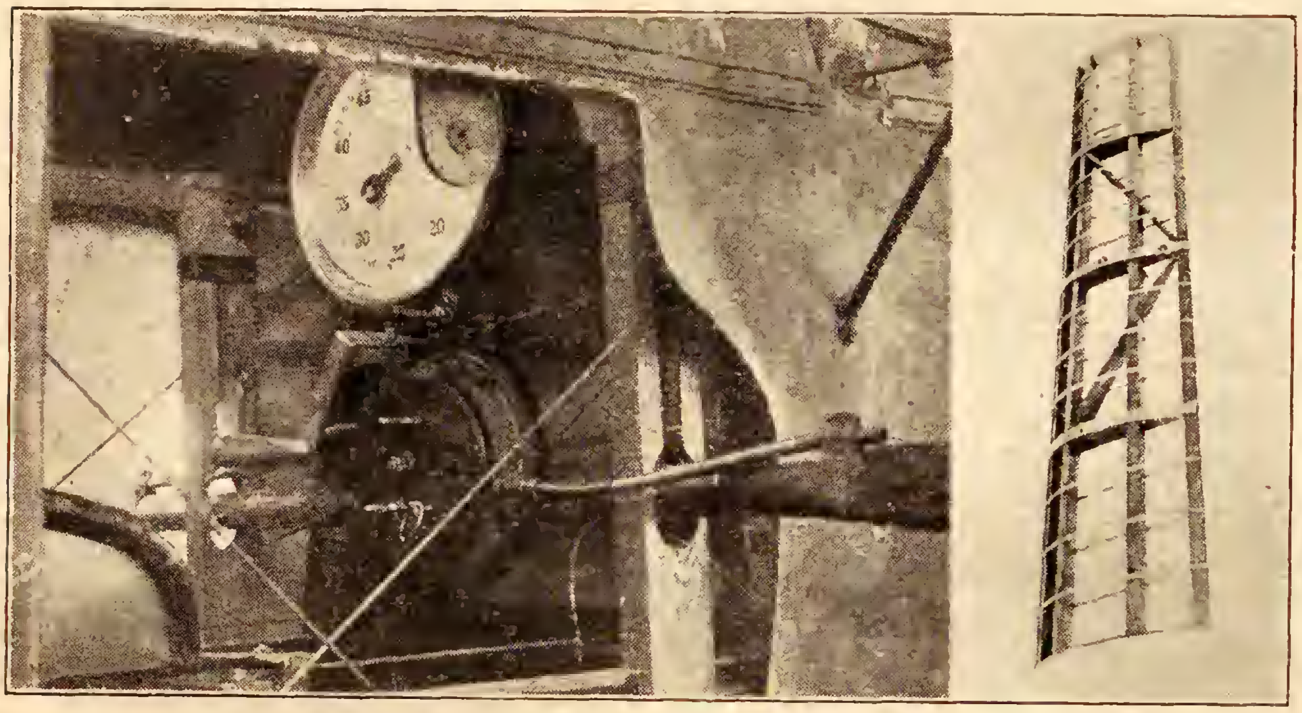
The angle at which the wing trails back is measured by means of a reading telescope mounted on the side of the *fuselage* with a graduated circle. The vertical is indicated by means of a small pendulum. The pendulum, although only slightly damped, was very steady, and would seem to be a very satisfactory method of indicating the vertical in uniform flight.

The angle of attack of the wing itself is measured by placing on the wing surface a liquid inclinometer which is viewed through the same telescope as used for measuring the angle. In this test the readings of the angle of attack were rather unsatisfactory, due to the length of the bubble and to insufficient damping of the liquid; so the fluctuations were at all times considerable. Much better results can be obtained by measuring the angle of attack in the cockpit from the length of the wires.

The first aerofoil constructed was of solid white pine, and a few runs were made with it. As the weight of this aerofoil was considerable, and as it was feared that it might do considerable damage to the aeroplane should it reach an angle of negative lift, it was considered safer to construct another one of light wood and fabric in the same manner as the usual type of aeroplane wing (Fig. 2). The forward wires are attached to the leading edge of the wing, and the third wire is attached to the rear end of a wooden boom running backwards for about 5 ft. On the forward end of this boom there is a small vertical fin, and at the rear end a large aluminium rudder, both for the purpose of giving directional stability. The area of these surfaces is probably much larger than there is any need of, and wind tunnel tests will be made in order to determine the minimum size that may be used. The size of the boom is also much larger than required, and its resistance can be at least halved.

When taking off and landing, the wing is drawn up close against the under side of the *fuselage*, a hole being cut in the fabric to take the upper part of the fin. When the aeroplane has reached a sufficient altitude, it is throttled down to about 45 m.p.h. and the windlass is slowly unwound, the angle of attack being gradually increased in order to correct for the change in direction of the air flow as the wing is lowered below the influence of the downwash. Incidentally, the angle and velocity of the air flow can be studied for any distance above or below a flying aeroplane by means of a trailing aerofoil. After the wing has reached the desired distance below, as determined by a mark on one of the wires, the aeroplane is held at exactly 60 m.p.h., and readings are taken on the balance and with the telescope for various angles of attack. No difficulty at all is experienced in making turns with the wing hanging down, although no banks greater than 20° were attempted. Several runs were made with the wing in extremely bumpy air, and although the wing swings around considerably, mainly in a lateral direction, there appeared to be no danger of its getting out of control; but in making accurate tests it is quite essential that the air be smooth. After a test has been completed the wing is reeled up against the *fuselage*. Care has to be taken when gliding down to the field not to reach too great an air speed, for the force on the wings may become dangerously large. Over twenty flights were made with this wing, the piloting being done throughout by Mr. T. Carroll, of the Committee's staff.

Throughout the conduction of the tests it is necessary for the observer to use the utmost care that the lift on the wing does not reach such a small value that it cannot be balanced by the weight of the wing itself. When using larger aerofoils than this one there would be great danger in such an occurrence, as the *fuselage* or tail surfaces would very probably be seriously crippled. This danger can be guarded against by having an electrical contact on the balance set so that



Testing Aerofoils in free flight: Fig. 1, View of balance assembly mounted in aeroplane. The fuselage fabric has been stripped off to show the apparatus. On the right (Fig. 2), the aerofoil before covering.

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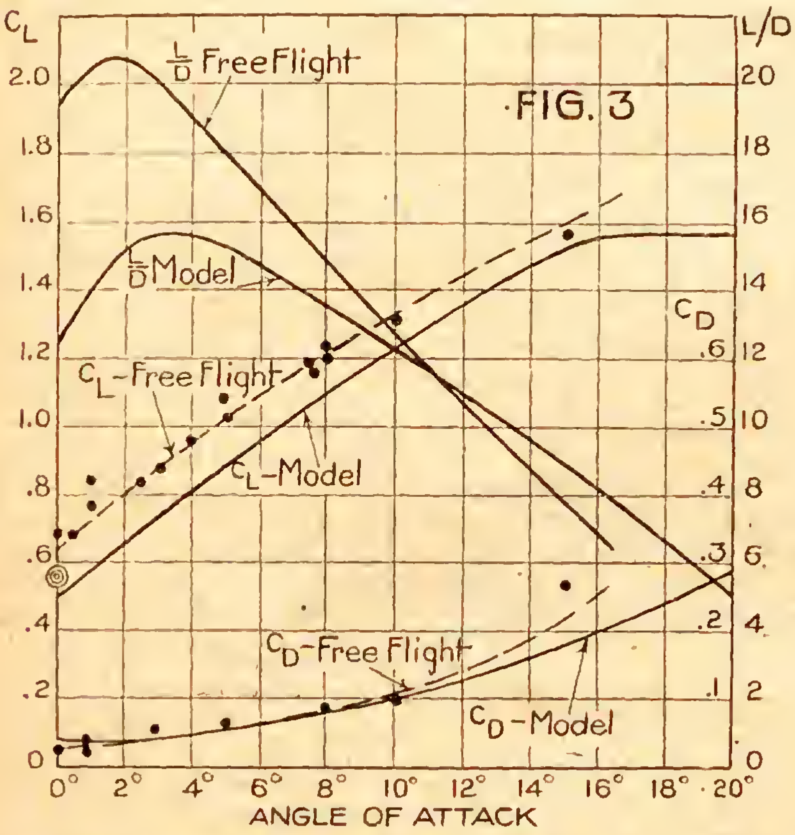
* Technical Note No. 77 of the American National Advisory Committee for Aeronautics.

when the pull in the wires decreases below a certain safe value the angle of attack will be automatically increased.

The lift and drag on the aerofoil are given by the following expressions where θ is the angle of trail from the vertical, W is the weight of the wing, D_1 is the effective resistance of the wires and supporting boom, and R the pull in the wires :—

$$L = R \cos \theta - W$$
$$D = R \sin \theta - D_1.$$



Testing Aerofoils in free flight : Fig. 3, Comparison of model and free flight tests of N.A.C.A., No. 64 section. Model 3 ins. by 18 ins. at 30 ft./sec. Free flight 12 ins. by 72 ins. at 60 m.p.h.

Precision.—The factors which enter into the computation of the lift and drag of the wing are the air speed, the tension in the wires, the angle of trail and the resistance of the wires and boom. An experienced pilot can easily hold an aeroplane within 1 m.p.h. of the given speed when the air is smooth, but if the air-speed reading is recorded with each reading of the balance even a greater variation than this is of little importance. By calibration over a speed course it should be possible to measure the air speed of the 'plane to within ± 0.5 m.p.h. If we fly, for example, at 60 m.p.h. this will introduce an error into the force readings of ± 1.5 per cent.

The tension in the wires, as far as the balance itself goes, can be measured as closely as desired, the limit of accuracy being the steadiness of the load. In these experiments it was found that the spring balance vibrated quite rapidly over a range of from 5 to 10 per cent. of the absolute reading, although a mean reading could be taken to the nearest pound. It is thought that this vibration can be greatly reduced by using a suitable dash-pot in the system. There is little doubt that the value of the resultant can be read to within one pound of its true value under all conditions.

The angle at which the wing trails back from the vertical may vary between 5° to 20°, according to the L/D of the aerofoil. It might be thought that a wing supported on wires 30 or 40 ft. below the aeroplane would make severe oscillations, but when the air is smooth the wing remains so steadily in one place that it is almost impossible with the eye alone to detect any relative motion with the aeroplane. When the telescope is used a slight oscillation can be observed, but this is so small and so regular that there is no trouble in obtaining a mean reading of the angle to 0.2°. An error of 0.2° in the trail angle will introduce an error in the drag of about 3 per cent. when the L/D is at a high value.

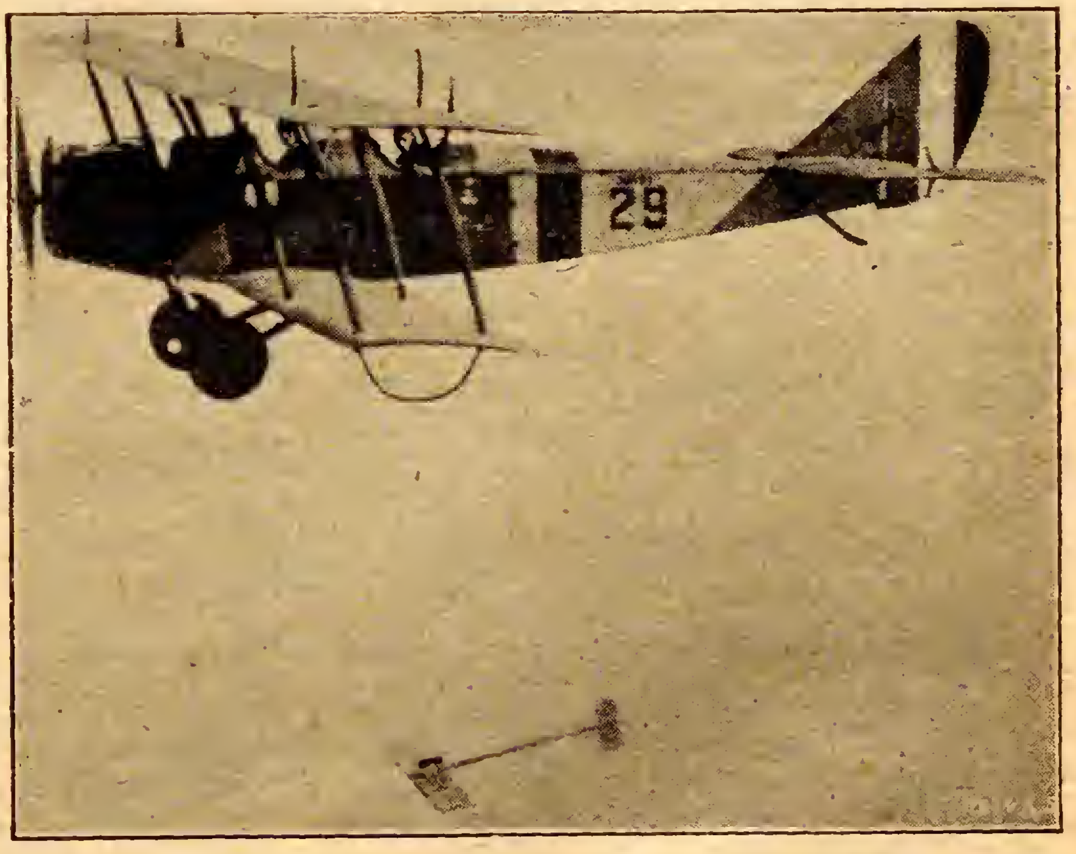
The method of measuring the angle of attack in this experiment was rather unsatisfactory, as the fore and aft oscillations of the wing, although small, produced a considerable longitudinal acceleration on the wing which made the bubble in the inclinometer vibrate back and forth over several degrees, so that an estimation of the angle of attack was quite difficult. It is believed that much better results can be obtained by calibrating the windlass in such a way that the angle of attack can be directly read from the cockpit. This would have the advantage in that it would allow the observer to set the angle to definite values each time. The angle of attack, however, is not of primary importance, and even if it was found that it could not be determined with accuracy, it would not greatly reduce the value of the test.

Another source of error which may be serious if care is not taken is the vertical direction of the flight path. By the careful use of a sensitive statoscope, levels should be maintained good to within 20 ft. in a mile, which represents about 0.2°. Larger errors than this, however, may be introduced, due to the rising and falling currents which are often present in the atmosphere. It seems probable, however, that rising and falling currents occur only when the air is bumpy, and as tests cannot be made in bumpy air, it does not seem as if the errors due to rising and falling current would be troublesome. It is always advisable to fly these tests either early in the morning or just before sunset, as the air at these times is almost sure to be smooth.

The true drag of the wing is the difference between the total drag of wing and supports and the supports alone. It is evident that the greater the resistance of the supports compared with that of the wing, the more accurately must all measurements be made. It is probable that the resistance of the supports in free flight can be cut down to one-half the minimum drag of the wing. This is as small a proportion of support drag as is usually obtained in wind tunnel tests.

The drag of the wires and boom may be determined either by a wind tunnel test or by trailing them in flight. The latter method has been tried out, and no difficulties were encountered. The interference between the boom and wing may be considerable, and should be measured in the wind tunnel on a model.

Results on the N.A.C.A. No. 64 Aerofoil.—A 12-in. by 72-in. aerofoil, as described above, was mounted on the aeroplane, and a test was made with the wing about 20 ft. below the balance. The two forward supporting wires were each .022 in. in diameter, while the rear wire was .015 in. in diameter. The drag of the wires and boom was measured by lowering the boom and wires alone and measuring the angle at which they trailed back at 60 m.p.h. In order to get the correct angle of trail the boom was constructed partly of lead. The oscillations of the boom were slightly greater than for the wing, but a mean reading could be taken with considerable accuracy. The resistance of the boom and wires—which



Testing Aerofoils in free flight : Photograph shows the model aerofoil suspended below a Curtiss aeroplane in which the balance is mounted.

varied, of course, with the angle of attack—amounted to 2 lbs. at zero angle, which is approximately equal to the minimum drag of the wing itself. In this test no attempt was made to obtain the interference between the boom and the wing; therefore the drag as read is probably somewhat high, which probably accounts for the abnormally high L/D measured for this section. The actual time required in taking the readings on the wing (Fig. 3) was not over 10 minutes, and the time in the air (two flights) was not over 30 minutes.

The results for this section are plotted in Fig. 3, together with the test of a model of the same aerofoil in the wind tunnel. It will be noted that the lift curve, although parallel to the model curve, is considerably higher at all points. Except in a few cases, the observed points lie fairly closely to their curve. The drag curves lie very close together, although the free flight values are somewhat lower at low angles of attack. Both the lift and drag curves show that the angle of attack in free flight was probably somewhat in error, and that both curves should be shifted about a degree to the right. The maximum L/D in free flight is rather high, reaching a value of 21 as compared to 16 for the model test. While the increase in scale would be expected to increase the L/D to a considerable degree, the free flight curve is probably too high, due to the fact that the interference between the boom and the wing was not taken into account. These results are only of the most preliminary nature, and no pretence is made for accuracy, but it is believed that, rough as they are, they demonstrate clearly the feasibility of this method.

Tests of Spheres and Streamlined Bodies.—In order to investigate the possibilities of measuring the drag of bodies in free flight, a bomb-shaped model and a sphere were each let down below the aeroplane on a single wire. The bomb oscillated considerably after changing speed or after turning, but if steady conditions were held it appeared as steady as the aerofoil. The sphere was equally steady, and even though the test was made on a bumpy day, the trail angle of 18° could be read to 0.5° with ease. There seems to be no reason why the resistance of spheres up to 3 or 4 ft. in diameter cannot be measured in this way with a high degree of accuracy. Unfortunately, the time was not available for making any actual measurements with these bodies, but it is hoped that extensive work of this kind can be carried out in the near future.

Conclusion.—The results from this investigation demonstrate that it is possible to make tests on large wings in free flight with a considerable amount of ease and accuracy. It is recommended that further work be carried out along this line on an aeroplane of greater capacity and on wings of larger size. In this connection a balance should be designed which will automatically record the air speed, the force on the wires and the angle of trail for each angle of attack. It would also be advisable to record the force on the rear wire separately so that the moments of the wing could be determined.

On the larger wings it will also be necessary to provide a power windlass for lowering and pulling up the wing, and, as suggested before, an electrical safety device to prevent the wing from getting a negative loading. It is believed that if such a balance and apparatus is designed, wings of 30 ft. span and 5 ft. chord can be tested as quickly and accurately at a speed of 100 m.p.h. as a small model can now be tested in the wind tunnel.

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CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

SOARING FLIGHT

[2053] While bound from Bombay to London on the P. and O. S.S. *Delta*, being interested in the subject of the flight of seagulls, I performed the following experiment to test the assertion that their soaring is due to their taking advantage of an ascending current at the stern of the steamer. At about 5 p.m. on February 19, 1922, the ship was about 70 miles north of the Daedalus reef in the Red Sea and proceeding towards Suez at a speed of about 14 knots. There was a moderate breeze (force 3) blowing from right ahead and a moderate short sea from the same direction. A large number of gulls were present. A reel of cotton was unwound and the thread allowed to stream astern. Its end was carried upwards at an angle of about 60° with the horizon to a height of about 15 ft. above the rail of the ship. On unreeling more cotton, the end gradually assumed a more horizontal position until it reached a point about 30 ft. from the stern, when it began to be carried downwards. The thread now took the form of a parabola rising upwards from the stern, and at about 30 ft. away descending at about the same angle. Thus it was proved that an ascending current existed just aft of the stern and that further to leeward there was a descending current. Contrary to what one might expect, it was only in this descending current that the gulls indulged in soaring flight. On one occasion the thread at the point where it was in the descending current became entangled with a gull, and about 10 ft. of it was carried away by the bird. The gulls seemed carefully to avoid the ascending current. Sometimes a gull did get within its range. When this happened there was much flapping until the bird regained the descending current further to leeward. The zone of the descending current did not seem to extend very far. It was noticed that when a gull went down to water level after food, on again starting it had to flap until it reached the region of the descending current, when it at once resumed its effortless soaring flight. My observations were continued for about half an hour, during the whole of which time the behaviour of the gulls was as above described.

F. CLARK
(Navigating Officer B.I. Co.)

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN FEBRUARY 19 AND MARCH 4, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon-Paris	39	88	19	34	34	2 48	D.H. 4a G-EAWH (1h. 55m.)	B. (2), Br. (1), D.H. 4 (1), D.H. 18 (3), G. (6), H.P. (1), Sp. (6), V. (1).
Paris-Croydon	42	118	10	36	40	3 3	D.H. 18 G-EAWW (2h. 8m.)	B. (3), Br. (1), D.H. 4 (1), D.H. 18 (3), G. (7), H.P. (1), Sp. (6), V. (1).
Totals for 2 weeks ...	81	206	29	70	74			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

Av = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

ROYAL AERONAUTICAL SOCIETY

(OFFICIAL NOTICES)

Elections.—The following Members have been elected :—

Fellow.—John Case.

Associate Fellows.—Sir Arthur Whitten Brown, L. J. Jones.

Students.—J. Calderwood, H. Gornez-Cornejo, E. Arthur Skinner, F. B. Ford.

Member.—D. Longden.

Associate Members.—George Hoare, Hugh Lambert Reilly, E. E. D. Smith, C. J. Wood.

Civil Aviation Advisory Board.—Lieut.-Col. M. O'Gorman, C.B. (Chairman), has been nominated to represent the Society on the Air Ministry Civil Aviation Advisory Board.

International Air Congress, 1923.—At the request of the Society of British Aircraft Constructors the Chairman (Col. M. O'Gorman, C.B.), Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., and the Secretary have been nominated to represent the Society on a Committee to consider the holding of an International Aeronautical Congress in London in 1923.

Lectures.—The following lectures will take place at 5.30 p.m. at the Royal Society of Arts, John Street, Adelphi, W.C., during the month of March :—March 16, Dr. V. E. Pullin on "Radiological Inspection Work" ; March 30, Capt. G. de Havilland on "Design of a Commercial Aeroplane."

Students' Meetings.—The next Students' Discussion Meeting will be held in the Society's Library at 7 p.m. on Thursday, March 23, when Mr. S. H. Evans will open the discussion with a paper on "Some Notes on a Commercial Aeroplane." Mr. A. V. Roe will be in the Chair.

Annual General Meeting.—The Annual General Meeting will be held in the Society's Library at 5 p.m. on Tuesday, March 28. Nominations of Candidates for the Council Elections must reach the Secretary not later than Tuesday, March 7, and resolutions to be laid before the Meeting not later than Tuesday, March 14.

Library.—The following books have been added to the Society's Library :—"Les Vainqueurs de l'Air," by H. de la Vaulx ; "Grundlagen der Flugtechnik," by Dr.-Ing. H. G. Bader ; "Notes and Examples on the Theory of Heat and Heat Engines," by John Case.

W. LOCKWOOD MARSH,
Secretary

LONDON TERMINAL AERODROME

Monday, February 6, 1922.

TRAFFIC is increasing steadily week by week. Last month there were more than double the number of passengers who travelled in January, and already this month is showing a still greater upward trend. Handley Page Transport still get the lion's share of the traffic. Today, for instance, they had 10 passengers, while other lines shared one between them.

Days are now long enough for double trips, and today both the Handley Page D.H.4a and the Instone "Vimy" left about 9 a.m. for Paris, with the intention of returning the same day, thus foreshadowing the beginning next month of regular daily double trips. At a rough estimate, there will be over 30 machines a day in and out of the aerodrome this summer. The K.L.M. reopen with a double service on April 18. Monoplanes will leave London at 10.30 a.m. and 2 p.m. daily, while from Amsterdam the times will be 10 a.m. and 2 p.m. Several new pilots, all of Dutch nationality, will be on the service—all the British pilots having left the Company one by one.

The Instone Air Line propose, I understand, to run three services a day in each direction between London and Paris. One of these is to be an early morning service for goods, and it is proposed that this shall leave the terminal aerodromes about 2.30 a.m. The idea of this service is to speed up the delivery of goods so that they make the journey between the sender and their destination during the time business houses are closed. In addition to London business houses, those in the provinces will also benefit by this arrangement, as parcels sent off by evening passenger trains can be collected and delivered to the aerodrome in time to catch these early morning machines.

32 "Air Expresses" Daily

THE Daimler Airway intend to run four services a day, the Messageries Aériennes two, the Grands Express two, Handley Page two and the S.N.E.T.A. one. This gives a total of 16 in each direction, or 32 a day. It is to be hoped that some agreement will be arrived at between the various companies, so that there is not a big batch of machines going off all together and then a long gap before the next. It should be quite easy to arrange, with this number of machines, for an hourly service throughout the day.

One of the Messageries Aériennes machines, *en route* from Paris to Croydon, force-landed in a field near Orpington on Saturday. The engine of the machine kept cutting out, owing to some obstruction in the petrol pipe, and the pilot, who had followed the Thames up, having skirted the coast owing to thick weather inland, found himself so low near Orpington that he decided to land. The field in which he descended is so small, however, that it will be necessary to dismantle the machine and bring it to Croydon by road.

Two of the Maybach-engined Goliaths of the S.N.E.T.A. are running between Amsterdam and Brussels, and delivery of the other four is expected any time now.

Capt. Leverton tells me that the K.L.M. monoplanes have all been thoroughly overhauled and done up during the winter, and have had emergency exits fixed in the roof of the cabins leading out on to the top of the wooden wing. Incidentally, Mr. Calvert, who has been in charge of K.L.M. engines in Amsterdam, has left to join the Daimler Airway, and is to be stationed at Paris.

New Fuel Storage Plans

BIG extensions of the bulk-storage petrol systems are contemplated. The Anglo-American and the Shell-Mex are both to establish new tanks and pumps, while the B.P. people are also, it is rumoured, to instal bulk storage. When all the services are running this summer, and machines have to be turned round quickly, there is no doubt that the present arrangements would be insufficient.

Two new acetylene flares have been installed, one on the top of the hangars, and the other in the junction of the landing "L." These are coloured red by means of strontium, the official name for them being, in fact, strontium beacons. They are intended to act as fog-piercing lights. On Thursday a Service Handley Page flew over after dusk to carry out tests on these new flares, and made two landings, one with the ordinary paraffin flares, and one with the electric landing lights. Both landings were bumpy, the pilot, apparently, being chary of the fence. The fence, in fact, came in for a good lot of criticism, all the people in the machine being of the opinion that it was a danger to night-flying machines. They wanted to know why it had been erected. This, of course, has been puzzling many on the aerodrome, and the solution to the mystery is known only to the favoured few.

Belgian Aero Club Competition for Touring Machines

DETAILS of the International Competition for Touring aeroplanes organised by the Ae.C. of Belgium at Brussels on June 23-25 are now to hand. The competition is open to touring machines, single-seaters or multi-seaters, whose engine capacity does not exceed 7 litres. The course is to be Brussels-Gosselies (landing) 47 km. Gosselies-Brussels-Gosselies-Brussels (landing) 141 km. on Saturday, June 24. The awards will be made for a total of 100 points, allotted as follows : 30 points for minimum of space occupied in the garage, 30 points for general economy of the engine, 25 points for slow landing, and 15 points for quick get-off. The machines entered must be on the Evere aerodrome at Brussels before noon on June 22. The prizes are as follows : The King of Belgium's Challenge Cup, to be retained by the winner for one year ; and the following cash prizes : 1st prize, 15,000 francs ; 2nd prize, 7,000 francs ; and 3rd prize, 3,000 francs. All enquiries should be addressed to Secretariat de la Commission Sportive, Aero-Club de Belgique, 73, Avenue Louise, Brussels. The entrance fee, returnable if machine starts, is 100 francs, and should be sent to the Treasurer of the Belgian Aero Club before June 10.

Cairo-Baghdad Air Mail

THE Postmaster-General stated on March 2 that the air mail which was dispatched from London on February 9 reached Baghdad on February 27. The mail due to be dispatched by air from Baghdad on February 18 reached Cairo on February 23, and letters included in it for this country arrived in London on March 3.

The next air mail to Baghdad will be dispatched from London today (Thursday, March 9).

CIVIL AVIATION ADVISORY BOARD

The Air Ministry announces that the Civil Aviation Advisory Board, the creation of which was announced by the Under-Secretary of State for Air at the recent Air Conference, has now been set up with the following terms of reference:—

"To advise generally on the development of Civil Aviation, and to report upon any specific point which may, from time to time, be referred to the Board by the Secretary of State for Air."

The constitution of the Board is as follows:—

Chairman: The Under-Secretary of State for Air (The Rt. Hon. Lord Gorell, C.B.E., M.C.).

The Controller-General of Civil Aviation, Air Ministry (Maj.-Gen. Sir Frederick H. Sykes, G.B.E., K.C.B., C.M.G.).

The Director-General of Supply and Research, Air Ministry (Air Vice-Marshal Sir W. G. H. Salmond, K.C.M.G., C.B., D.S.O.).

General Post Office (Brig.-Gen. F. H. Williamson, C.B.E.).

Air League of the British Empire (Maj.-Gen. Sir W. Sefton Brancker, K.C.B., A.F.C.).

Association of British Chambers of Commerce (Mr. Edward Manville, M.P.

Federation of British Industries (Mr. H. James Yates).

Lloyd's (Lt.-Col. Sir Frederick Hall, K.B.E., D.S.O., M.P.).

Royal Aero Club (Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S.).

Royal Aeronautical Society (Lt.-Col. Mervyn O'Gorman, C.B.).

Society of British Aircraft Constructors, Ltd. (Sir Henry White Smith, C.B.E.).

Mr. F. G. L. Bertram, C.B.E. (Secretary), Air Ministry.

Arrangements have also been made for consultation, when required, with representatives of the Dominions.

The Secretary of State has decided to refer to the Advisory Board, as the first subject upon which he desires its recommendations, the question of the cost and practicability of an Imperial Air Mail Service.

The Advisory Board held its first meeting on Thursday, March 2.

AN AIR "TOKEN" VOTE

Last week-end a note explaining a "token" Air Votes Supplementary Estimate for 1921–22 amounting to £10 was issued from the Secretary of State for Air, the Supplementary Estimate being issued later in the day. This showed that the sum it was sought power to utilise was £802,540, and that the extra cost of the revised programme for Air Services in the Middle East was estimated at £450,000; towards meeting the cost of the emergency measures taken during the coal dispute estimated at £309,100; and towards meeting the cost of research work carried out by the Department of Scientific and Industrial Research estimated at £43,450; also for the revised programme of works service in the Middle East and elsewhere.

It is mentioned in the explanatory statement that when it was decided that the cost for all Middle Eastern services should be accounted for by the Colonial Office, there was an item under the sub-head "Repayment to Air Ministry of expenditure on Air Services." "No provision for utilising any portion of such credit has hitherto been made," continues the statement, "and the prescribed Parliamentary form for so doing is in the form of a 'token' Supplementary Estimate.

"Owing to the more extended use of the Air Force, with the object of reducing total expenditure in the Middle East, the provision for Middle East Air Services contemplated in February, 1921, will be insufficient, and a further sum of £440,000 in all (partly voted in July, 1921, and partly embodied in the recent Middle East Supplementary Estimate) will be required for those Services.

"Expenditure arising from the emergency measures taken during the coal dispute last year, amounting to £309,000, was also outside the provision made in February, 1921, and requires the covering sanction of Parliament, which has already been given to similar expenditure from Navy and Army Votes.

"Notwithstanding these considerable unforeseen liabilities, economies effected in other directions during the current financial year will be sufficient to meet them, and, moreover, to leave over an unexpended balance, of a substantial but at present uncertain amount, for surrender to the Exchequer.

"The opportunity is taken of reporting to Parliament the cost of certain important works services which, with Treasury sanction, have been commenced in anticipation of Parliamentary authority on account of their urgency. These services are: (1) a revised programme of works expenditure in Egypt, Palestine and Irak, due to decisions taken after the original estimates were framed; and (2) the removal of the Instrument Design Establishment from Biggin Hill to the Royal Aircraft Establishment at Farnborough, a step which has been taken with the object of securing substantial permanent economies by the amalgamation of the two establishments."

FRENCH AIR TRAFFIC

The French Department of Aeronautics and Air Transport has issued a statement giving traffic figures in connection with the progress of commercial aviation in France during the years 1919, 1920 and 1921. Considering the handicap under which aviation has been carried on by the companies concerned, these are very encouraging. The following is a summary of the official figures:—

Year.	Journeys made.	Miles covered.	Passengers carried.	Parcels, lbs. (approx.)	Letter Mails, lbs.
1919 ..	988	158,606	588	14,000	900
1920 ..	2,386	529,454	1,721	110,000	9,000
1921 ..	6,221	1,457,437	10,336	375,000	21,000

Figures which are available for the air mail between France and Morocco for 1921 are also very instructive. In the "round" journey there and back the increases have been very marked. In January, 1921, the total was 16,377 letters; in January, 1922, the number was 50,851, equal to over 300 per cent. increase. Curiously, the dispatchings from Morocco to France were greatly in excess, viz., 32,691, as against 18,160 in the reverse direction. So steady has been the growth of the air mail that it has determined the Secretary of State to augment the facilities by increasing the service between Toulouse and Casablanca from three to five times per week as from this month—necessitating a fleet of 90 craft. The following monthly figures of letters carried during 1921 speak for themselves:—

February, 12,025; March, 14,005; April, 17,179; May, 18,878; June, 22,738; July, 28,108; August, 34,283; September, 35,006; October, 40,601; November, 41,330; December, 47,235.

Helicopter Prize

The Air Ministry announces that the Air Council have under consideration the offer of a prize of £50,000 for a Helicopter flying machine which complies with certain tests. The conditions under which entries will be received will be announced at a later date, and until this announcement is made no applications or inquiries on this subject can be dealt with, whether made personally or in writing.

Certain applications have been received as the result of a premature announcement in the Press some weeks ago. These will not be dealt with in the meantime.

No. 214 Squadron Reunion Dinner

The first reunion of No. 214 (Handley Page) Squadron took place at Pinoli's Restaurant, Wardour Street, on the 25th ult., when over 70 old members attended for dinner. The company rose to "Our Fallen Heroes" before commencing dinner, and a capital musical programme was provided. Unfortunately, the Committee are still out of touch with many old comrades, but it is hoped that the meeting will show an improvement next year. Will any old members communicate with the Secretary, Mr. R. J. Mitchell, 80, Station Road, Harrow, for registration of their addresses?

TESTING AIRCRAFT TO DESTRUCTION

By Wm. D. DOUGLAS, A.R.C.SC.I., A.F.R.Ae.S.

This paper, read before the Royal Aeronautical Society on March 2, was one of considerable interest inasmuch as it gave those who are not familiar with modern methods employed in testing to destruction aeroplanes and their components an excellent idea of the thorough manner in which these tests are carried out, and the pains that are taken to ensure that, so far as our knowledge of load distribution and stresses goes, actual flying conditions are correctly and fully represented. It is not possible entirely to do so, and a certain number of assumptions must be made. There is little doubt, however, that tests to destruction do form a very useful check on the assumptions that necessarily have to be made in stress calculations, and there are cases in which nothing but such tests will give an accurate indication of the strength of certain structures or components. The somewhat cumbersome expression "test to destruction" is used as being more descriptive of what actually takes place than the older name "sand test." The latter is also, of course, misleading in so far as it indicates that the tests are carried out by loading the wings or machine with sand bags. This was done in the earlier days, but was found unsatisfactory, and for several years the sand bags have been superseded by accurately weighed shot bags, or by lever systems.

Before proceeding to a description of the actual methods of testing, the lecturer showed lantern slides of a number of typical failures which are obtained from time to time. Among these were illustrations of the yielding of timber under steel fittings, bolts shearing through the wood, crushing of timber under a metal fitting, owing to too great bearing pressure, failures due to off-set attachments of control levers, pulleys, etc., and buckling of undercarriage struts.

In the formulation of any test, the lecturer stated, the following procedure is usually adopted: (*a*) the particular conditions to be represented are ascertained; (*b*) The air loading under these conditions is obtained, or assumptions founded on the best aerodynamical data available are made; (*c*) In many cases it is necessary to assume some modification of the above airloading to suit the limitations of the test loading process; (*d*) Arrangements are made for the gravitational or other acceleration forces, which balance the air force, to be represented by controlled reactions supplemented, if necessary, by other applied forces.

For any given speed, the maximum lift force on the planes will occur when these are at their angle of maximum lift. In practice this might occur at high speed on pulling out of a dive, and machines are therefore tested under conditions representing such a case, *i.e.*, with high loading at large angles. Except in unusual cases, it is customary to assume that the drag component is 1/7 of the lift. The machine to be tested is mounted in such a manner, inverted of course, that gravitational force represents in direction and magnitude the resultant air force on the machine. In order to avoid excessive complication it is customary, in stress calculations, to regard the attachments of the main plane structure to the *fuselage* as being fixed relatively. In testing, this is not necessary, and consequently it is possible to arrange for the main plane attachments to deflect relatively to the *fuselage*. Four to six points of support, corresponding with the main weights such as engine, tanks, crew, undercarriage, etc., are slected, and supports placed under them, using a simple system of levers to ensure that the reactions have the desired relative values. For equilibrium a further force will be necessary; this may be supplied by securing the tail plane at, say, the hinges of the elevators. The reaction will then represent roughly the aerodynamic load on the tail plane under the flight conditions assumed. The wings are loaded (still in the inverted position, of course) with shot bags, usually placed in two rows along the spars, the relative value of the two rows being so arranged that the resultant centre of load coincides with the assumed position for the centre of pressure.

Measurements.—Although frequently the primary object of the test is to determine the ultimate load, an endeavour is always made to obtain from the test a maximum amount of information by means of observation and measurement of distortions. In tests of the main plane structure information can usually be obtained bearing on the deformation of the structure, the distribution of loads in members, the deformation of the spars, and the bow of struts. As regards deformation of the structure, this may be obtained from measurements which give the rise or fall of strut points on the top spars, from changes in stagger, or from the movement of fittings. The first is obtained from readings taken by means of a "Y" level on a graduated staff. Change of stagger may be detected at the trailing edge of the planes by plumb lines of fine copper wire, while arrangements can be made to observe and measure displacement of fittings, if such expected. The distribution of load in the various members can be determined by the use of strain gauges on the wires and cables. The lecturer pointed out that the use of tensionometers has been extensively considered, but that no satisfactory form has been discovered. Recourse has, therefore, been had to measuring the strain in the member direct by means of a suitable extensometer and calibrating the actual wire and instrument at some previous or subsequent time. Unfortunately, a commercial extensometer does not appear to be available, but the lecturer stated that a form of photographic instrument, at present in the experimental stage, promises to give greatly improved results. The deflection of spars can be measured while measuring the deflection of the whole structure, provided, of course, measurements have previously been made of any initial non-alignment that may exist. The lateral deflection, or "bow" of struts is usually measured at the centre of their length.

A test of the main plane structure for conditions corresponding to high speed is very similar, except that the attitude of the machine is, of course, different, and the reaction at the tail support is generally greater, stressing the rear portion of the *fuselage* to a greater extent. The lecturer also referred to tests of a machine corresponding to the conditions of a nose dive at terminal velocity. This test is expensive, and is, the lecturer stated, only justified in exceptional cases. Occasionally a machine is tested in the upright position, to represent conditions of inverted flight.

Testing auxiliary surfaces.—Owing to the somewhat meagre knowledge of the load distribution on control surfaces, these are tested under somewhat arbitrary load distributions. *Ailerons*, elevators, and rudders are usually tested by supporting the aeroplane itself in such a position that when in its normal position relative to the machine, the control surface is horizontal. A triangular load distribution is assumed, and to represent this the loading is so arranged that its centre of gravity is everywhere one-third of the distance from leading to trailing edge behind the hinge joint. The tests are carried out with the controls secured in place by a cable attached to a spring balance, so that by reading the balance one can see what force the pilot would have to exert to hold the member under the assumed load.

In default of definite information relating to the load distribution over a tail plane and elevators, it is assumed that a sufficient approximation can be attained by loading the tail plane at the rear spar or at the hinges of the elevators.

Testing fuselages.—Although the *fuselage* will have been tested to a certain extent by the previous tests, there are others and more severe ones carried out, especially on the *fuselage*, notably that for torsional resistance, in which the *fuselage* is supported at the point of attachment of the rear spars of the lower plane, and the rear portion twisted by applying forces in opposite directions to the rear spar of the tail plane. In the case of *monocoque fuselages* it is sometimes a matter of considerable difficulty to record the indeterminate distortions which occur in the skin. Sometimes it is useful to outline with chalk the bulges and dents which form in the ply-wood skin, using white chalk for the former and black chalk for the latter.

Undercarriage tests.—On the subject of undercarriages, and methods of testing them, the lecturer had a good deal to say. Static tests of undercarriages are made by supporting the *fuselage* in the inverted position, with the chord of the bottom plane horizontal, and applying load to the axle. This represents, of course, the case where the resultant force on the axle is normal to the chord. Where hydraulic or pneumatic energy-absorbing devices are fitted, the static test is useless, and in such cases dropping tests are carried out. In the dropping test the undercarriage, either whole or in part, is attached to a pair of shafts, hinged at their other end and carrying, above the undercarriage to be tested, a trough or platform which can be loaded with shot bags to represent the weight of the aeroplane for which the undercarriage is intended. A quick-release is provided, and in descending the wheels alight on a couple of platforms so arranged on rollers as to allow them a certain amount of travel parallel with the axle, thus allowing the wheels to "splay" as the axle bends.

Rib Tests.—Reference has already been made to the testing of main planes, and to the method adopted of placing the load along the main spars. This loading does not, of course, determine the strength of the ribs, and supplementary tests are, therefore, necessary. The chief difficulty lies in determining the distribution of the loading on the rib. This is influenced by three main factors: the distribution of air forces, the re-distribution of these forces through the medium of the fabric covering to the ribs, either directly or through leading and trailing edges, and the stresses introduced by the initial tension of the fabric. The distribution of the air forces must be assumed from tests on wing sections, and the stresses introduced by the doped fabric, as they may be considerable and cannot be estimated accurately, can best be reproduced by covering a test section of plane, taking care that the dummy end ribs are very stiff. As it is extremely difficult to calculate the distribution of stresses in the covering of a plane, assumptions must be made. The lecturer referred to the method described in R. & M. No. 344, and to the duplicate levers used for testing two ribs simultaneously. An exceptional case occurs when certain sections, such as R.A.F. 15, are flying at very high speed and at a small angle of incidence. Under these conditions, the top surface is heavily loaded, while the lower surface has loads varying from positive to negative, but never being of great magnitude. For such a case it is sufficiently accurate to remove panels of fabric from the lower surface, and to apply a load of loose shot to the top surface, the wing being, of course, inverted.

The lecturer concluded with a description of the standard type of shot bag employed at the Royal Aircraft Establishment.

Personals

Married.

Flight-Lieut. **Walter Fraser Anderson**, D.S.O., D.F.C., 45th Squadron, R.A.F., youngest son of the late Capt. John Weir Anderson, of Toronto, Canada, was married on February 2, at the British Consulate, and afterwards at All Saints' Church, Cairo, to **Phyllis Mary**, only daughter of Mr. **William O. Joseph**, of Zeitorin, Cairo.

Eric Burton, R.A.F., son of Mr. and Mrs. F. Burton, of Hildenborough, was married on March 4, at St. Mary's, Chiddingstone, to **Jessie Vivienne**, younger daughter of Mr. and Mrs. **Sydney Freeman**, of Waterlake, Chiddingstone, Kent.

To be Married

The engagement is announced of Maj. **Alan M. Morison**, A.F.C., Croix de Guerre, late R.A.F., of Togston Hall, Acklington, Northumberland, only surviving son of John Morison, of 18, Windsor Terrace, Newcastle-on-Tyne, and Mrs. Morison, and **Hilda Blanche**, younger daughter of **Joseph Thompson**, of East Cliff Mansions, Bournemouth, and Mrs. **Thompson**.

The engagement is announced of Mr. **A. Baldwin Raper**, M.P., late R.A.F., to the **Marchioness Conyngham**.

Death

Maj. **Percy Russell Grace**, who died on February 27 at Wrotham Heath, Kent, was the fourth surviving son of the late J. W. Grace, for some time of Leybourne Grange, Kent, and of the late Mrs. Grace, of Elm Park House, London. Born in 1879, he was variously educated in England, America and Germany, and studied engineering at considerable length. He was one of the first to own a motor-car, and again, when flying machines were still in their infancy, he and his brother, Mr. Cecil S. Grace, the well-known airman, who lost his life in the Channel in 1910, went to Sheppey in the late autumn of 1908. Here the brothers established a staff of skilled workmen and admirably equipped workshops.

Owing to his marriage and the death of his brother, he was not able to continue in aeronautical work. During the War he served in the Flying Corps and contracted tuberculosis in a very virulent form. From this he never recovered entirely, remaining an invalid until the time of his death.

"Safety First" Air Prize

A prize of 25,000 francs is offered by the French "L'Union pour la Sécurité en Aéroplane," for the best safety device or scheme for flying in fog or at night submitted during 1922. Details governing the award are not yet available, but those interested can communicate with the Association at 35, rue Francois-Ier, Paris.

Seaplane Contest at Marseilles

It is announced that the Aviation Committee of the Colonial Exchequer, to be held at Marseilles this year, have definitely decided to organise a contest for seaplanes from April 17 to 19. There will be three categories: under 150 h.p.; 150 to 400 h.p.; and over 400 h.p.

Eliminatory trials are to take place on April 17 when entered craft must ascend to 1,000 metres, and have on board, in addition to the normal useful load, sufficient fuel for 1½ hrs. flight. The course, Marseille-Monaco, is 413 kilom. Prizes to the extent of over 40,000 francs are offered. An entrace fee of 200 francs (returnable in its entirety) obtains, and communications should be addressed to the Aviation Commission, A. C. de France. Military competitors will take part *hors concours*, a trophy being their recompense.

To Improve upon "landing" on Water

In France our contemporary *L'Auto*, has raised the point of finding a verb better to define "landing" on water. Suggestions, weird and otherwise, are naturally forthcoming, amongst them being aquarir, aquater, and afflotter. For our own part, we get over it by putting the trouble on to "alighting."

Gliding in Germany this Year

From reports from Germany it appears that the gliding competitions which started on quite a modest scale a couple of years ago are to assume greater proportions in the future. Not only are the Rhön competitions to be resumed this summer, but it is stated that a new prize of 100,000 marks is to be offered for the first German glider which makes a flight of 40 minutes' duration over a course similar to that of a yacht race. Presumably this means over a triangular course. The prize, it is reported, is to be offered by the Society of German aircraft constructors, after consultation with the German Aero Club, and the German Aeronautical Society. The conditions are sufficiently difficult, coupling as they appear to do a duration of 40 minutes with a specified course. One or the other might be fairly easily attainable, but the combination of the two is so difficult that one doubts whether the prize will be won for some considerable time.

Rather Suggestive

An evening contemporary, in referring to extra summer attractions proposed for Southend, sets out that "an enterprising Brixton firm have secured the right to establish a seaplane or hydroplane service from the shore near the pier. For every passenger they take aboard they pay the Corporation 6d.; *if they bring him back they have to pay another 6d.*"

We are just wondering how much the firm will have to pay if they don't!

Students' Section R.Ae.S.

The Students' section of the Royal Aeronautical Society is rapidly gaining in popularity. The attendance at the meetings is increasing, and altogether the section is proving extremely useful. On March 23 a paper will be read by Mr. S. H. Evans, Hon. Sec. of Students' Section, entitled "Some Notes on Commercial Aircraft." On April 7 Prof. L. Bairstow will read a paper on "Some Outstanding Problems in Aeronautics." The meeting for April 7 will be the "Annual Lecture" of the Students' section, and it is hoped to make this a permanent feature to be held at the close of each session. To this lecture all grades of the Society will be admitted. Both meetings referred to will be held at the R.Ae.S. Library, 7, Albemarle Street, W. 1, at 6.45 p.m. The Chairman on March 23 will be Mr. A. V. Roe.

THE ROYAL AIR FORCE

London Gazette, February 24, 1922

Medical Service

Flight Lieut. W. B. Wilson is dismissed Service by sentence of General Court-Martial; February 10.

Memoranda

Two Cadets are granted hon. commns. as 2nd Lieuts., with effect from dates of their demobilisation.

London Gazette, February 28, 1922

General Duties Branch

Flt. Lt. W. F. Anderson, D.S.O., D.F.C., is granted a permanent commn., retaining his present substantive rank and sen.; July 21, 1920. *Gazette*, July 23, 1920, appointing him to a short service commn., is cancelled. R. H. S. Mealing is granted a short service commn. as a Flying Offr., with effect from and with sen. of Feb. 16.

The follg. Pilot Offrs. on probation are confirmed in rank:—H. A. Bayne, N. M. Ffrench, H. P. L. Gardner, A. E. Golds, F. L. Hudson, B. J. J. Nimmo, R. H. Windsor; Mar. 1.

The follg. are restored to full pay from half-pay:—

Flt. Lts.—P. B. Hunter, A. L. Messenger, A.F.C., Obs. Offr. L. T. Kerry; Feb. 17.

Wing Comdr. P. S. Rickcord (Lt.-Cdr., R.N.) is re-attached to the R.A.F. for a further period of two years; March 1. Sqdn. Ldr. A. A. E. Robinson, O.B.E. (Paymr. Lt.-Cdr., R.N.) relinquishes his temp. commn. on return to Naval duty; Feb. 15.

Medical Service

A. C. Ransford is granted a temp. commn. as a Flt. Lt., with effect from and with sen. of Feb. 13. Capt. H. J. Higgins, Army Dental Corps is granted a temp. commn. as Flt. Lt. while attached for duty with the R.A.F.; Jan. 25. He will continue to receive emoluments from Army funds.

Memoranda

Four Cadets are granted hon. commns. as Sec. Lts. with effect from the dates of their demobilisation.

Hon. Sec. Lt. P. L. Martin relinquishes his hon. commn.; June 3, 1921.

London Gazette, March 3, 1922

General Duties Branch.

Wing-Comdr. F. Ranken, O.B.E., is placed on ret. list; March 1.

Memorandum.

Sec. Lieut. (Hon. Capt.) J. R. Cassidy to be Lieut. (T.), but with pay and allces. of that rank (Grade A) between Aug. 22, 1918, and Jan. 10, 1919, only, and to be Hon. Capt.; April 23, 1918 (*Gazettes* Aug. 5, 1919, Aug. 26, 1919, and Sept. 16, 1919, concerning this officer are cancelled).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Flight-Lieutenants.—C. E. W. Lockyer, from No. 208 Squadron (Middle East Area) to R.A.F. Depôt (Inland Area). 25.1.22. H. J. Higgins, to R.A.F. Depôt (Inland Area) on attachment from Army Dental Corps, 25.1.22, and to School of Technical Training (Men) (Inland Area). 8.2.22. O. St. Leger Campion from No. 100 Squadron No. 11 (Irish) Wing to No. 2 Squadron No. 11 (Irish) Wing. 8.2.22. W. A. Malone from School of Army Co-operation (Inland Area) to R.A.F. Depôt (Inland Area). 29.11.21. C. Pilkington, A.F.C., from R.A.F. Depôt (Inland Area) to No. 4 Squadron (Inland Area). 18.2.22. W. G. Weston, M.B., to research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to Temporary Commission. 30.1.22, and to R.A.F. Depôt (Inland Area). 14.2.22. T. L. P. Harries, M.B., to Research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to Short Service Commission. 30.1.22. and to R.A.F. Depôt (Inland Area). 14.2.22. B. J. Silly, M.C., D.F.C., from Central Flying School (Inland Area) to No. 5 Flying Training School (Inland Area). 15.2.22. H. L. Nunn, D.S.C., D.F.C., from No. 230 Squadron (Coastal Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 21.2.22. E. A. E. Wood from Air Ministry (Director-General of Supply and Research) to R.A.F. Depôt (Inland Area). (Supernumerary.) 3.2.22. A. R. Churchman, D.F.C., from R.A.F. Depôt (Inland Area) to Headquarters (Inland Area). 13.2.22. A. R. Arnold, D.F.C., A.F.C., from R.A.F. Depôt (Inland Area) to R.A.F. Cadet College (Flying Wing) (Cranwell). 15.2.22.

Wing Commanders.—W. H. Primrose, D.F.C., from No. 6 Flying Training School (Inland Area) to R.A.F. Depôt (Inland Area). 20.2.22. H. L. Reilly, D.S.O., from School of Naval Co-operation and Aerial Navigation (Coastal Area) to command No. 6 Flying Training School (Inland Area) *vice* Wing Commander W. H. Primrose, D.F.C. 20.2.22. P. B. Joubert de la Ferte, C.M.G., D.S.O., from Air Ministry (Directorate of Operations and Intelligence) to Air Pilotage School (Cadre), (Inland Area). 12.12.21.

Squadron Leaders.—C. L. Colbran, from Headquarters (Inland Area) to Headquarters (Coastal Area). 1.3.22. D. Blair, from Headquarters, No. 1 School of Technical Training (Boys), (Halton) to Headquarters (Inland Area). 23.2.22. R. S. Maxwell, M.C., D.F.C., from R.A.F. Depôt (Inland Area) to Air Ministry (Directorate of Training and Organisation). 18.2.22. J. A. Stone, from R.A.F. Depôt (Inland Area) to Headquarters (Inland Area). 17.2.22. Augustine ap Ellis, from Headquarters (Inland Area) to command No. 208 Squadron (Middle East Area). 17.2.22. C. O. F. Modin, D.S.C., from No. 230 Squadron (Coastal Area) to command No. 216 Squadron (Middle East Area). 17.2.22. A. J. Currie, from Record Office (Inland Area) to Headquarters (Middle East Area). 17.2.22.

Flight Lieutenants.—H. G. Bowen, from No. 100 Squadron, "D" Flight, No. 11 (Irish) Wing, to R.A.F. Depôt (Inland Area). 17.2.22. E. O'Donovan Crean, from No. 1 School of Technical Training (Boys), (Halton), to Armament and Gunnery School (Cadre), (Inland Area). 18.2.22. T. M. Walker, to Research Laboratory and Medical Officers School of Instruction (Inland Area), on appointment to temporary commission. 9.2.22. A. C. Ransford, to Research Laboratory and Medical Officers School of Instruction (Inland Area), on appointment to short service commission. 13.2.22. E. N. C. Waldron, from Headquarters (Inland Area), to Central Pay Office (Inland Area). 20.2.22. L. H. Packenham-Walsh, D.F.C., from No. 100 Squadron No. 11 (Irish) Wing, to R.A.F. Depôt (Inland Area). 20.2.22. T. R. S. Thompson, M.B., from No. 14 Squadron (Middle East Area), to No. 56 Squadron (Middle East Area). 1.2.22. W. G. Weston, M.B., from R.A.F. Depôt (Inland Area) to School of Army Co-operation (Inland Area). 21.2.22. J. T. T. Forbes, from No. 56 Squadron (Middle East Area) to No. 14 Squadron (Middle East Area). 1.2.22. R. J. Ahearne, M.C., from No. 1 School of Technical Training (Boys) Hospital (Halton), to Headquarters (Middle East Area). 17.2.22. N. H. Medhurst, from Headquarters, R.A.F. Cranwell, to Headquarters (Middle East Area). 17.2.22. F. Fernihough, M.C., from No. 14 Squadron (Middle East Area) to No. 1 Armoured Car Company (Middle East Area). 1.2.22. R. W. Dawes, to Inspector of Recruiting (Birmingham) to Aircraft Depôt (Middle East Area(. 17.2.22. R. W. Edwards, from No. 1 Flying Training School (Inland Area) to Aircraft Depôt (Middle East Area). 17.2.22. P. E. Maitland, A.F.C., from School of Naval Co-operation and Aerial Navigation (Coastal Area) to No. 4 Flying Training School (Middle East Area). 17.2.22. J. Noakes, A.F.C., M.M., from Experimental Section, Royal Aircraft Establishment (Inland Area) to No. 216 Squadron (Middle East Area). 17.2.22. R. H. M. S. Saundby, M.C., A.F.C., from No. 1 Flying Training School (Inland Area) to No. 45 Squadron (Middle East Area). 17.2.22. A. L. Messenger, A.F.C., from half-pay list to No. 45 Squadron (Mdidle East Area). 17.2.22. C. R. Cox, A.F.C., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Cranwell. 25.2.22. C. J. W. Darwin, D.S.O., from Headquarters, R.A.F., Cranwell, to (R.A.F. Depôt (Inland Area). 20.2.22. W. Burkinshaw, from Air Ministry Directorate of Equipment) to Palestine Group Headquarters (Middle East Area). 17.2.2. P. B. Hunter, from half-pay list to Aircraft Depôt (Middle East Area). 17.2.22.

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IN PARLIAMENT

R.A.F. Pilots

MAJ. GLYN on March 2 asked the Secretary of State for Air (1) how many reserve pilots in all are available for service as trained naval and military pilots respectively in case of emergency, how many naval and military officers on the regular establishment of those two services are trained pilots able to fly at the present time; and how far have the pilots recently trained by the Air Ministry been able to satisfy the requirements of the Navy and Army when attached for duty?

(2) How many fully trained pilots are available for service with the Army and the Navy, respectively; whether the proportion of trained pilots for artillery work, both naval and military, is adequate to the demand, irrespective of trained executive officers of the Navy and Army being lent for the purpose; and whether the Board of Admiralty and the General Staff have expressed their entire satisfaction with the facilities offered by the Air Ministry?

Capt. Guest: All of the 1,862 qualified flying officers now serving in the General Duties Branch of the Royal Air Force are available for service either with the Navy or Army, or independently. The majority have had experience of working with one or both of the two other Services, but they are not allocated in distinct classes to Navy co-operation and Army co-operation work, nor to artillery work, as a subdivision of either class, the policy of the Air Council being to give all officers the widest possible training and experience. The importance of having a nucleus of officers with highly specialised qualifications for this kind of work is, however, fully recognised, and two schools, one for Army and one for Naval co-operation, exist for the purpose. Reserve pilots for an emergency will be found, in due course, from the present short service commission officers who pass to the reserve. I have no information as to the number of trained pilots who are still on the active list of the Navy and Army, to which they returned after service with the Royal Air Force in the War. The allocation of air forces for co-operation duties with the Navy and Army is agreed annually between the Air Council and the Board of Admiralty and Army Council when the annual Estimates of the Air Ministry are under consideration. Though the Navy and the Army are satisfied with the qualifications of the pilots when trained, I fear that, in these days of strict economy, it is hardly in the power of any Government Department, for the moment, entirely to satisfy the demands made upon it, whether from within or from without.

British Aircraft for Russia

MR. RAPER, on March 4, asked the Secretary of State for Air what is the total quantity of aeroplanes and the number of each type which have been bought for delivery from this country on behalf of the Russian Soviet Government since the signing of the economic Agreement; and whether any guarantees have been asked for and/or given regarding the uses to which these machines will be put?

Captain Guest: There is no obligation on firms to obtain permission before exporting to Russia aircraft unarmed and not fitted to take armament. But if the aircraft to which my hon. friend refers are armed or fitted to take armament, an export licence will be required, and this would only be granted by the Board of Trade after reference to the Foreign Office. Particulars of any such export licences already granted could be obtained from the Board of Trade.

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Mountain Reconnaissance by Air

AN officer of the Geodetic Mission in Syria has carried out recently an aeroplane reconnaissance of the zone which he is engaged in surveying. The object of the experiment was to prove whether it was possible by flying over a region, such as the anti-Lebanon Mountains, to get an exact idea of the differences in height of the summits and consequently to be able to select the points to be used as a basis for triangulation. The experiment proved very satisfactory and several weeks' time was saved.

COLOMBIA AND AVIATION.

In a report by Lieut.-Col. G. W. Rhys-Jenkins, Commercial Secretary to H.B.M. Legation, Bogota, for 1921, just to hand, upon commercial aviation in Colombia, it is stated that there exists considerable public interest in the subject of aviation. Last year a company was floated in Bogota with the idea of establishing an air service between the capital and Barranquilla, and very convincing exhibitions and trial flights from Bogota to Honda and various other points were made, but the extreme stringency of money prevented the necessary capital being raised.

Various French and Belgian projects have been put forward, machines brought out to Barranquilla and Medellin and trial flights made successfully, but so far none of these projects has taken practical form.

Recently a company was formed by the combination of people in Medellin with certain German residents in the country, and they have now established a limited hydro-aeroplane service from Barranquilla to Girardot, carrying a small quantity of mail and two or three passengers, making the return journey once in about every 14 days. The establishment of such a mail service will show a saving of time of about nine days in the transmission of letters between Bogota and London.

The Department of War has established a school of aviation, under the instruction of officers from the French Army. The establishment at present is seven French machines, but is authorised up to the strength of three squadrons.

Although the report states that the present commercial situation does not seem to indicate any favourable prospect in aviation for some time, the British aircraft manufacturers are, however, advised to observe the Colombian situation carefully, and to be prepared to take advantage of the opportunities which this market may well afford when business has recovered.

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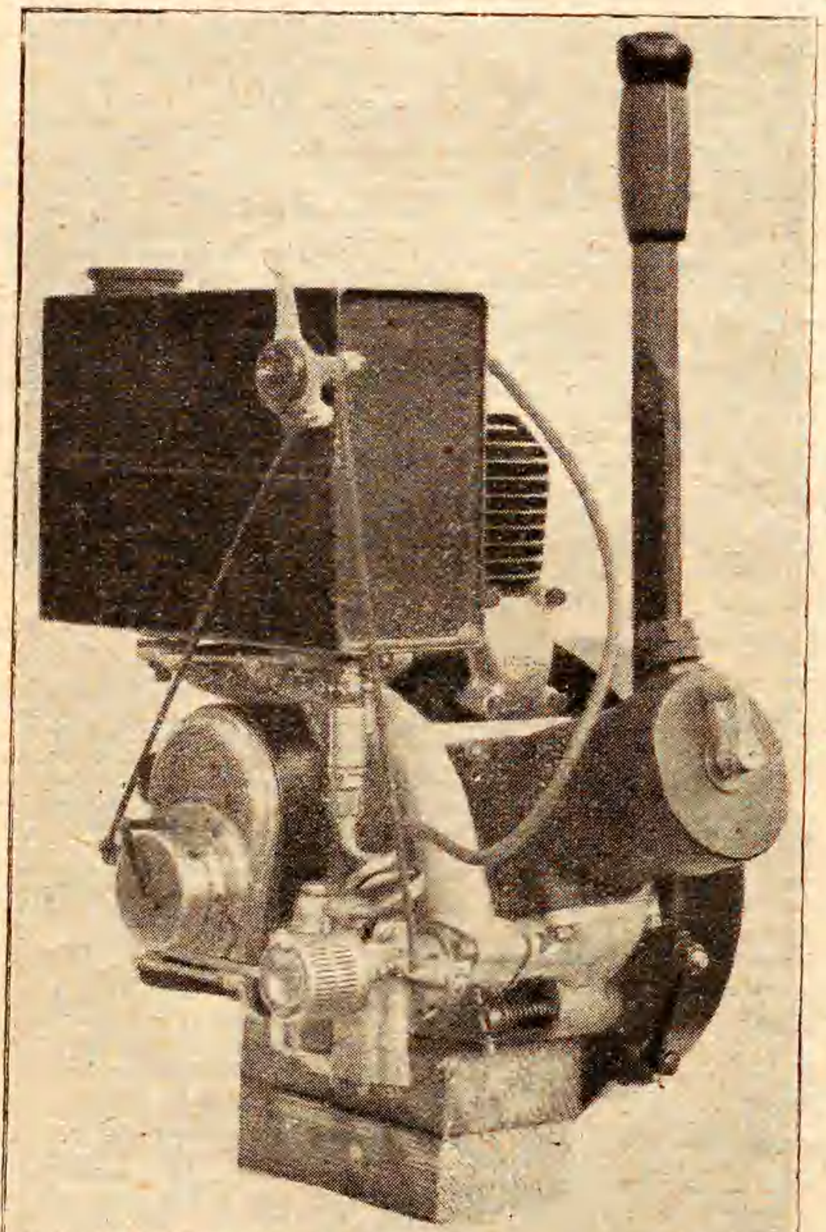

THE BRISTOL GAS-ENGINE STARTER: Our photograph shows the starter in its latest form. It will be seen that a tank is now fitted as standard, making the engine a complete unit in itself.

Aeroplanes Busy Demonstrating their Usefulness

From many quarters come details of odd services being rendered by the use of 'planes. In India during the troubles engineered for the Prince's tour, patrolling has been carried out from the air, and in like manner in Johannesburg, in connection with the mine strikers, a quintet of craft was for the first time in evidence on the Reef and created a good impression. On the Florida coast, near Miami, a squadron of 14 armed aeroplanes have been dealing so effectively with the very profitable occupation of liquor smuggling into the United States that the authorities captured the British schooner *Annabelle* laden with 11,000 cases of "Mountain dew," said to be worth the bagatelle of £750,000!

In an essentially humane direction in Norway the 'plane has also last week proved its versatility for relieving awkward situations. Owing to the extraordinary ice conditions in the lower part of Christianiafjord a local steamer crossing the fjord on February 22 was completely blocked when midway across. There were 14 passengers on board and very little food. The next day the steamer was supplied with food by aeroplane, other assistance being impossible.

Territorial Air Defence Force

In the proposals of the Secretary of State for War regarding the strength and administration of the Territorial Army during the next financial year, submitted to the County Associations, it is proposed to form half a group of Air Defence troops with an establishment of 220 officers and 2,708 other ranks, as it is considered advisable to make a start in organising Territorial Defence troops.

* * * *

PUBLICATIONS RECEIVED

University of Toronto, Bulletin No. 2. Paper No. 1. Aeronautic Papers. By J. H. Parkin. University of Toronto Press, Toronto, Canada.

The Ross-Smith Flight: Set of Six Postcards. The Photochrom Co., Ltd., 7–10, Old Bailey, London, E.C. 4. Price 6*d*.

Technical Memorandum No. 29. Starting Aero Engines at Low Temperatures. The Air Board, Ottawa, Canada.

Rugby Engineering Society. Proceedings for Session 1919–1920. *Vol. XIV.* The Rugby Engineering Society, c/o British Thomson-Houston Co., Ltd., Rugby.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: **cyl. = cylinder; I.C. = internal combustion; m. = motors**

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(Continued from p. xii.)

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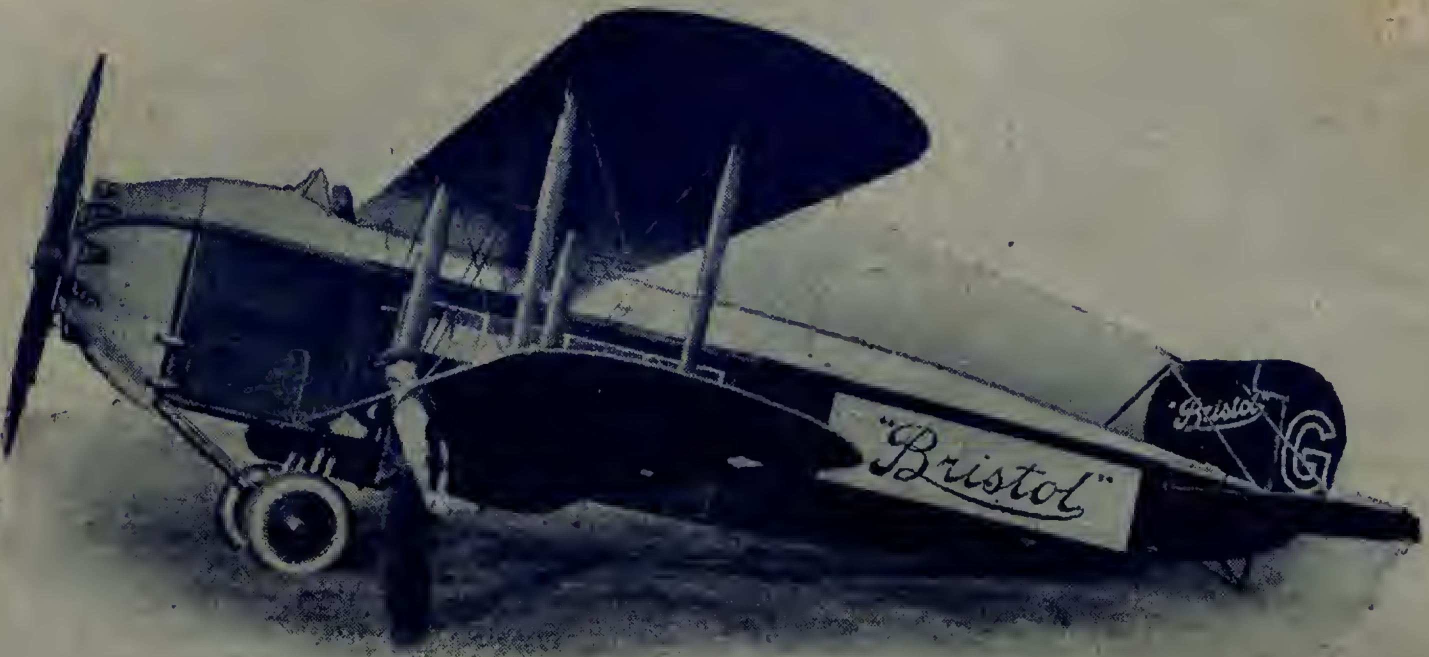

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FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Mar. 16	**Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.**
Mar. 23	**Lecture, "Some Notes on Commercial Aircraft," by S. H. Evans, before Students' Section, R.Ae.S.**
Mar. 26–April 2	**Nice Meeting**
Mar. 30	**Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.**
Mar. 31	**Lecture, "Aircraft Design" by H. P. Folland, before I.Ae.E.**
April 7	**Lecture, "Some Outstanding Problems in Aeronautics," by Professor L. Bairstow, before Students' Section, R.Ae.S.**
April 17	**R.Ae.C. Race Meeting, at Waddon**
April 17–19	**Seaplane Contest, Marseilles**
June 1	**Entries close for Schneider Cup Race**
June 5	**R.Ae.C. Race Meeting, at Waddon**
June 23–25	**International Competition for Touring Aeroplanes, Brussels**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT

The R.A.F. and Iraq

DURING the debate on the Supplementary Estimates in Parliament on March 9, Mr. Churchill scored a great victory by his able exposition of the manner in which the work of the country is being done by the R.A.F. much more cheaply and more expeditiously than it could possibly be done by the Army. He stated that there are now eight squadrons concentrated in a loop of the river at Baghdad, and that this represents a third of the whole strength of the R.A.F. This more than justifies the carrying out of the original intention of placing the military control of Iraq under the charge of the officer commanding the R.A.F., and the announcement to that effect will be received with the greatest satisfaction by all who believe in the future of the Air Force. As the R.A.F. will be by far the largest force in the country, it is only right, as Mr. Churchill said, that the command should follow the bulk of the forces there. We have no fear of the further outcome of this interesting experiment, and believe it to be the forerunner of many such undertakings in various parts of the Empire.

As Maj.-Gen. Seely stated during the debate, it is a red-letter day, because, for the first time in history, we see the young Air Force taking charge of a big country, with the older services ancillary to it, and we congratulate the Colonial Secretary on his being able thus early to complete his scheme by utilising the R.A.F. in this manner. As we have already said, we look upon the decision as the first step in the realisation of the enormous future which lies before the R.A.F. At the same time we quite agree with Gen. Seely that this departure will not be allowed to pass without the most formidable attacks by what he called the "old-fashioned people."

It is interesting to refer, in this connection, to some remarks made during the discussion of Air-Commodore Brooke-Popham's paper before the Central Asian

Society by Maj.-Gen. Sir Frederick Maurice, printed elsewhere in this issue. In his career Sir Frederick has had ample opportunity of getting experience of the War Office and of the old-fashioned military mind, and he stated as his firm conviction that, had the R.A.F. been under the control of the War Office it would never have been allowed to prove of what it is capable in the manner in which it has been allowed to do so under independent control. He expressed the view that under no circumstances must we allow the R.A.F., which is as yet in a stage of evolution, to be hampered and probably killed by being made subservient to the older Services. As we have repeatedly pointed out in these columns, forces are constantly at work attempting to undermine the R.A.F. and the Air Ministry as a separate service and ministry, and we must never relent our vigilance if these forces are to be kept in check and the R.A.F. allowed to develop untrammelled towards its ultimate destiny of being our principal fighting force and our first line of defence. And that is precisely why we are pleased with the matured steps announced by Mr. Churchill. So long as we have men with the courage of their opinions like the Colonial Secretary, who possesses the necessary imagination to take a broad view, and so long as the R.A.F. remains loyal to its chief and does its best to deserve the trust thus placed in it, we need have no fear for the future. The ultimate victory of the new air arm over the older Services is certain.

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The Loth Guide Cable

If there is any one item which, more than any other, affects the utility and safety of aircraft it is the capacity to fly in the dark and in fog. Over very long routes, such as for instance England to Australia, the capability to fly at night as well as in the daytime is practically equivalent to doubling the speed of an aeroplane. It is not, of course, quite so, as there must be delays in transferring passengers and/or mails from one machine to another, but for practical purposes the speed is very nearly doubled. To do so by any other means would be out of the question. Or, looking at the matter from another point of view, to be able to fly by night is the means of drawing full advantage of the speed of the aeroplane, when otherwise this could not be done. On the long routes it is of little use to be able to do 100 m.p.h. for 12 hours, and then having to stop for another 12 hours. The practical speed is then only 50 m.p.h. But by flying at night an *average* speed of, say, 70 or 80 m.p.h. could be maintained, which would be so vastly ahead of any other means of locomotion as to give aircraft an enormous advantage. Any means which can be taken for rendering safe flying by night and in fogs is therefore entitled to serious consideration.

In this connection, the Loth guide cable described elsewhere in this issue is of more than ordinary interest, and appears to promise great things for the future. Already the French Government has decided to equip le Bourget with such a cable, and there is more than a possibility that the cable will be extended from le Bourget to the French coast, as a first step towards introducing this means of guiding aircraft over the French portion of the London-Paris route. It now remains to be seen whether our Government is ready to co-operate by similarly equipping our modest 60 miles or so of route between Croydon and the English coast.

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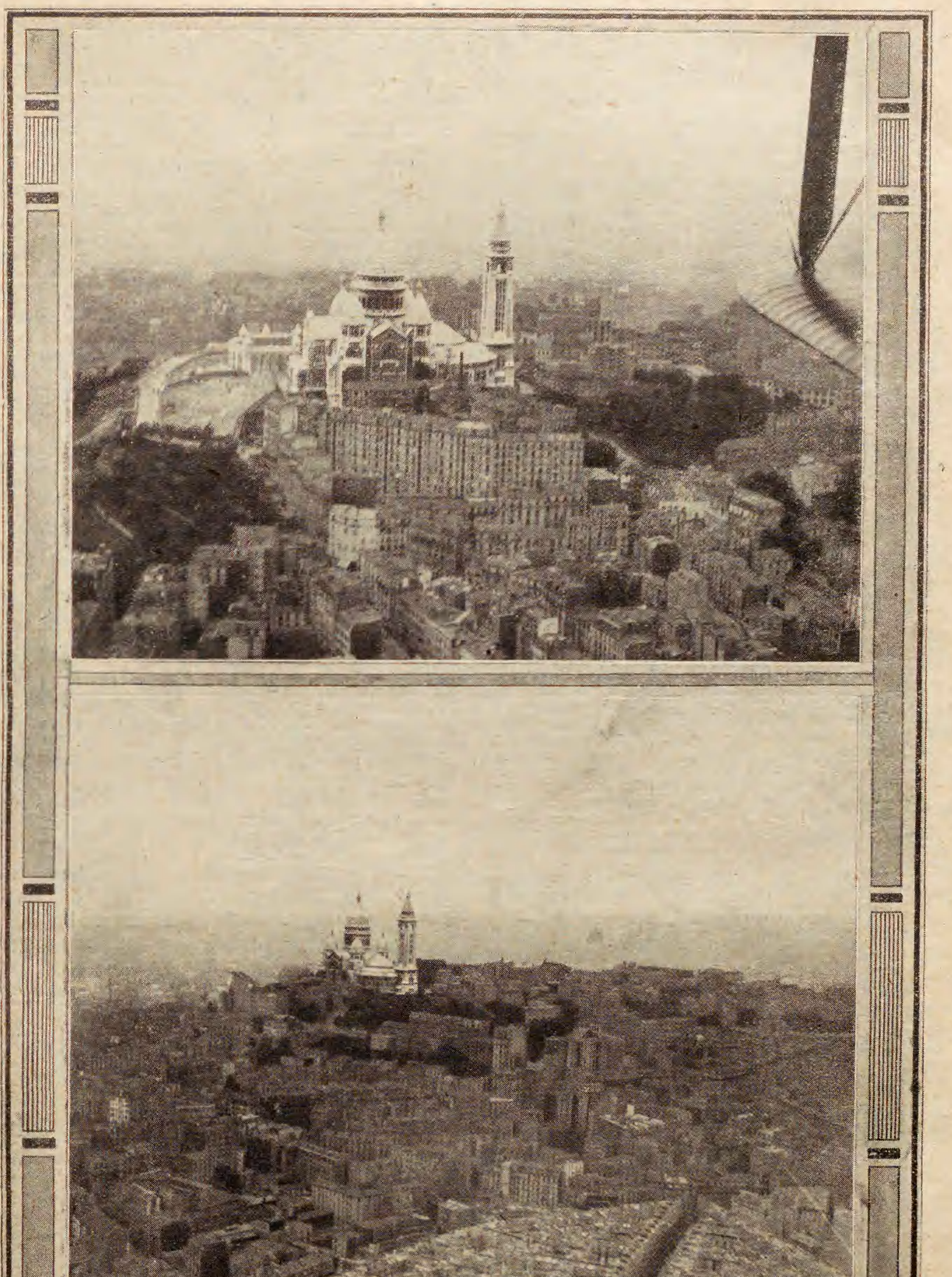
American Research on Thick Aerofoils

According to the American National advisory Committee Report for 1921 (Administrative Report without Technical Reports), a large number of tests on thick aerofoils have been carried out, with the object of studying the properties of aerofoils suitable for internal bracing. The Report states that the tests were made at air speeds of 35 metres (115 ft.) per second, and in some cases at a speed as high as 60 metres (197 ft.) per second. Several very interesting facts were brought to light. For instance, it was found that thick wings improve in efficiency with speed more rapidly than thin wings. In other words, the scale effect was considerable, and thick wings, when applied to modern high-speed aeroplanes, may be expected to have a better L/D ratio than would be indicated by model tests at relatively low speeds. It appears from the Report that an efficient thick wing was sought, rather than one having a high maximum lift coefficient. Thus it is stated that some of the sections developed had at all angles a higher efficiency than the R.A.F. 15 section tested under the same conditions, and yet were more than three times as thick as that section in the centre. The maximum lift coefficients were approximately the same.

The Report does not contain any figures relating to these tests, but no doubt the technical reports dealing with the experiments will be published in due course. We are looking forward to seeing them, as the reference to them appears to indicate a very great improvement. Thus, while having a wing as efficient as the R.A.F. 15, a much lighter wing would result from the greater depth of wing spars; or, if an internally braced cantilever wing is required, the section should be deep enough to allow of building such a wing without undue wing weight. Hitherto it has been customary in certain quarters to dismiss the thick wing as being hopelessly inferior, as regards efficiency, to the thin wing. This report indicates that the thick wing may have been sadly misjudged on its model figures, and no doubt the new wind tunnels which are being constructed in America will be used for determining the scale effect on such wings at speeds giving a truer indication of the properties of the actual full-size wings.

In this connection it is also of interest to note that experiments on several heavily-tapered wings indicated that wings of this type had the same centre of pressure travel and practically the same efficiency as wings of uniform section. This is all in favour of the cantilever wing, since for structural reasons it is an advantage to taper the wing from root to tip so as to get the greatest stresses where the section is of greatest depth and where, consequently, the spars are better able to resist the bending moments imposed upon them. Another advantage of the tapered wing is that it usually tends to make an aeroplane very nice to handle as regards lateral contol, the machine responding readily, even to fairly small ailerons, as instanced by several German types having tapered wings. As soon as the technical reports on these tests become available we hope to place them before our readers.



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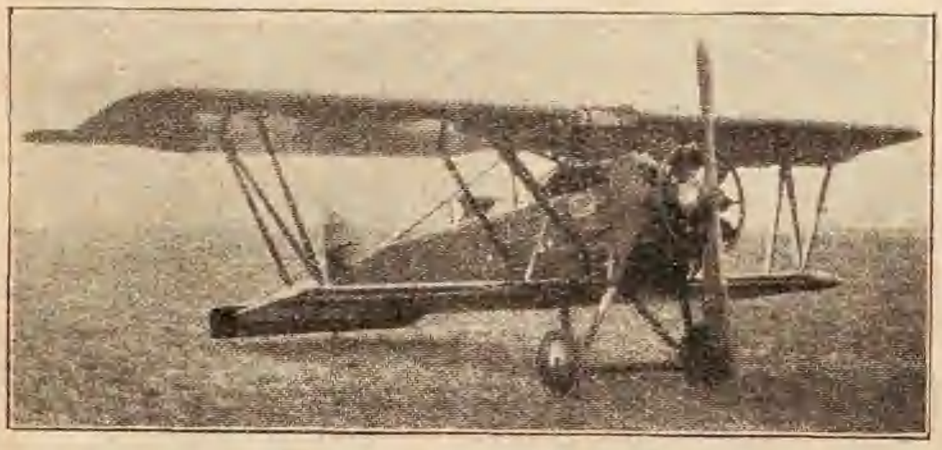
LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE:
No. 29.—In Paris. *Top:* Sacre Cœur. *Below:* General View of Montmartre.

THE HUFF-DALAND BIPLANE

Huff, Daland and Co., of Ogdensburg, N.Y., have recently produced two interesting machines incorporating thick-section wings and several novel constructional features. These two machines are known as the H.D.9A two-seater Army training biplane, and the H.D.8A "Petrel" three-seater commercial biplane. The former was brought out to meet the United States army requirements of a Type 14 air-cooled-engine training 'plane, and was fitted with a 100 h.p. Anzani engine, whilst the latter is a further development of this machine incorporating the Curtiss O.X.5 water-cooled engine. It was produced to meet the demand for a strong, moderate-powered three-seater of simple construction, capable of being operated and maintained at the lowest possible figure.

Except for the changes necessitated by the change of engine and a slightly more streamlined *fuselage* in the H.D.8A, both of these machines follow the same general type of construction, and the following description more or less applies to both.



The Huff-Daland H.D.9A Biplane : Three-quarter front view of the 100 h.p. Anzani model.

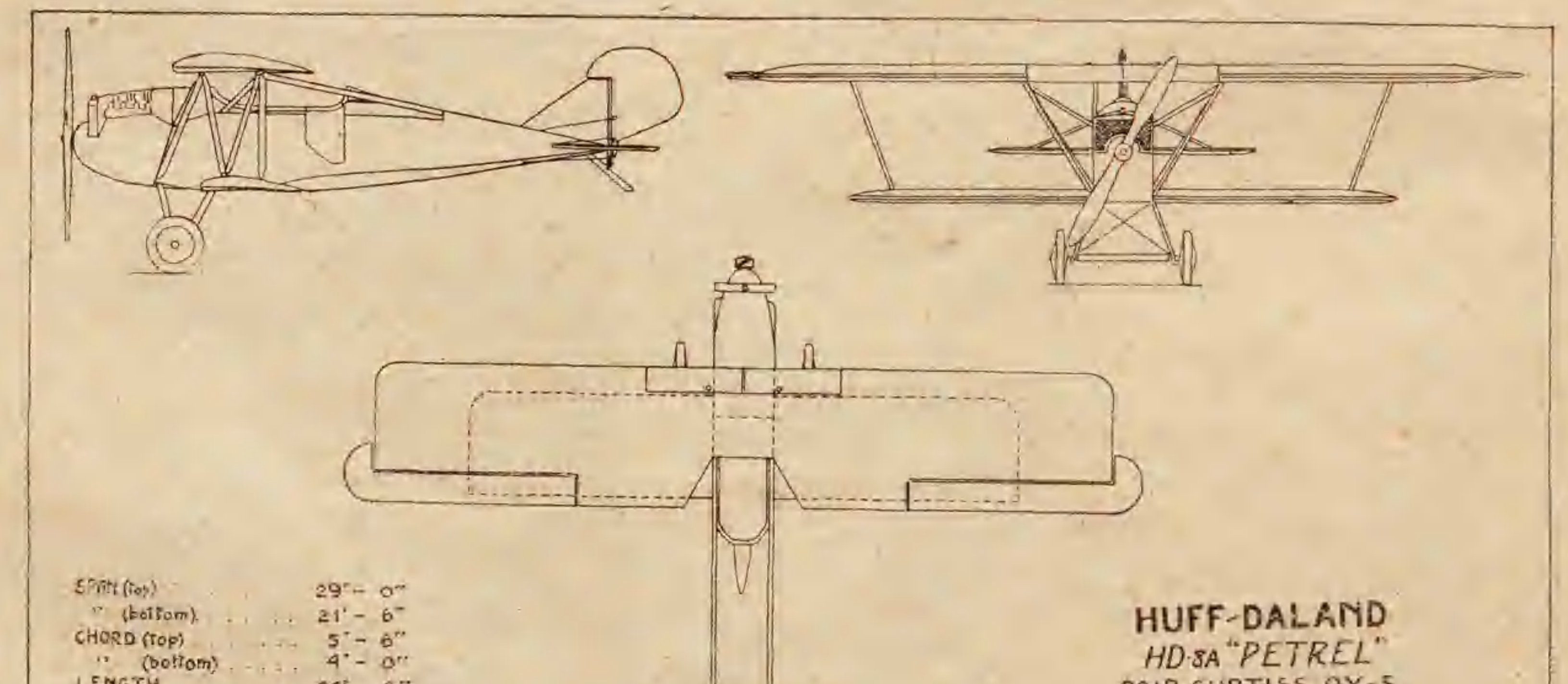
It is in the *fuselage* that the most interesting feature of the H.D. machines is to be found. A somewhat unusual, but at the same time exceedingly simple, method of construction has been employed on all the H.D. models—a form of construction differing from the orthodox braced girder type, as may be seen on referring to the accompanying illustrations. It will be seen that the upper and lower *longerons* in this case form a triangulated truss between the main planes and the tail, the apex being at the latter—very much after the fashion of the outrigger tail booms of the "box-kite" biplane. Each upper member, or *longeron*, runs from the rear spar of the top plane, where it is connected with the corresponding lower member by two struts, meeting the latter at the location of the lower plane rear spar and the foremost extremity—at engine partition—respectively. Other vertical struts connect the upper and lower members at the end of the cockpit, at the tail (leading edge) and midway between these points. Auxiliary *longerons* extend rearwards from the top of the transverse engine bulkhead and form the pilot's and passengers' cockpit. Aft of the latter the auxiliary *longerons* are decked over by means of stringers, whilst a curved bottom is similarly formed on the lower members.

By this form of construction tail loads and wing loads are carried by direct paths through these rigid members in place of the usual struts and wires. It also greatly reduces the number and weight of parts, whilst the time taken in assembly is likewise reduced. The only wire cross-bracing is between the lower *longerons*, and these wires are threaded on the ends and carried through holes in the *longerons* at the strut junctions to a small steel plate and nipple. The use of a large number of turnbuckles is thus obviated.

Veneer is used for covering the *fuselage* from the engine plate to a point aft of the cockpit, and access to the latter is by means of side doors which in no way weakens the *fuselage* structure. The rest of the *fuselage* is fabric-covered.

The mounting of the 10-cylinder Anzani engine follows that employed on the earlier training model turned out by this firm—the H.D.4. It consists of a circular nose-piece to which the engine is bolted, supported by a system of tubular trussing connected to the forward bulkhead at the *longeron* junctions. Four large pins connect the unions of these tubes at their attachment to the *fuselage*, making the removal of the engine unit an easy matter, and allowing the engine to be swung backward for inspection by withdrawing two pins on one side or the other.

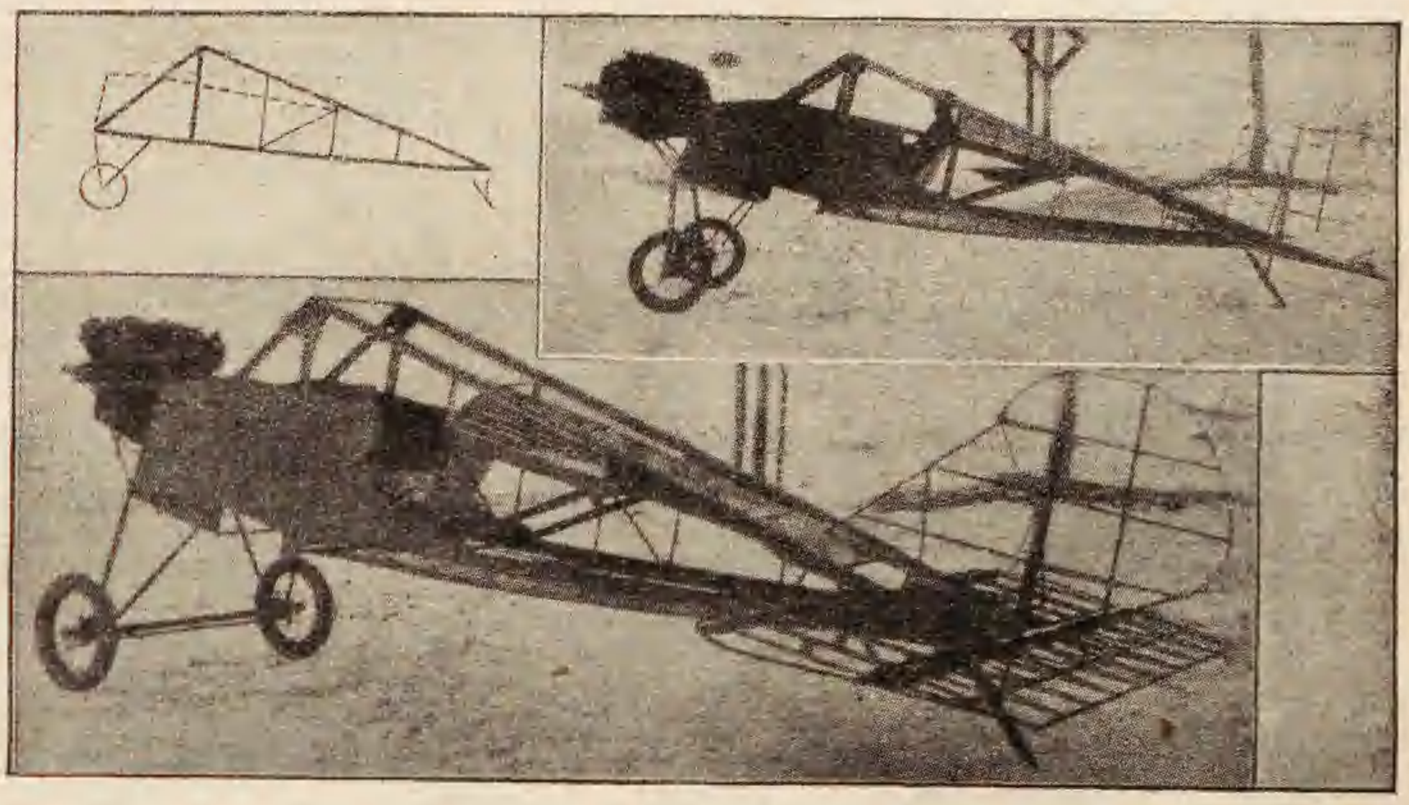
In the case of the Curtiss O.X. 5, in the H.D.8A, the mounting is as follows :—The *fuselage* terminates with a solid bulkhead and fire-shield, upon which six large pin fittings are mounted. The tubular engine mounting itself, made up in two halves, right and left, is bolted to these fittings without the need of any cross wires or external bracing for support. It may be detached with the engine as a unit in case of quick changes on the aerodrome, while in the shop the engine can be slipped into place along the bearers without having to disturb


SPAN (top) . . . . 29' – 0"
" (bottom) . . . . 21' – 6"
CHORD (top) . . . . 5' – 6"
" (bottom) . . . . 4' – 0"
LENGTH . . . . 24' – 0"
WING AREA . . . . 227 Sq.Ft.
HUFF-DALAND
HD-8A "PETREL"
90HP CURTISS OX-5.

THE HUFF-DALAND H.D.8A BIPLANE : General arrangement drawings.

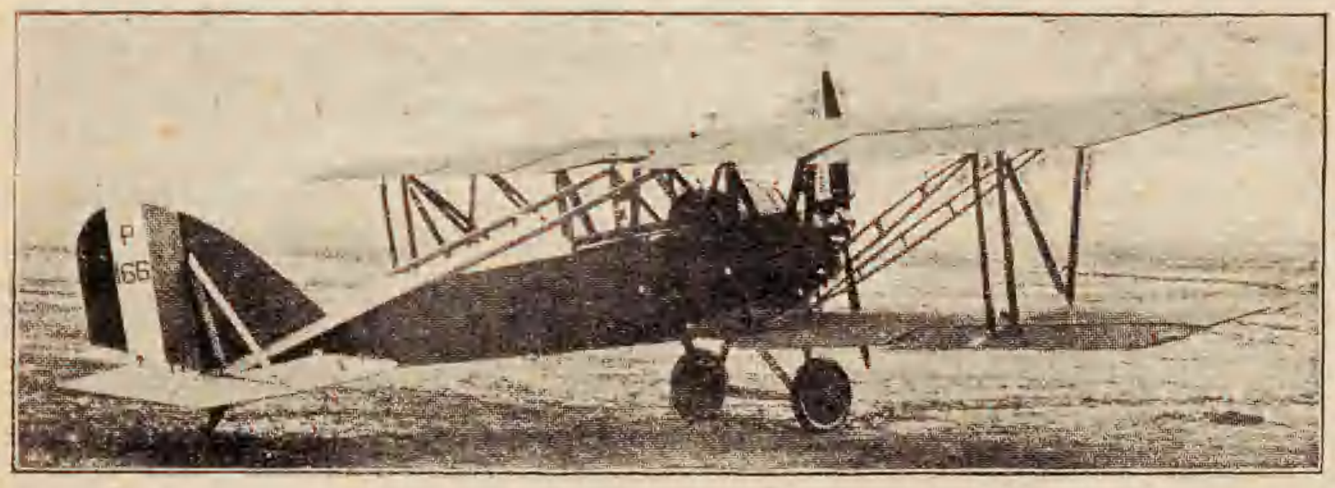
any of the accessory fittings. The cowling is hinged aft of the engine top and bottom, so that it may be raised or lowered entirely out of the way and yet not require complete removal.

The wing section employed in both machines is the Göttingen 387. Both upper and lower wings are built upon veneer-sided box spars. The veneer sides terminate at points about one-fifth of the span from the wing tips, the remaining portion of the spar being formed by a Warren truss supporting the upper and lower members of the spar. The ribs are of special construction and novel design. Owing to the great wing-depth two independent girders of basswood are used to form the top and bottom flanges, fastened together by suitably spaced vertical members. The fabric is sewed separately about the upper and lower parts, giving added security by forming an independent attachment for both surfaces. Sand texts have been carried out on these ribs beyond the required f.s. of 8 without sign of failure. The entering edge is of veneer.



The Huff-Daland H.D.8A Biplane: Two views showing the novel fuselage construction.

A double set of drift wires, which independently truss the upper and lower members of the spars, give unusual rigidity. The top plane is supported with a rigid connection between the rear spar and the apex of the *fuselage longeron*, and three additional struts on each side. These are located as in the Fokker D-VII biplanes, one extending from the lower *fuselage longeron* at junction with lower rear wing spar to the upper rear wing spar at the end of the centre section; a second strut extends from the forward extremity of the lower *longeron*—at junction with front chassis strut—to the front top wing spar, corresponding to the rear spar attachment. The third strut runs from the top of the second to the forward extremity of the auxiliary *fuselage longeron*. These struts, as well as the "N" interplane struts, are of streamline steel tubing, the "N" struts being adjustable for the correction of incidence. The lower wing fits into a recess formed in the *fuselage* bottom, and is secured by four large bolts—a system also similar to that employed on the Fokker D-VII.



The Huff-Daland H.D.4B Biplane: Another type, the forerunner of the H.D.8A and H.D.9A, used for training purposes.

Ailerons are fitted to the top plane only, and are of the balanced, washed-out type. They are carried upon false spars, and are identical in area and arrangement with Fokker D-VII design. The leading edge consists of a large steel tube, and the trailing edge a much smaller gauge tubing; they are connected by short triangular ribs of steel tubing. The *ailerons* are actuated by a push-and-pull rod extending within the wing, and connected by a bell crank and tube to the horn on the *aileron* tube. Movement of this push-and-pull rod is obtained by the use of two cables running over four pulleys and fastened to it directly over the cockpit. By removing two connections, readily accessible through holes in the lower surface, the upper wing may be removed with its controls complete.

The tail surfaces consist of an adjustable horizontal stabiliser, a one-piece unbalanced elevator hinged to the trailing edge of the stabiliser, and a vertical fin and balanced rudder braced by two adjustable tubes. Aluminium sheathing is provided to prevent leakage at the union of the stabiliser and the elevator. Conventional controls are used for the rudder and elevator.

The usual V-type landing gear is fitted, constructed of steel tubing, but the method of securing the shock-absorber cords is somewhat unusual. These are wrapped on separate spindles and fitted as units, providing an easy means of replacement.

An extremely simple petrol system is employed on these machines, consisting of two 11-gal. tanks located in the middle of the top plane, each connected by a ¾-in. steel tube carrying in its centre a sight gauge, giving a positive record at all times to the pilot. Petrol flows by gravity directly from the tank to the carburettor, using the hollow flying struts as a medium—outlets being welded at the upper and lower ends for hose connections. In a similar way a large hand pump, accessible from the cockpit, is connected through another strut to the tanks, and thus provides an easy and quick means for filling the tanks.

During flight tests with these machines the characteristic high-lift qualities of the thick wing sections at high angles of incidence were demonstrated to a marked degree. It is stated that the H.D.8A, arranged as a dual-control two-seater, has been accepted by the United States Army for training purposes.

The general specifications of the H.D.8A for commercial work are given below, and these, with one or two exceptions, also apply to the H.D.9A :—

Span—upper	29 ft.
Span—lower	21 ft. 6 ins.
Length over all	24 ft.
Height over all	9 ft.
Chord—upper	5 ft. 6 ins.
Chord—lower	4 ft.
Stagger	10¾ ins.
Gap (mean)	4 ft. 6 ins.
Incidence (upper and lower)	0°
Wing section	Göttingen 387.
Total wing area	227 ft.
Rudder area	8½ sq. ft.
Fin area	7½ sq. ft.
Stabiliser area	20½ sq. ft.
Elevator area	19½ sq. ft.
Aileron area	11½ sq. ft.
Weight light (with water)	1,120 lbs.
Useful load	660 lbs.
Passengers (two) and pilot	510 lbs.
Petrol and oil	150 lbs.
Loading per square foot	7.9 lbs.
Loading per horse-power	19.8 lbs.
Endurance (full throttle)	2½ hrs.
Speed range	85–31 m.p.h.
Climb (at sea level)	370 ft. per min.
Absolute ceiling	10,100 ft.

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NOTICES TO AIRMEN

Italy : Regulations Governing Flight

THE following are extracts from regulations governing flight over Italian territory, issued by the Italian Ministry of War under date November 19, 1921 :—

(1) *Aerodrome Control.*—(*a*) Acrobatic landings are prohibited at every aerodrome throughout the realm. (Article 22.)

(*b*) *Direction of Landing.*—In every aerodrome the normal line of landing and " taking off " shall be clearly indicated on the ground by a T, the dimensions of which shall conform to those shown in Fig. 1. The long arm of the T indicates the direction of landing, and the short arm indicates the proper position for the under-carriage wheels to touch ground. In every aerodrome there shall not be more than one T, which shall be oriented in the most natural direction of landing, taking into account the direction of the prevailing wind. (Article 27.)

The direction of landing indicated by the T shall be obligatory for all aircraft. (Article 28.)

If an aeroplane, owing to the necessity of landing up wind, be obliged to land in a direction different from that indicated by the T, and if the dimensions of the aerodrome permit, the signal to the aircraft in flight shall be given by placing in the new landing direction white ground strips in the form of a Roman dagger, as shown in Fig. 2. It shall be obligatory to display this signal only at aerodromes having no proper semaphore service. (Article 29.)

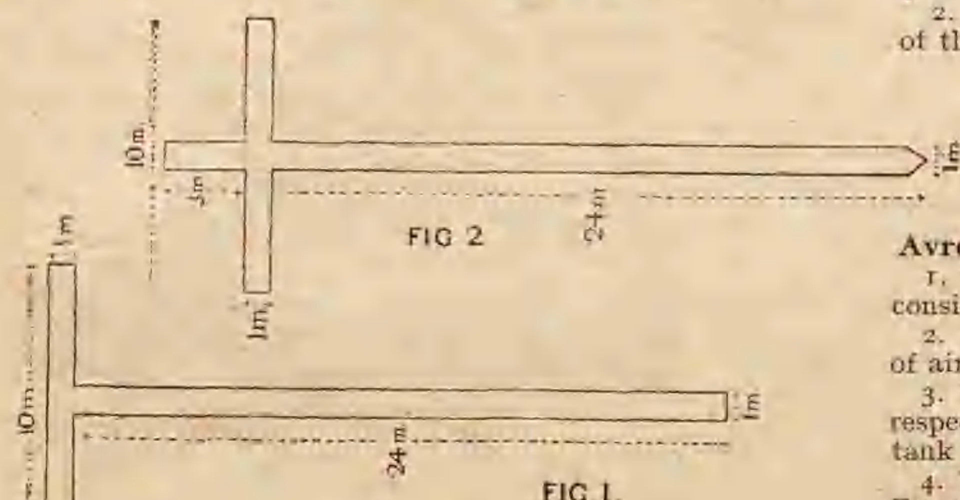

FIG 2

FIG. 1.

(*c*) *Marking of Obstructions.*—All fixed obstructions dangerous to flying (such as towers, chimneys, W/T aerials, etc.) within a zone of 500 metres around all aerodromes shall be indicated by three lights, one white, one red and one green. (Article 35.)

Note.—Pending information that the system of markings described above has been definitely established, pilots landing on Italian aerodromes should not assume without investigation that marks are laid down in accordance with this system.

(2) *Height of Flight ; Aerobatics, etc.*

It is strictly prohibited :—

(*a*) To engage in aerial acrobatics of any kind whatsoever at an altitude of less than 1,000 metres (3,280 ft.) above the aerodrome.

(*b*) To engage in aerial acrobatics above inhabited areas.

(*c*) To fly over inhabited areas at a height of less than 1,000 metres (3,280 ft.) in the case of flying machines and of less than 200 metres (660 ft.) in the case of free balloons and airships.

(*d*) To carry out any flight which on account of low altitude or the vicinity of persons or dwellings may in any way endanger the public safety.

(*e*) To carry out any flight at an altitude of less than 1,000 metres (3,280 ft.) above any aerodrome or place in which a public meeting is being held. This rule may be waived only in the case of meetings of a sporting nature when a special written authorisation has been received from the competent aeronautical authorities and from the competent political authorities having jurisdiction over the area within which the meeting is to be held. Such authorisation will only be granted where all the circumstances relating to the event and to the locality are such as to guarantee public safety. (Article 36.)

(No. 23 of 1922.)

Wireless Navigational Warnings to Airmen

1. Information of a specially urgent nature concerning aerial navigation, *e.g.*, warning regarding the discontinuation of navigational aids or obstruction of landing areas at aerodromes, will in future be broadcasted by wireless telegraphy from Air Ministry W/T Station, in addition to being promulgated in the usual manner.

2. Such notices issued by wireless will be added at the end of the Air Ministry synoptic weather reports transmitted on a wave length of 1,400 metres C.W. at any of the following times :—

0600 G.M.T., 0800 G.M.T., 1400 G.M.T., 1900 G.M.T. (No. 25 of 1922.)

NOTICES TO GROUND ENGINEERS

Avro 504K Type Aircraft : Gravity Tanks

1. The gravity tank on the top centre section is to be considered a standard fitting on Avro 504K aircraft.

2. No Certificate of Airworthiness in respect of this type of aircraft will be issued unless a gravity tank is fitted.

3. No renewal of an existing Certificate of Airworthiness in respect of this type of aircraft will be granted unless a gravity tank is fitted.

4. These gravity tanks are obtainable from Messrs. A. V. Roe and Co., Ltd. (No. 2 of 1922.)

" Petroflex " Tubing and Jointing

The following precautions should be observed when using " Petroflex " tubing :—

1. The ends of piping or connections to be joined by means of " Petroflex " should be parallel, with sharp edges removed.

2. Pipes should enter the short lengths of " Petroflex " up to the first corrugation, but no further.

3. On no account must the lining of the tubing be stretched or contracted by attempting to fit it to connections of a size other than that for which it was manufactured.

4. Ends of " Petroflex " joints should be slightly bell-mouthed (to the extent of approximately $\frac{1}{16}$ in.) in order to prevent the lining from being forced back or injured when assembling.

5. Care should be taken not to twist or disarrange the tubing during assembly.

6. Gold size may be applied to the connections before fitting the tubing. This facilitates assembly and makes a good joint. On no account should soft soap or oil be used as a lubricant for this purpose.

7. Tubing must be securely fixed by means of approved hose clips.

8. " Petroflex " must not be used in either water or lubricating oil systems.

9. " Petroflex " tubing should be stored in a dry place. (No. 3 of 1922.)

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

COUPE HENRY DEUTSCH DE LA MEURTHE

(International Contest)

(*Under the Regulations of the Fédération Aéronautique Internationale and the C.S.A.*)

GENERAL REGULATIONS

LAST week we were able to refer briefly to the new rules for the Coupe Deutsch de la Meurthe. We have now received the complete regulations as drawn up by the *Commission d'Aviation* of the *Aero Club de France*.

Origin of the Cup

Art. 1. Mme. Henry Deutsch de la Meurthe and her family have decided to offer, in memory of M. Henry Deutsch de la Meurthe, a sum of 200,000 francs for an international speed contest to be called the Coupe Henry Deutsch de la Meurthe.

The Cup will be contested under the conditions laid down in the present regulations, which have been drawn up at the request of the donors, and with their approval, by the *Commission d'Aviation* of the *Aero Club de France*. The *Commission d'Aviation* is responsible for the organisation of the Contest.

Prizes

Art. 2. The sum of 200,000 francs will be distributed as follows :—(*a*) An objet d'art of 20,000 francs. (*b*) Three prizes of 60,000 francs each to be awarded to the winners of the Cup, in accordance with the present regulations.

General Conditions

Art. 3. The Contest will be an international challenge open to all machines of Class " C " (flying machine with engine). It will consist of a speed test over a distance of about 300 kms. Each year before May 1, the *Commission d'Aviation* of the *Aero Club de France*, taking into account the progress in Aviation, shall publish the special regulations for that year.

Qualification of Competitors—Pilots

Art. 4. Every qualified National Federation shall signify to the *Aero Club de France* its willingness to contest the Cup. This notification must reach the Secretary of the *Commission d'Aviation* of the said Club before the date fixed by the special regulations for the year. This entry must be accompanied by a sum of 1,000 francs for each machine, 500 francs being returned in respect of each machine crossing the starting line in flight.

The entrants of each nation shall be the constructors of the machines, and shall not be approved unless presented by a National Federation affiliated to the *Fédération Aéronautique Internationale*. Each National Federation shall not present more than three entrants (*i.e.*, 3 machines in all).

The entrants and pilots in charge of the machines must be of the same nationality as the Federation presenting them or belong to a country not represented on the *Fédération Aéronautique Internationale*, the countries that were at war with France from 1914 to 1918 being excepted, unless they are members of the League of Nations.

Date and Place of Contest

Art. 5. The Cup will be contested each year on a date and at a place fixed by the Special Regulations for the year.

Award of the Cup.—Provisional Holder and Permanent Holder

Art. 6. The National Federation recognised by the *Fédération Aéronautique Internationale* whose representative has won the Cup, shall be the Provisional Holder until the following award has been made. The objet d'art shall remain in the hands of the *Aero Club de France* until the final award has been made.

The Permanent Holder of the Cup shall be the Competitor who has twice won the Contest, or, failing that, the third winner. In the event of the first two contests being won by the same competitor, this competitor, having become the Permanent Holder of the Cup, shall at the same time receive the remaining two prizes of 60,000 francs.

Art. 7. Entrants are responsible for all accidents to themselves and their personnel, as well as for damages of any kind to third parties, officials, etc., caused by their machines, pilots, workmen or themselves.

Art. 8. To satisfy administrative and customs requirements, competitors must send to the *Commission d'Aviation de l'Aero Club de France*, on a date to be fixed by the annual regulations, the following information (failure to do so may prevent the competitor taking part in the Contest) :—

1. Value of each machine. 2. Name and address of the pilot of the machine, also name and address of the substitute, it being permissible to change the first pilot if necessary. 3. Name or number of machine. 4. Type of machine and motor. 5. Weight and material of wings. 6. Weight of motor. 7. Weight of propellers. 8. Country of origin.

Supplementary Regulations for 1922

Art. 1. The Contest will take place over 300 kilometres in the circuit Villesauvage–La Marmogne (the course of the Gordon Bennett Cup, 1920). Alightings, repairs and replenishments are allowed.

Art. 2. The Contest will take place on Saturday, September 30, 1922.

Art. 3. Entries presented by the National Federations must reach the *Commission d'Aviation de l'Aero Club de France* before 6 p.m., on Saturday, August 19, 1922.

Art. 4. Machines must be on the Aerodrome at Villesauvage before 4 p.m. on the day before the Contest, viz., September 29, 1922.

Art. 5. Competitors must send to the Secretary of the *Commission d'Aviation* before 6 p.m. on August 19, 1922, the information required in Art. 8 of the General Regulations.

Art. 6. Each entrant must nominate, by a declaration in writing to be handed to the *Commissaires Sportifs* before 6 p.m. on the day before the Contest, a person to represent him on the Course. This person shall declare the time of departure.

Art. 7. The Contest shall be open from 9 a.m. to 6 p.m. During this period of 9 hours, starts shall be made at times chosen by the competitors, as follows :—

Each entrant, or the person accredited by him, shall inform the *Commissaires Sportifs* of his intention of starting, indicating the time at which he wishes to start. The *Commissaires Sportifs* shall then hand to him a slip fixing the time of starting, after which 30 minutes will be allowed to the competitor to cross the starting line in flight.

If after the expiration of this time the competitor has not crossed the starting line in flight, he will be obliged to make a second and final request to start, and the same procedure will be followed as for the first request, except that at the expiration of the second 30 minutes the competitor will be considered to have started.

Art. 8. The Cup will not be awarded if the speed attained is less than 280 kms. per hour.

Art. 9. In the event of bad weather on the day of the Contest the *Commissaires Sportifs* may postpone the contest from time to time.

All communications regarding this Contest should be addressed to the Secretary, Royal Aero Club, 3, Clifford Steeet, London, W. 1.

Previous Winner

1921. FRANCE.—*Georges Kirsch*, Villesauvage, October 1, 1921. Nieuport-Delage. 300 h.p. Hispano-Suiza. Distance 300 kms. Time, 1 h. 11 m. 39⅕ s.

EASTER AVIATION MEETING

THE Royal Aero Club will hold an Aviation Race Meeting at Waddon Aerodrome, Croydon, on Easter Monday, April 17, 1922, starting at 3 p.m.

Members of the Club will be admitted free on presentation of their membership cards. Motor cars, 5*s*.

Programme

Club Handicap.—For machines Avro type. Distance approximately 16 miles. Prizes £30.

Second Waddon Handicap.—For machines with a speed of not less than 100 m.p.h. Distance approximately 32 miles, Prizes, £30.

Second Croydon Handicap.—For machines with a speed of less than 100 m.p.h. Distance, approximately 24 miles. Prizes, £30.

First Spring Handicap.—For machines occupying the first three places in the Waddon and Croydon Handicaps. Distance, approximately 32 miles. Prizes, £60.

Double Parachute Descent.—By Sergeant W. Newell in a " Guardian Angel " parachute.

Balloon Sniping Competition.

The Aircraft Disposal Co., Ltd., have certain machines available for the Races, and they will be prepared to consider applications for the hire of these from qualified pilots. Applications should be made direct to the Company at Waddon Aerodrome, Croydon.

The following Club machines will also be available :—

B.E.2E (2-seater), 90 h.p., R.A.F.
Avro (2-seater), 110 h.p. Le Rhone.
Avro (2-seater), 110 h.p. Le Rhone.
Avro (2-seater), 110 h.p. Le Rhone.

Qualified pilots wishing to take part in the Races may hire any of these machines from the Club at £3 for each event, which will include cost of petrol, oil and insurance of machine. Applications for these machines should be made direct to the Club.

The Races will be over a circuit, the machines remaining in sight of the spectators at the Aerodrome all the time.

Entries close on Friday, April 7, 1922, at 5 p.m. Entry fee, £1 for each event.

Further particulars of the Races may be obtained from the Club.

Offices : THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

LONDON TERMINAL AERODROME

Monday Evening, March 13.

THE air station becomes gayer and more brightly painted day by day. If paint were any criterion of the success of commercial aviation, it would appear that the air-lines are in a very flourishing condition. The Grands Express have nearly completed their new passengers' waiting-room, and are painting it in the firm's particular shade of light blue. The Instone Line's passenger waiting-room is an ambitious affair, with writing-tables, comfortable armchairs, and a settee.

It would almost appear as though the various air-lines expect their passengers to do a lot of waiting. Yet any such attitude would be very hard to justify. Surely it might be better if, instead of expending time, money and space on the provision of these waiting-rooms, the air-lines were to arrange their car and aeroplane services so that no waiting is necessary. Considering the amount of time already spent on the journey between terminal aerodromes and cities there should be no waiting whatever on the 'drome.

For the past week, workmen have been busy digging a huge hole on the edge of the aerodrome, near the new hangars, and this morning a giant petrol-tank arrived ready to be buried therein. Pipe-lines are to be run out to the new hangars, so that machines can be filled with petrol without having to wait their turn near the departure-platform.

The Housing of the "Air Expresses"

THE Daimler Airway are erecting a dynamometer for testing their engines, and have already put down the concrete base next the hangar nearest the departure-platform. This company are to have the top hangar, Handley Page Transport and the Instone Air Line the next two; while the fourth is, I understand, to be occupied by the K.L.M.

The K.L.M. "F.2," which arrived from Holland a fortnight ago, and has been held up for repairs to the engine, left for Amsterdam this morning. Mr. R. E. Duke, who is joining the Daimler Airways, has been retained by the K.L.M. to pilot this machine to Amsterdam. He had with him, in the seat beside the pilot, Mr. Van Der Hoop, a Dutch pilot, who is getting used to the London-Amsterdam route, and will probably be seen on the service this summer. Mr. Leverton, who had business in Amsterdam, travelled as passenger in the machine, and was anticipating a very rough trip, as the wind was blowing almost a gale from the east, and the journey was expected to take between four and five hours.

In connection with the activities of the Fokker firm, which are apparently on the increase, Mr. Van Der Waal, the manager of the Fokker works, has been in London buying aero-engines. I understand that he bought Napier "Lions" for the "F.4," and Rolls-Royce "Eagles" for a new machine, the "F.5," which is an intermediate size between the "F.2" and "F.4."

The Instone Air Line are considerably worried by the engineers' labour trouble. They are afraid that it will hold up the new machines which Vickers are building for them, and also the repairs which are being made to some of the old "flying stock."

The great gale on Wednesday last completed the work of bringing down two of the disreputable old hangars which have been an eyesore in front of the Disposal Company's sheds since the aerodrome opened. Luckily, there were only a few old machines, of no commercial value, in the hangars at the time they were blown down.

A number of machines of various types have been out on test for the Disposal Company, during the week, and Mr. Piercy brought back a machine—originally destined for Spain—which had been damaged while landing at Paris.

Forced Landing and Damage of a "Goliath"

ONE of the Grands Express Goliaths was "written off" by a forced landing on Saturday at Farnborough, Kent. The pilot and three passengers escaped injury. The passengers were, in fact, rather intrigued by their experience ; but the machine had its under-carriage and *fuselage* very badly damaged. M. Chalambel, the pilot, had been forced to descend owing to a mist which was thickening as he approached Croydon.

M. Didier informs me that he expects the first of the Messageries' Renault-engined "Goliaths" at Croydon on Wednesday. In the meantime, the Messageries' service is still carrying on with the five-seater Spads and an occasional Breguet.

Mr. Olley, of Handley Page Transport, had a strange experience during the week. While getting-off from Le Bourget, he apparently caught one of the obstruction posts, and when he arrived at Croydon this post was found wedged in his under-carriage. It pierced the bottom plane, in fact, as he was landing. Yet he was quite unconscious of having struck anything, and was astonished to find the post in his under-carriage when he descended from the machine.

Mr. Havelock Wilson, of the Sailors' and Firemen's Union, went by Handley Page to Paris to attend a conference during the week. On his return journey there was a stiff wind, and the machine took between six and seven hours on the flight. Owing to the length of the trip, a descent was made at Lympne to fill up with petrol, and in order that there should be the least possible delay, a wireless message was sent by the pilot when in mid-Channel asking for so many gallons of petrol. When Mr. Wilcockson brought the machine down at Lympne the petrol was ready waiting to be poured into the tanks.

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British Empire League

THE DUKE OF DEVONSHIRE presided over a meeting of the Council of the British Empire League on March 7, at the House of Lords. Among those also present were: Lord Aberdeen, Lord Blyth, Lord Buxton, Lord Foley, Lord St. John, Lord Sydenham, Mr. A. H. Ashbolt (Agent-General for Tasmania), Sir Ion Hamilton Benn, M.P., Sir Edward Beauchamp, M.P., Sir John Cockburn, Sir J. D. Connolly (Agent-General for Western Australia), W. Herbert Daw, Admiral Sir E. R. Fremantle, Mr. Lewis Haslam, M.P., Sir J. Norton-Griffiths, M.P., Sir J. Hood, M.P., Colonel Culver James, Sir John Randles, M.P., Mr. Gershom Stewart, M.P. and Mr. C. Freeman Murray (Secretary).

On the motion of Sir J. Norton-Griffiths, M.P., seconded by Mr. A. H. Ashbolt (Agent-General for Tasmania), the following resolution was unanimously adopted :—

"The Council of the British Empire League considers that the establishment of an Imperial Air Service by means of airships working from Great Britain to Egypt, India, Australia, New Zealand and South Africa, would be of the greatest importance in the interests of the Empire, and urges upon His Majesty's Government the necessity of providing such financial guarantees as are required for the preliminary measures, in order that such Airship Service may be established as soon as possible, on a commercial basis.

"The Council further considers that nothing should be done to break up the existing ships, plant and personnel before June 1, as undertaken by Capt. The Right Hon. F. E. Guest, M.P., Secretary of State for Air, at the recent Air Conference in the Guildhall."

The resignation of Lord Sydenham as Chairman of Executive was received with much regret, and Lord Southborough was unanimously elected as his successor to that office.

Wireless Telephones for Channel Machines.

IT looks as if it will be possible shortly for passengers on the London-Paris machines to speak by wireless 'phone to offices in either city while in the air. The necessary arrangements are, we understand, nearing completion.

THE LOTH GUIDE CABLE

An Interesting French Aid to Air Navigation

Although there were relatively few things upon which members of the recent Air Conference agreed, it was inevitable that in all that mass of problems there should be some upon which every one was agreed. Among these was the desirability of being able to fly by night and in fogs. Virtually the ability to do this amounts to doubling the speed of any given aeroplane—at any rate, over long distances. Even for such short routes as the London–Paris, it was pointed out by several, notably by Gen. Williamson of the G.P.O., that a night air mail service would be valuable and would save a great deal of time. In addition to the advantages of being able to save time by flying at night, the question of reliability and regularity of service is closely bound up with the capability of flying in fog or clouds. With modern instruments the problem of flying in clouds is perhaps less serious than that of carrying on during foggy weather. Nevertheless, pilots do not particularly like flying in or over clouds—at any rate, until the wireless service has been so far developed that a pilot may at any time, and with a minimum of delay, obtain his bearings by D.W. Progress is being made in many directions, and there is little doubt that before long fogs, clouds and darkness will have lost much of their danger to aircraft. Among the various inventions which have for their object the making safe of flying under such conditions, not the least interesting is the guide cable adapted for aircraft by M. Arthur William Loth, a French engineer. Experiments along similar lines have been made at Portsmouth and in New York, using a cable for directing ships during foggy weather. The problems confronting aircraft are, however, somewhat different, notably on account of the third dimension in which an aircraft moves. While it cannot, perhaps, be claimed that M. Loth invented the guide cable, he can, at least, claim the credit of having adapted it for use with aircraft, and the Loth system is, in our opinion, one which is likely to prove of the greatest use in the future. The following notes on the Loth guide cable are based on an article by M. P. James in our excellent French contemporary *l'Aérophile*.

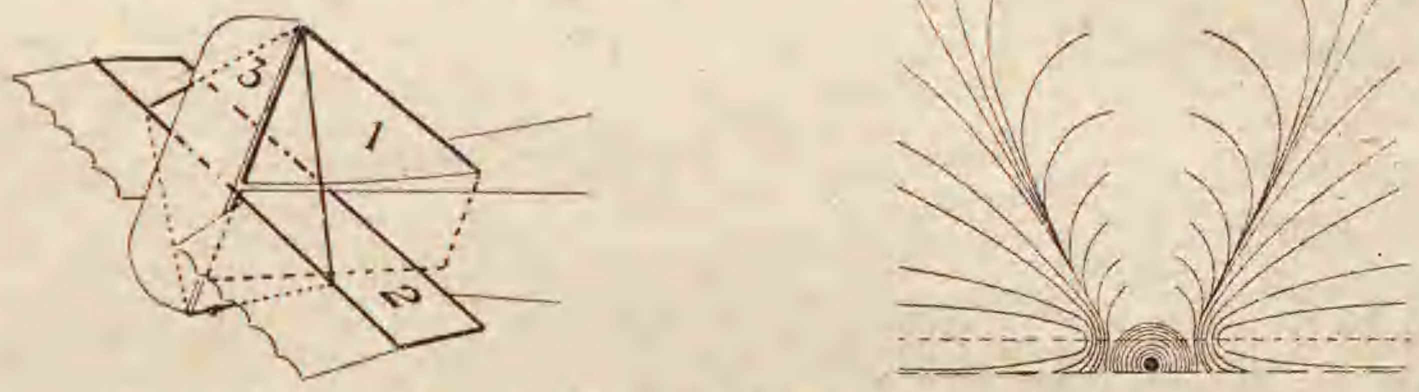
The fundamental principle of the Loth guide cable rests on the fact that if a high-frequency alternating current is sent through a cable earthed at each end, a magnetic field of considerable intensity is created around the cable. The effects of this field can be detected by means of suitable instruments at considerable distances from the cable. Thus if an aeroplane or airship is equipped with these instruments, its navigator can determine his position relative to the cable, and thus ascertain his bearings. Although the principles are very simple, M. Loth was faced with numerous problems before bringing his system to perfection. Thus he had to do a tremendous amount of research and experimental work in connection with the formation and extent of the magnetic field surrounding the cable. This work took a long time, as measurements were often taken at intervals of a metre or so. The lines of force, shown in the accompanying diagram, were found to vary with the frequency of the alternating current sent through the cable. The lines shown in the diagram represent the field resulting from using a frequency of 600 per second.

As regards the equipment of the aeroplane, this is simple in principle, consisting in mounting in a suitable place—for instance, on the tail of the machine—three panels of insulated copper wire so placed as to be at right angles to each other. Thus in the accompanying diagram, 1 is the longitudinal vertical panel, 2 the lateral horizontal panel and 3 the lateral vertical panel. These panels are connected to a telephone receiver, as in ordinary direction-finding wireless, *via* a commutator, so that the navigator can "listen in" on either of the three panels.

According to the position of the machine in relation to the cable, the intensity in each of the three panels varies or may even disappear. For instance, when the machine is flying parallel to the cable, the sound is a maximum in the longitudinal panel 1, and *nil* in the transverse vertical panel 3. As the machine diverges from the course parallel to the cable, the sound diminishes in the longitudinal panel, and increases in the lateral vertical panel, in which the sound becomes maximum when the machine is at right angles to the cable. The sound in the longitudinal panel then vanishes. The horizontal panel has the property that the sound in it vanishes when the machine is vertically above the cable. It will thus be seen that if an aerodrome has a cable running around it, the navigator of a machine can determine, even in a thick fog, the exact moment of crossing the cable, and by finding the height from the altimeter he can determine at what angle to glide into the aerodrome in order to make a landing.

A special commutator enables the operator to put any two of the panels in series, and the information gained by so doing enables the exact position of the machine in relation to the cable to be determined. Thus, by placing in series the longitudinal and transverse vertical panels, the operator can determine whether the machine is inclined to right or left in relation to the cable. In order to determine whether the machine is approaching the cable from left to right, or from right to left, the longitudinal and horizontal panels are placed in series. Placing the transverse and the horizontal panels in series serves to indicate the vertical distance above the cable; in other words, it shows whether the cable is running up or down the side of a hill or mountain, or whether it is running horizontally over flat ground. By the use of the Loth cable, a machine can thus travel along over any sort of country, the navigator knowing his position, and knowing that he cannot accidentally run into a hill in the fog, as his receiver will warn him if he approaches too close to the cable. If this happens while the machine is flying horizontally, he knows that the cable is running up the side of a hill, and if he is on a familiar route he will probably know which is the hill in question. Put in another way, the guide cable is both a direction wireless and a contour map of the route flown.

It goes without saying that the inventor had many difficulties to surmount, difficulties not directly connected with his system, but which had a considerable effect on its development. Thus it was found that the magnetos caused such a noise in the receiver as to drown, or nearly so, the sound from the wireless panels. To overcome this difficulty, it was necessary to explore the magnetic fields of the magnetos thoroughly, and this was consequently done. We do not propose to tire our readers with a technical description of how M. Loth overcame the difficulties. Suffice it to state that he has succeeded in doing so. Not only so, but he has found means of interrupting the sound from the wireless panels for the very short interval occupied while the spark-



On the left, installation on board the aeroplane for utilising the Loth Guide Cable: 1, longitudinal panel; 2, horizontal panel; and 3, transverse vertical panel. On the right, lines showing magnetic field produced in space by the cable.

ing plugs are giving off sparks. In point of fact, the receiving in the telephone ear piece is intermittent, but the intervals are so short as to be inaudible to the human ear, which hears the receiving as if it were continuous.

Having indicated very briefly the fundamental principles of the Loth guide cable, a few words dealing with the practical results obtained may not be without interest. With the horizontal panel (2) contact with the cable has been established from an altitude of 10,000 ft. With the two vertical panels contact has been attained from a height of about 8,000 ft. At an altitude of somewhat over 6,000 ft., the operator can hear on all three panels, and can begin to guide the machine without being much disturbed by the various noises on board. At lower altitudes the receiving becomes very loud. When flying at about 6,500 ft., the cable can be "picked up" from a horizontal distance of approximately one mile. As the machine flies lower, what might be termed the "useful zone" increases in width, until at ground level the range is about 9 miles. These results were obtained with an experimental cable of 9,500 ft. in length, and having eight sharp angles in it. The longest straight length was less than 2,000 ft. It is confidently expected that with a proper line, running more nearly straight, and of greater length, even better results will be obtained.

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SOME NOTES ON AEROPLANES, WITH SPECIAL REFERENCE TO THE CROSS-DESERT ROUTE FROM CAIRO TO BAGHDAD

[Under above title, Air-Commodore H. R. M. Brooke-Popham read a paper before the Central Asian Society on March 9, 1922, the chair being taken by Sir Michael O'Dwyer in the absence of the Rt. Hon. Lord Carnock. The paper was, to all intents and purposes, identical with that read by Air-Commodore Brooke-Popham before the Royal Aeronautical Society on October 6, 1921, a *résumé* of which was published in our issue of October 13, 1921. Thus the bulk of the paper did not contain anything which necessitates dealing with it at length on this occasion. An exception is, however, formed by the concluding paragraphs of the paper, which were not included in the paper as read before the R.Ae.S., and which, as they deal with the subject of handing over the military control of Iraq to the R.A.F., are of interest. This section of the paper is, therefore, printed verbatim below.—Ed.].

As you know, it has been decided by the Cabinet, that the responsibility for the military control of Iraq shall devolve upon the R.A.F. Without entering into a lengthy discussion on this, I should like to indicate one or two of the special advantages of air power in this connection. The normal course of any form of small war in which this Empire engages is roughly as follows:—

Some tribe raids another under our protection, refuses to pay taxes or eats a missionary. After due preliminaries and failure to obtain any apology, an expensive expedition is organised, and, after a lapse of some months, either gains or fails to gain its objective. Even in the former case the tribe that committed the enormity has probably forgotten all about it, and so the effect is not so great as might have been anticipated. The main difficulties are:—(*a*) The need for a line of communication which has to be guarded; (*b*) The delay in starting due to large amount of transport and troops that have to be collected and organised, mainly for the L. of C.; (*c*) The slow movements even after the expedition is ready to start; (*d*) Natural obstacles met with, *e.g.*, deserts.

Now provided the objective is within, say, 200 miles of their base, aeroplanes have none of these difficulties. They can act within a few days, in some cases within a few hours, of receipt of orders, and they want no L. of C. There must be a great saving not only in time but in money and in life.

As a case in point, may I remind you of the Somaliland operations in January, 1920. The following is an extract from the despatch of the Governor of Somaliland:—

"Second Supplement to *London Gazette*, October 29, 1920.

"Twenty-three days of active operations have sufficed to effect the final overthrow of the Dervish power. For this, credit is primarily due to the Royal Air Force. They exercised an immediate and tremendous moral effect over the Dervishes, demoralising them in the first few days. Our casualties amongst troops were confined to three native ranks killed and eight wounded, and one of the Camel Corps was slightly wounded. Neither the R.A.F. nor the Royal Navy suffered casualties."

Then again, the rapidity with which aircraft can act may be the means not only of preventing a disturbance increasing and becoming a really serious affair, but of nipping it in the bud.

An interesting case was that of Colonel Jacob's Mission, which was interned at Baji near Aden in November, 1919. The local authorities estimated that a whole mixed brigade would be required to rescue this Mission, and I believe this had been actually asked for. It was, however, decided to see what moral effect could be produced by aircraft, and, consequently, two single-seater machines with a total of eight men, were sent on the deck of a steamer and landed on an island, the distance from which to Baji was 55 miles. The succeeding events can now be best described in the form of a diary:—

November 26.—One machine flew over the neighbourhood of Baji. Colonel Jacob reported no good effect, rather the reverse.

November 28.—One machine flew over Baji and dropped a few bombs in a previously selected spot for demonstration purposes. Colonel Jacob reported excellent results of aeroplane demonstration and a great advance towards settlement.

December 12.—Mission was released without any troops being sent.

The following is an extract from the report of the G.O.C., Aden, on the occurrence:—

"The effect of two flights by a single aeroplane over the hostile tribal area was so great that men, women and children were filled with alarm, and brought to bear immediately the full weight of their influence against continued hostility to the Government."

I have sometimes seen criticisms levelled against the use of aircraft for this sort of purpose on the grounds that they are merely an instrument of terrorism, that bombing is necessarily indiscriminate, and even that any action we take amounts chiefly to bombing women and children. I think this is a most unfair statement to make, and in any case, I fail to see that killing women and children by means of aircraft bombs is more cruel or reprehensible than killing them by means of shells from a gun. However, apart from that I do not believe that aircraft really are going to rely entirely upon terrorism in Mesopotamia, but that they will have a distinct effect in pacifying and civilising a semi-developed country.

There are the opportunities afforded by rapid communication. This will not only enable political officers to visit distant parts of the country at very short notice, but will also afford a means of conveying tribal leaders to the Headquarters of the Government, and thus afford the opportunity of personal interviews with all the benefits that accrue therefrom.

Further, there are the opportunities for doing direct friendly action to individuals in isolated districts; an instance of this has already been referred to.

Time alone can prove the wisdom or otherwise of the decision to make the R.A.F. responsible for the control of Iraq, but all the experience so far available shows that the decision is correct, and that it will result not merely in crushing opposition, but in preventing it, and this I know is the opinion of those best qualified to judge on the spot.

The Discussion.

The Chairman, by way of illustrating the manner in which risings can be not only suppressed but also prevented by the use of aircraft, related how, in India, there were riots simultaneously in several places and how no garrison troops were available for rendering aid to an outlying post. It was discovered, however, that one aeroplane was available, and this was sent out and succeeded, by dropping a few bombs among the rioters, in quelling the disturbance in a few minutes and thus saved the white population. He related several instances of a similar nature, and succeeded in giving an excellent idea of the very great service which aircraft can do in circumstances such as these. He then called upon Major-General Sir Frederick Maurice to open the discussion.

Sir Frederick pointed out that aviation is as yet only a few years old, and that it is still in a stage of evolution. It is essential, he said, that we keep the Royal Air Force independent of the Army and Navy if it is to develop freely. He had personally had a great deal of experience of the War Office, and in the early days of flying he came back from France very enthusiastic about the possibilities of aircraft, and tried to get the War Office interested. He saw a very high official there, but, after putting his case for aircraft as strongly as he could, he was told that flying could never amount to anything as far as the Army was concerned, as those who flew were of a peculiar bird-like disposition not usually found in the material of which the Army was composed, and that men with these qualifications would not be forthcoming in sufficient numbers! He referred to the early days of the war, and to what happened at Mons, drawing the moral that aircraft was essential. He also called attention to what had been done by the R.A.F. in various areas in the East, and stated as his firm conviction that had the R.A.F. been under War Office control, it would never have been allowed to go ahead and prove what it was really capable of doing, as it had done under independent control.

Captain P. D. Acland stated that he did not really wish to take part in the discussion, but would confine himself to saying that it seemed to him that the lecturer had proved that there might be very great advantage in carrying out development work by aircraft. This could be done more quickly and cheaply than by other means, and it was a difficult thing to establish railways at high cost before one knew what would be the amount of traffic which the railway, if built, could count upon. In such cases aircraft seemed to furnish a better instrument of development, and that this important fact should not be overlooked.

Brigadier-General Caddell caused much amusement by some humorous remarks regarding the advantage which Air-Commodore Brooke-Popham had over previous travellers over that desert route, such as Alexander the Great, who was tempted into committing bigamy. As the Air-Commodore was single, he was not in danger of doing this sort of thing.

Major Burton related some personal experiences which he and a small survey party had in the same locality, but he said he was sorry to say that the Arabs on this occasion did not adhere to the rules laid down by the lecturer. As a matter of fact, they attacked at 10.30 p.m., and wounded the whole party, and to this day he could not understand how he had managed to escape with his life. There was no time to relate the manner of their rescue, but he would mention that on arriving home he had discovered that his relatives had, at the very instant when his party were being attacked, been uneasy about him and had prayed earnestly for his safety. He did not know what was the opinion of the audience concerning the ethics of prayers, but he was personally convinced that these and nothing else had saved his life. His escape could not be otherwise explained.

The Chairman then asked the audience to pass a hearty vote of thanks to the lecturer for his most instructive paper.

THE R.A.F. AND THE MIDDLE EAST

MR. WINSTON CHURCHILL's statement in Parliament on March 9, and the discussion which followed it in connection with the Supplementary Estimates, shed very valuable official light upon the great success and enormous economy of the utilisation of Air forces in place of the regular Army. Mr. Churchill scored an immense victory in the debate, following his bold experimental policy in giving the R.A.F. the wide latitude for making good which he, in the months past, had confidently prophesied. Mr. Churchill's main references to the R.A.F. and the economies effected by their use were as follows :—

The great factor in these reductions has been the use of air power. With regard to the Air Force, we had six squadrons last year, and we have raised that number now to eight squadrons.

We have eight squadrons all concentrated at Baghdad in a loop of the river, which renders them certainly secure. They constitute the principal agency by which the local levies all over the country are supported, by which the authority of the Arab Government is rendered effective, and by which the frontiers are to a very large extent defended. It is a very powerful concentration. There is nothing like it elsewhere in the British Empire at the present moment. The eight squadrons represent one-third of the whole strength of the Royal Air Force. We propose during the coming year to place the military control and security of Iraq under the charge of the officer commanding the Royal Air Force. That will be much the largest force in the country, and it is only right in that case that command should follow the bulk of the forces there. There will be ancillary units, armoured-car companies, steamboats on the river, and armoured trains, which will all be comprised within the general control of the Air Force, and will look after the mechanical depôts which eight squadrons require. By the time the Air Force take over control there will only be four battalions of troops, and they will be there for the purpose of keeping order in Baghdad and securing the aerodromes from marauders, and not for the purpose of wandering about the country on expeditions.

Colonel Sir C. Yate : Could not the Air Force themselves defend their aerodromes ?

Mr. Churchill : I think it is better to have a certain force of men to see to the security of the central organism on which this novel scheme of holding a great country depends. I should like to say how enormously the whole of this reduction of troops has been facilitated by the Air Ministry and by Air-Marshal Sir Hugh Trenchard, whose exploits in the War are so well-known. He, again and again, has had to face the terrible difficulty of actually doing things on the spot in contact with hostile influences. He has thrown himself into this task with extraordinary energy and power, and I am most deeply indebted to him and the Air Ministry for the assistance they have rendered us. It would have been absolutely impossible to secure anything like the saving we have made, if it had not been for their whole-hearted co-operation in a scheme which, after all, is of consequence to the Air Force and to the whole position in the future of our aerial Army. Before I leave the Air Force, I may say that everything goes to show that that force will play a great part in keeping order in these territories—not by violent measures. The mere demonstration of the presence of aeroplanes has again and again been effective in preventing disorder. It has put the civilian officers in close contact with the various tribes, it provides the means of supporting the local levies if outbreaks occur, while it does not involve the movement of bodies of troops and does not place small parties in a position to be cut off and ambuscaded ; neither does it involve long, vulnerable lines of communication. It is a very powerful factor which, at present, is only in an experimental stage, but which has been gradually growing in its claim on the confidence of the authorities on the spot during the whole of the present year. I should like to say that the air mail which I indicated was to be started last year is now running with fair regularity from Baghdad to Cairo. Indeed, one individual has actually travelled from Baghdad to London in from six to seven days. The Government's communications with Iraq have been shortened by nearly two-thirds—by a month out of six weeks—and there is no doubt that the civil communications will go that way by this aerial route as soon as it develops a little further.

Major-General Seely : The Secretary of State for the Colonies announced today a very remarkable policy, and one of an entirely novel character.

It is a most interesting experiment. It opens up vistas of economy compared with which anything suggested by the Geddes Committee is really as nothing. If this experiment succeeds, you will be able to do the most astonishing things all over the world in the way of reducing the number of your garrisons, and especially in the way of reducing the number of garrisons in unhealthy places, but do not let anyone think that the Secretary of State's statement will go unchallenged. I know it will be bitterly opposed by all old-fashioned people, and possibly by some others.

Who is right so far as we have been able to go ? I have seen a number of people who have come back from Iraq, where this policy is being carried out against the violent opposition of what I must term the War Office—I do not say the present Secretary of State for War, but the old-fashioned military idea. If the War Office are right, we are going to be landed in disaster, and instead of diminishing the cost from £20,000,000 to £2,000,000 we shall land ourselves into untold millions of expenditure, but, if they are wrong, we are going to save all this money and administer the country in a more economical and merciful fashion.

Let us see what has happened so far. During the past year there have been four little rebellions, and the Secretary of State told us that, so far as is known, the casualties have been in the neighbourhood of three or four killed and three or four wounded due to air accidents. At a place called Naziriyah there was trouble. If it had not been for aeroplanes, we should have sent an expedition which would have taken several weeks to get there, and there would have been considerable casualties, but on this occasion aeroplanes flew over and dropped a warning. At the appropriate interval they came back and dropped a more efficient form of warning in the shape of a bomb or two, and the very next day the inhabitants came in and apologised and surrendered. That was in

September last. There is another place called Bani Said, where an exactly similar thing happened in the last year. There again a warning was conveyed by aeroplane; there again the political officer himself went to the place, or as near as he could, to explain to them that they really must keep the peace; there again it was necessary to take hostile action in the form of dropping bombs upon such bodies as could be seen; and there again within a week the whole body came in and surrendered. Now I will come to this year. All this I have heard from people who have been on the spot. Not far from Basra, as distances go in that country, a tribe went into open rebellion; that is to say, they refused either to pay taxes or to allow the District Commissioner to approach the place, or any political officers to go there. Again, we sent a warning by aeroplane, and again, the warning not having been attended to, aeroplanes were sent for hostile action, and yet again within a week the whole party came in and surrendered.

It may be said that all these are places in the plains—and that is so—but what about Kurdistan, of which we heard a good deal from Mr. Asquith? There are steep mountains there, where, it is said, aeroplanes are valueless, but, really, it is quite the other way; according to my information, the argument is all the other way. It is just in those mountainous regions that the advance of troops is so dangerous, as in the defiles on the Indian frontier. But if you adopt the entirely new methods of strategy involved in attacking from the air, you do not attack the enemy by means of a prolonged expedition. The last time I spoke on this question and urged that this policy should be adopted, little knowing how soon it would be adopted, we had not got such good concrete cases as we now have. The Sulaimaniyah, in Kurdistan, rebelled three years ago. We had to send an expedition at once. There were very heavy casualties, and it took six weeks to restore order by flying columns operating at extraordinary speed. Exactly the same type of thing happened in the same region with the same people last January. Air power was, however, employed, and the warning was issued within a day. The result not being satisfactory, an attack was delivered within 48 hours, and as these gentlemen did not surrender a further attack was delivered two days later, on this occasion the attack being delivered from Baghdad, 160 miles away, without the machines ever coming down, and within a few days the whole party again surrendered, and are now loyal and, let us hope, contented subjects.

I cordially congratulate the Secretary of State for the Colonies and the Secretary of State for Air on the success which has so far attended their efforts, beg of them not to relax them, especially not to be afraid of the formidable attacks which will come from old-fashioned people, and assure them that there is a great body of opinion in this House which will back them up with all its power in adopting and developing this efficient and merciful means of maintaining our Empire.

I congratulate the Secretary of State on his imagination in utilising the Air Force as policemen in this country. This is a red-letter day in the military history of the world, because for the first time we see this new young Air Force taking charge of a big country with the older service ancillary to it.

The Air Force during the War worked practically entirely for the Army. In this particular scheme the Army has to co-operate with the Air Force, and the success of the venture now being tried can be made or marred by the Army. I hope it will do its best to help the venture in every way.

THE GEDDES NATIONAL EXPENDITURE CUTS AND AIR ESTIMATES

In dealing with the Geddes report in Parliament last week, Sir R. Horne, when referring to the case of the Air Ministry, said: "I will turn now to the question of the Air Force. There the cuts recommended are £5,500,000, but, as before, £1,000,000 of that is unspecified. The Air Ministry proposes a reduction of £3,000,000, so that the comparison is as between £3,000,000 on the one hand and £4,500,000 on the other. The Air Force have made great efforts to economise. They are reducing the £18,500,000 Estimate of this year to £10,500,000 in the next year, giving a reduction of 43 per cent.

"It may be questioned, as I gather from some hon. members behind me, whether we are not running great risks in going so far in these reductions. We have looked at the problem, weighing, on the one hand, the necessities of our country, and, on the other hand, the position of financial stringency in which we find ourselves, and we give these recommendations to the House as those which, we believe, can be most justified in the condition in which we now are. It was suggested by the Geddes Committee that there should be set up a Ministry of Defence. That would not immediately have the result of bringing about great economies in the public service, and it is obviously a matter which requires very careful investigation and great consideration before any plan can be adopted. The whole question is to come up for consideration at the Committee on Imperial Defence."

Capt. Wedgwood Benn during the debate said:—"I wish to refer to another matter which forms one of the subjects dealt with in the Geddes Report—I mean the continued existence of a separate Air Service. If the Under-Secretary of State for War is able to say in reply to my question that it is the Government's intention to maintain the integrity and independence of the Air Service, I shall not trouble the House with any further remarks."

The Under-Secretary of State for War (Lieut.-Col. Sir R. Sanders): "That is so."

Capt. Benn: "If that is the case, then I have nothing further to say."

Sir R. Sanders: "I do not want to give a definite assurance of that kind in answer to a question without careful consideration, but I understand it is so, and that the Air Service will continue as an independent service."

Capt. Benn: "If that be so, then I should not dream of troubling the House with any further remarks. That is an extremely satisfactory statement in view of the doubts that have been thrown upon the future existence of the Air Service. If the hon. gentleman states that there is no intention of interfering in the matter, that assurance is extremely satisfactory."

Sir R. Sanders: "That is my belief at the present moment."

IN PARLIAMENT

Airships

MR. GILBERT, on March 8, asked the Secretary of State for Air how many airships are in the possession of his Department at the present time; whether all or any of them are of German make; if it is proposed to retain all of them for air-service work or if any of them are to be disposed of; and, if so, how many?

Captain Guest: The answer to the first question is five; to the second, one; to the third, that it is not proposed to retain any of them for Air Force work, and that in view of the present need for economy and of the inability of India and those Dominions from whom replies have been received to contribute towards their operation on Imperial air routes, it has with great regret been decided to pass them all for disposal. This process must necessarily take a few weeks, and during that time it is, of course, still possible for offers to be made with the object of running an airship service.

Sir J. Norton-Griffiths: Does my right hon. friend's undertaking given at the Guildhall that this material would not be disposed of before June hold good?

Captain Guest: No. There is some slight misunderstanding about it. We hoped that the further delay would be of value to the other Dominions, as no reply had been received then. Since then I have received a reply, and there is no object in keeping this material any longer.

Major-General Seely: Even if we dispose of the airships, will we retain at least a proportion of the skilled personnel, and the research staff to enable us to resume activities in case of necessity?

Captain Guest: In spite of the small monetary grant for this purpose, an effort will be made to retain some of the skilled members of the staff in maintenance and other parties.

Captain Viscount Curzon: Have the Admiralty concurred in this decision?

Captain Guest: The Admiralty views were represented a great many months ago, when their statements were considered very carefully.

Depôts or Air Stations

MR. GILBERT asked the Secretary of State for Air how many depôts are now maintained for the Air Force in Great Britain; how many air stations are also provided, and can he state approximately in what parts of England and Scotland they are situated; and if it is proposed to give up any of these depôts or stations, and, if so, how many?

Captain Guest: The answer to the first question is 7; to the second, 32, of which two are situated in Fifeshire, one in Flintshire, and the remainder in the counties east of a line drawn from Lincoln to Plymouth; to the third, that one air station will be relinquished in May next, and four others will be reduced to a care and maintenance basis early in April next.

R.A.F. Recruiting

LIEUT.-COLONEL CAMPION, on March 9, asked the Secretary of State for Air the amount of money expended in recruiting advertisements during the current financial year, and the number of recruits obtained?

Captain Guest: It is estimated that expenditure on recruiting advertisements for the Air Force, including posters, films, etc., will be £15,000 on Air Votes in the financial year now ending, and £3,000 on the Stationery Office Vote. During the first 11 months of the year some 6,320 recruits have been obtained.

Captain Viscount Curzon: Would it not save money to combine with the Navy and Army in this matter of recruiting posters and so on?

Captain Guest: That is one of the matters which are receiving the close attention of the Government.

Colonel Ashley: Could the right hon. gentleman say why it costs so much more to get recruits for the Air Force than for the Army?

Captain Guest: *The type of recruits that we require is of a very high standard.*

Halton Buildings

MR. G. LOCKER-LAMPSON asked whether it is proposed to proceed with the large expenditure upon buildings at Halton?

Captain Guest: The answer is in the affirmative. The buildings are four-fifths completed, and to stop now would be a very false form of economy, since provision would have to be made elsewhere for the training of these boys.

Air Attachés

MR. RAPER asked how many air attachés there are; what are their duties; and what is their remuneration in the aggregate and individually?

Captain Guest: There are two air attachés, at Paris and at Washington, and their duties are to keep His Majesty's Government in touch with the developments of aviation in all its aspects in the countries to which they are accredited. Their remuneration consists of their ordinary Air Force pay, together with a foreign allowance (also admissible for naval and military attachés) of £5 a day at Washington and £4 at Paris, inclusive of entertainment and all other allowances, except travelling allowance for journeys outside the capital city.

Mr. Raper: Is it not the fact that France, which is so far ahead of us as regards progress in aviation, has already decided to dispense with air attachés, as being unnecessary?

Captain Guest: I am not aware of the point raised by my hon. friend, nor am I prepared to admit that France is so far ahead of us in aviation.

Mr. G. Murray: What is the rank of these two officers?

Captain Guest: To the best of my recollection, one is an air commodore and the other a group captain.

Mr. Raper: If, as I suggest, France has withdrawn her air attachés as unnecessary, will the right hon. gentleman consider doing the same?

Captain Guest: We will certainly consider it.

Rear-Admiral Sir R. Hall: If it be the fact that France is withdrawing her air attachés, could the right hon. gentleman ascertain who is doing the work?

Captain Guest: *I feel convinced that the work is being done by somebody*

Round-the-World Flight

MR. RAPER asked whether the proposed flight round the world to be undertaken by Sir Ross Smith will be financed or subsidised in any way by His Majesty's Goverment?

Captain Guest: The answer is in the negative.

Air Estimates

MR. G. LOCKER-LAMPSON asked whether the Air Estimates for 1922–23 have been framed in accordance with the Cabinet instruction of 1919, on the assumption that no great war is to be anticipated within the next 10 years?

Captain Guest: The answer is in the affirmative.

The Air Ministry

COL. MILDMAY, on March 13, asked the Prime Minister whether, in view of the prospective Debate on the Air Estimates on Monday next, he can find it possible to lay upon the Table of the House the memoranda of the First Sea Lord and of the Chief of the Imperial General Staff—if such were compiled for the information of the Cabinet—with reference to the policy of terminating the existence of the Air Force and Air Ministry as at present constituted, and of merging the force in the Navy and Army?

Mr. Chamberlain: No, sir; without saying whether or not papers have been laid, I think my hon. friend will see that I could not undertake to publish papers which, if presented at all, would be of a most confidential kind relating to questions of public defence, and must be so treated.

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Royal Air Force Sports Board

R.A.F. Boxing Association.—The Annual Air Force Individual Boxing Championships will take place this year in the R.A.F. Depôt Gymnasium at Uxbridge, on April 6 and 7. Entries are unlimited for both officers and airmen, but the weights for officers are confined to heavy, middle, welter, light and feather. Entries should reach the Hon. Sec., R.A.F., B.A., not later than March 31.

Air Board in India

IN the Summary for the half-year to December last of the Air Board it is stated that in September, 1921, the administration of Civil Aviation was transferred from the Department of Commerce to the Public Works Department.

The Air Board now consists of the following members:—

President.—Colonel Sir Sidney Crookshank, K.C.M.G., etc.

Members.—Mr. G. R. Clarke, C.S.I., C.B.E., I.C.S.; Mr. E. Burdon, C.I.E., I.C.S.; Air-Commodore J. I. Webb-Bowen, C.B., C.M.G.; Doctor G. T. Walker, C.S.I., F.R.S.; Mr. R. P. Hadow, Secretary.

The programme for the year 1922–23 has been discussed, and the board has decided to recommend the following expenditure:—

(1) Balance of expenditure on Allahabad Aerodrome, Rs. 5,000; (2) Upkeep of existing aerodromes, Rs. 10,733; (3) Investigation of accidents, Rs. 5,000; (4) Investigation of conditions affecting aircraft in India, Rs. 77,000; (5) Calcutta–Rangoon route, Rs. 500,000; (6) Share of expenditure on Cairo–Karachi route, Rs. 12,400; total: Rs. 610,133.

This, with an allowance of Rs. 21,760 for establishment, amounts to Rs. 631,893, but it is considered unlikely that funds will be available for this programme.

The Part of 'Planes at Johannesburg

'PLANES quickly brought into action in the Rand mine strikes have without question helped to bring much nearer the end of the trouble than could otherwise have been the case. In their use there is an uncanny persuaviness to respect the peace—keeping powers that be and the community's laws, which the red Bolshie finds it difficult to resist—yet the average "superior" man will still ask "What's the use of aircraft, anyway?" It is very regrettable that so good an officer as Capt. Carey Thomas should have been reported killed in the attacks.

The following item, from an official communique issued from Pretoria on the 12th, reflects the effects upon the rioters of the use of aeroplanes: "The revolutionaries in the Brixton area surrounding two squadrons of police who have been holding out most gallantly for the last day or two were heavily bombed at daybreak today, thirty-two bombs being dropped, causing a large number of casualties. This effectually reversed the position, many of the revolutionaries surrendering to the police and others taking shelter in the native location, where they were safe from the bombing."

The Monaco Meeting

THE following list of entrants for the "croisière" Marseilles-Monaco is now announced: 1, Chantiers de la Mediterranée, Maicon, on E. Romano type R.I., 130 h.p. Clerget; 2, G. Minier, Minier, on Farman type F.40, 80 h.p. Renault; 3, Caudron, no pilot announced, Caudron type C.66, 140 h.p. Hispano-Suiza; 4, Caudron, no pilot announced, Caudron type C.65, 130 h.p. Clerget; 5, Marcel Besson, Jules Duclos, on Marcel Besson, 130 h.p. Clerget; 6, Cie. des Transaériens de tourisme et Messageries, Clot, on Savoia S.13, 250 h.p. Isotta-Fraschini; 7, Société Breguet, Thierry, on Breguet 14T bis, 280 h.p. CV. Renault; 8, Caudron, no pilot announced, Caudron C.39, 3-130 h.p. Clerget; 9, Drouilh, Henry Drouilh, on Georges Levy, 300 h.p. Renault; 10, Aero-Navale, no pilot or machine announced, one 300 h.p. DD. and two 270 h.p. Hispano-Suiza; 11, Aero-Navale, no pilot announced, Liore and Olivier, one Salmson 250 h.p. and two Hispano-Suiza 300 h.p.

Enterprise

A STRIKING instance of the way in which the use of aircraft can accelerate communication was furnished by the de Havilland Hire Department in connection with the delivery of films of the Royal wedding. Four machines were used for conveying films of the wedding to Manchester, Newcastle and Leeds, with the result that the films were being shown in those towns shortly after 6 p.m. on the same day. G-EBAW, piloted by Wilson, left at 2 p.m. for Manchester, arriving at 3.59 p.m. At 2.55 p.m. G-EAYU, piloted by Cobham, left for Newcastle, arriving at 5.50 p.m. Broad, on G-EAAC left for Manchester at 3.25 p.m., arriving at 5.30 p.m., and at 4 p.m. Barnard left on G-EBAX, arriving in Leeds at 5.45 p.m. In no other way would it have been possible to get the films to these towns in anything like so short time, and the de Havilland Aircraft Co., no less than the film company, are to be congratulated on their enterprise. The performance, apart from the immediate object in view, was one of great value, as demonstrating the very practical value of "hustling" by air.

Royal United Service Institution Prize

THE result of the Prize Essay Competition for 1921, organised by the Royal United Service Institution, upon the subject of "The Influence of the Future of Aircraft on Problems of Imperial Defence," was announced at the anniversary meeting of the Institution last week. The Council have awarded the Gold Medal of the Institution and a prize of thirty guineas to Flight-Lieut. Mackay, R.A.F., and prizes of twenty and ten guineas to Squadron-Leader Walser, R.A.F., and Capt. the Hon. R. Plunkett-Ernle-Erle-Drax, R.N., Director of the Naval Staff College, respectively. The judges of the competition were Air-Marshal Sir H. Trenchard, Maj.-Genl. Sir P. Radcliffe, and Rear-Admiral Fuller, to whom a hearty vote of thanks was accorded.

Aeroplane Tent-pegging.

WONERFUL possibilities are suggested by the unpremeditated removal by the Bristol 10-seater of Handley-Page Transport, of a portion of Le Bourget aerodrome last week. The incident is referred to under our London Terminal Aerodrome Notes, but we now learn that, as a matter of fact, it was not a single post carried away by the machine but three large planks, measuring 7 ft. by 9 in. by 2 in. thick. The pilot was entirely unaware of their presence in the undercarriage until, on landing at Croydon, one of them perforated the lower plane How the planks got into the undercarriage is still a mystery, but the incident seems to indicate unusual strength in the Bristol. Apart from the punctured lower plane no other damage was done to the machine.

LONDON AERO-MODELS ASSOCIATION

THE General Purposes Committee have been engaged at the last two meetings preparing a programme of competitions for the ensuing six months. A copy of the same will be sent to all members in due course.

On March 25 at 6 p.m., a Propeller Competition will be held at Club Headquarters. Entry forms and full particulars of same to be had from the Competition Secretary, Mr. C. A. Rippon, 52, Fairbridge Road, Holloway, N. 19.

The Official Observer for the South-West District, Mr. D. A. Paveley, gave a lecture on Tuesday evening, March 7, to the Meccano Boys at Emanuel College, Wandsworth, the subject being "Early History of Flight, Heavier-than-Air Machines, incorporating Model Aeronautics." At the conclusion there were many enquiries from possible recruits to membership of L.A.M.A.

A fine cup which has been presented to the London Aero-Models Association by Mr. Felix Kelly for the best duration flight with a compressed-air-driven model.

Rule No. 3 of the Association states that "members not having paid their subscriptions to date, shall not be eligible to vote at meetings, or participate in competitions."

Meetings held at Headquarters every Thursday evening, 20, Great Windmill Street, Picadilly, W. 1, at 7.30 p.m.

Full particulars can be had from the Hon. Secretary, Mr. A. E. Jones, of 48, Narcissus Road, West Hampstead, N.W 6

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Gliders

IN view of the activity in gliding experiments in other countries, it has been suggested that facilities should be offered in this country to those who are interested in these experiments.

The Royal Aero Club, 3, Clifford Street, London, W. 1, will be pleased to hear from all those who contemplate taking an active interest in gliders.

German Air Enterprise in Colombia

CONFIRMATION has been received through the British Department of Overseas Trade that a contract has been drawn up between the Colombian Government and the Sociedad Colombo-Alemana de Transportes Aereos, whereby the company will operate a weekly air mail service from Barranquilla to Neiva and *vice versa*, with numerous intermediate landings, in return for a small subsidy. This service and another between Barranquilla and Cartagena were in actual operation in January, although at that time the contract still awaited the sanction of the Government. Apparently the affair is a very live proposition, from particulars recently to hand.

Mid-Air Collision Fatality

FROM Allahabad it is reported that on March 3 two aeroplanes, returning from Lahore to Ambala, collided at an altitude of 4,000 ft. and crashed to the ground, near Amritsar. The four occupants, Flight-Comdr. Fox, Flying Officer Buckland, Sergt. Hemings and Air-Mechanic Richardson, are stated to have been killed instantaneously.

IMPORTS AND EXPORTS, 1921-1922

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.

	Imports		**Exports**		**Re-Exportation**	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
	6,838	1,719	146,957	145,681	2,304	1,123

* * * *

PUBLICATIONS RECEIVED

Cours Pratique d'Aviation. By Capt. Gambier and Lieut. de Vaisseau J. Amet. Librairie Delagrave, 15, Rue Soufflot, Paris. Price 12 fr.

La Photographie Aérienne. By A. H. Carlier. Librairie Delagrave, 15, Rue Soufflot, Paris. Price 28 fr.

Scientific Papers of the Bureau of Standards. No. 427. Some Effects of the Distributed Capacity between Inductance Coils and the Ground. By G. Breit. Department of Commerce, Bureau of Standards, Washington, D.C., U.S.A.

Transactions of the Institution of Engineers and Shipbuilders in Scotland. Vol. LXV, Part V. March, 1922. Institution of Engineers and Shipbuilders in Scotland, Elmbank Crescent, Glasgow.

Technical Note No. 85. Air Force and Three Moments for "F-5-L" Seaplane. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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23,359. J. DEMOCRATIS. Parachutes. (175,308.)
31,141. GOODYEAR TYRE AND RUBBER CO. Airships. (154,578.)
31,738. W. GRUNOW. Devices for transference of articles between aircraft and vessels at sea. (175,367.)
31,911. F. W. SCARFF. Control of aircraft. (175,378.)

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1,070. N. BASENACH. Airship anchoring devices. (157,198.)
8,678. ARMSTRONG-SIDDELEY MOTORS, LTD., and F. M. GREEN. Air-cooled I.C. engines with radial cylinders. (175,554.)

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(Continued from p. xiv.)

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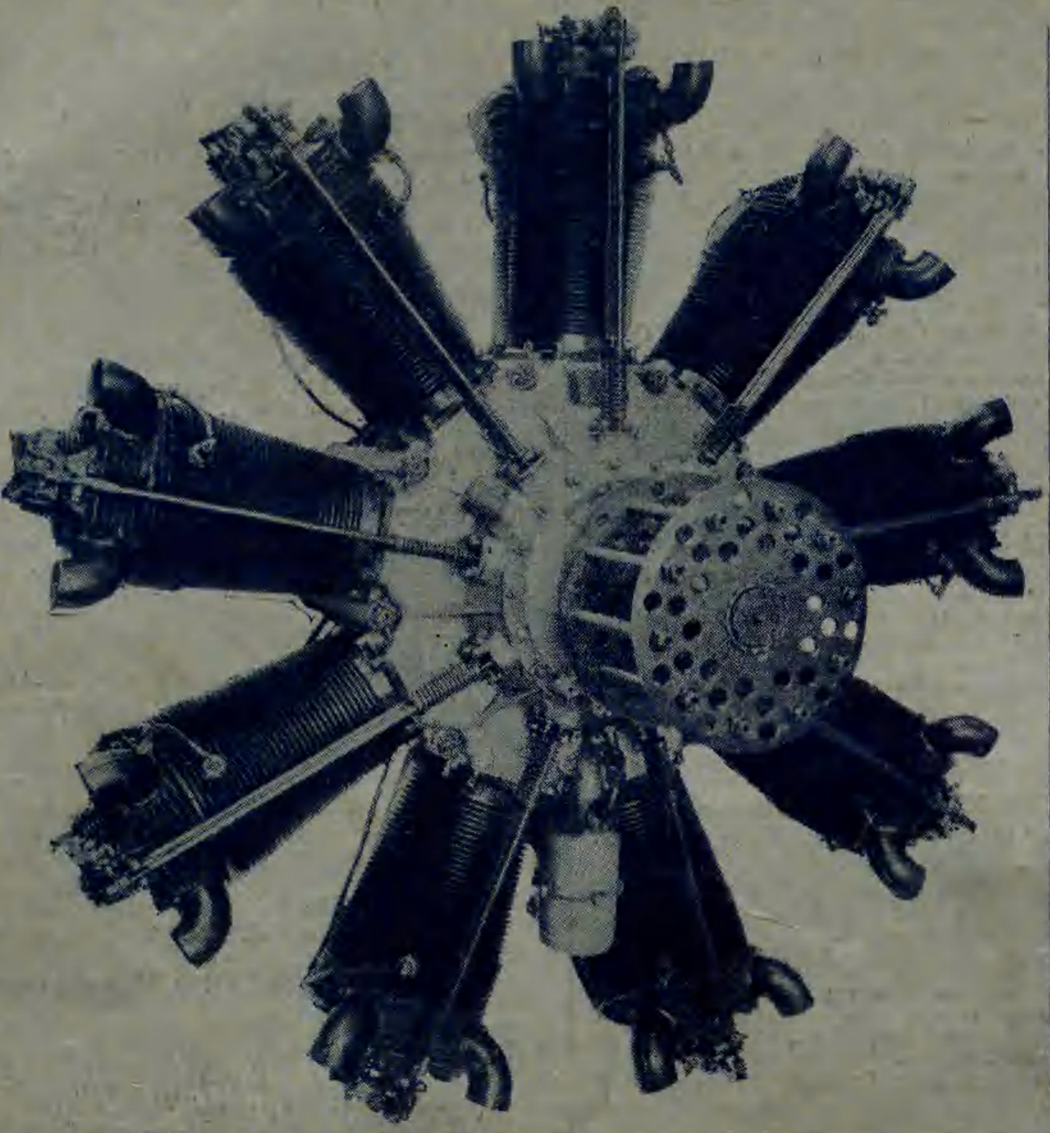

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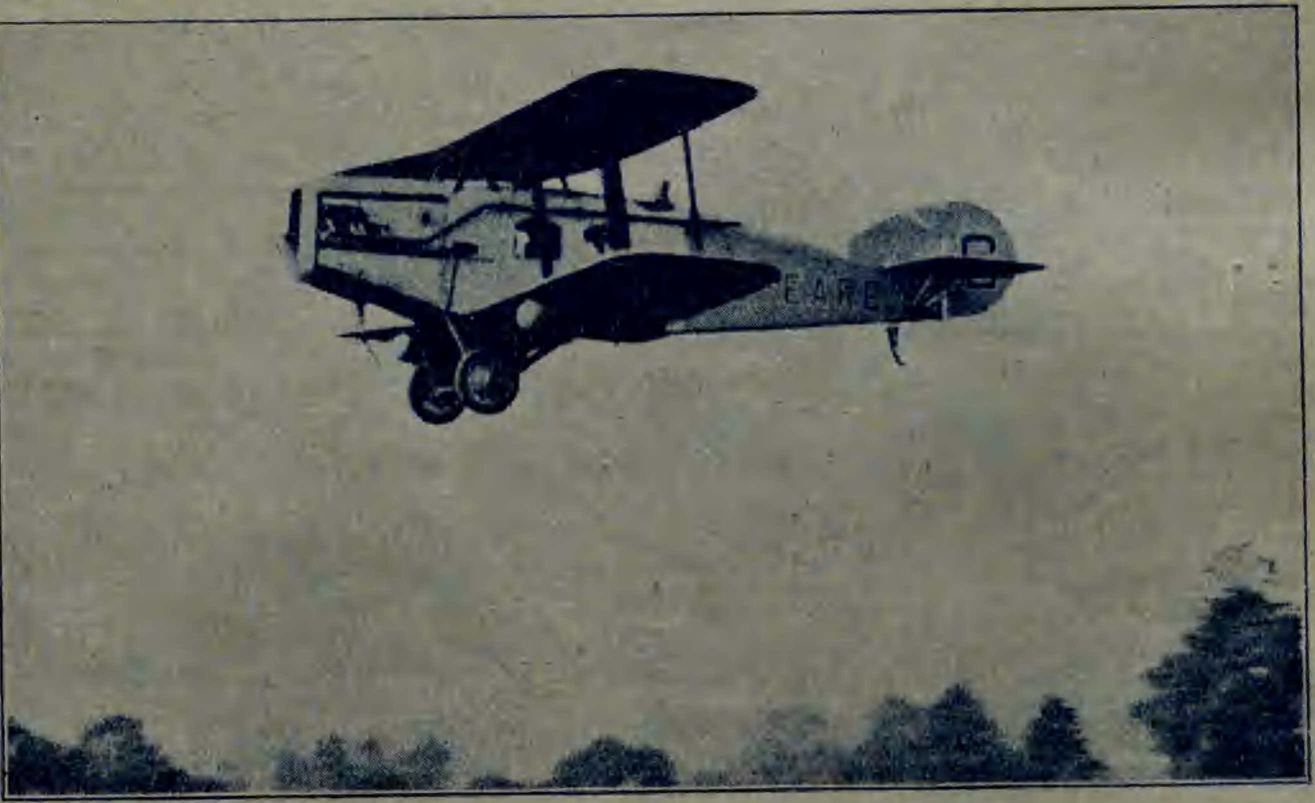

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

1922.	
Mar. 23	Lecture, "Some Notes on Commercial Aircraft," by S. H. Evans, before Students' Section, R.Ae.S.
Mar. 26–April 2	Nice Meeting
Mar. 30	Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.
Mar. 31	Lecture, "Aircraft Design" by H. P. Folland, before I.Ae.E.
April 7	Lecture, "Some Outstanding Problems in Aeronautics," by Professor L. Bairstow, before Students' Section, R.Ae.S.
April 17	R.Ae.C. Race Meeting, at Waddon
April 17–19	Seaplane Contest, Marseilles
June 1	Entries close for Schneider Cup Race
June 5	R.Ae.C. Easter Race Meeting, at Waddon
June 23–25	International Competition for Touring Aeroplanes, Brussels
July 6–20	French Gliding Competition
Aug. 6	Gordon-Bennett Balloon Race, Geneva
Aug. 7	R.Ae.C. Race Meeting, at Waddon
Aug. (last fortnight)	Schneider Cup Seaplane Race, at Naples
Sept.	Tyrrhenian Cup, Italy
Sept.	Italian Grand Prix
Sept. or Oct.	R.Ae.C. Race Meeting, at Waddon
Sept. 22 ...	Coupe Deutsche (300 kil.)

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT

"One Air Service, One Uniform, One Badge"

IT is now a matter of five years since FLIGHT first condensed the claim for a separate Air Service into the slogan "One Air Service, one Uniform, one Badge," although we had been pressing the claim for such a service for years before that. The Air Service, with its independent Minister, came into being at last, but ever since the R.A.F. and the Air Ministry have been the subjects of attacks from the older Services, who refused to admit the soundness of letting the Air Force develop independently of the Army and Navy. As we were the first to put forward the demand for the establishment of the Air Service as an independent arm, it was with no small satisfaction that we heard the very strong and convincing statement, by Mr. Chamberlain, in the House during the Debate on the Navy Estimates, of the Government attitude towards the forces which are working for the suppression of the R.A.F. and for its division into separate naval and military flying services. There has been a tendency to doubt whether the Government, when pressed for a decision, would resist the claims of the older Services and take up a strong stand in favour of retaining the R.A.F. as an independent force. Mr. Chamberlain's statement cleared the air at once, and set at rest the minds of those who, having the future of the Empire and the R.A.F. at heart, were somewhat doubtful as to the support which the Government would be prepared to give to our new First Line of Defence, which is actually what the R.A.F. is rapidly becoming.

The Navy's claim, as voiced by Rear-Admiral Sir R. Hall, was even less strong than might have been expected, and the gallant Admiral did not succeed in doing more than plead from the peculiarly narrow point of view of the Navy. His arguments were those which the Navy has ever advanced, and he gave an excellent proof of the failure of the naval officer to grasp the real significance of the advent of the Air

Arm. Mr. Chamberlain, in pointing out that all our fighting services exist, and only exist, for the defence of our common country, scored heavily in comparison with the very narrow view taken by Sir R. Hall, who appeared to look at the matter entirely from the naval point of view, as was, of course, only to be expected. All the old arguments about the failure of the necessary co-operation between the Navy and the R.A.F. were trotted up again, and, as usual, it was omitted to point out that this failure has been entirely the fault of the Navy itself. Nor is this surprising when one bears in mind that, as the Navy was out for getting control of its own air service, it was obviously desirable that the present arrangement should show up as badly as possible.

However, Sir Reginald Hall, as a result of the very strong stand taken by Mr. Chamberlain, and realising that the House appreciated the weakness of his case, begged leave to withdraw his motion, and thus it may be supposed that the Admiralty have, for a time at any rate, abandoned the idea of a Naval Air Force, and that the future of the independent Royal Air Force is assured. This is all to the good, and we congratulate the Government on their firm stand, which is, to all but those with vested interests or limited outlook, obviously the right one.

Having, presumably, been finally convinced that, no matter how it tries to pull the strings, it will *not* get its own Air Service, the Navy may be found in the future to be better disposed to co-operate with the R.A.F., seeing that it has now nothing to gain by refusing co-operation—for we do not believe that the Navy is blind to the possibilities of aircraft—and the appointment of a Committee to look into the better co-operation of the two Services may result in a great deal of good, even if it is not yet possible to establish a Ministry of Defence to co-ordinate the work of all three fighting services.

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The Air Estimates Elsewhere in this issue will be found a brief summary of the Air Estimates for 1922–23, which were published on March 17. The debate on them in the House of Commons is to take place on March 21, but as this is the day on which this journal is at press, it will not be possible to include a report of the debate in this issue. From the summary of the Estimates published this week, it will be seen that a reduction of just over 7½ million as against the current financial year is contemplated, while as regards personnel a reduction of 9,700 is provided for. The revised Estimates for 1921–22 were £18,411,477 and a personnel of 40,880, while the corresponding figures for the current year are £10,895,000 and 31,176 respectively.

We do not propose to deal with the net figures under the various heads in detail this week, but will confine ourselves to a few remarks on the Estimates as a whole. It is true that, faced as we are with the vital necessity of economising in every way possible, reductions have to be made. At the same time, the increasing importance of the R.A.F. is now generally admitted, and its functions are gradually expanding, as instanced by the taking over by the R.A.F. of the control of Iraq. Consequently it was to be expected that the recommendations of the Geddes Committee would not be carried out in full. Even so, the reductions are considerable, and we do not expect the forthcoming Debate in the House to bring forward any very strong criticism of the total amounts involved, although possibly the manner of their allocation may be open to discussion.

The reduction in expenditure on research of £529,000 is certainly open to adverse criticism. The problems which are still awaiting solution are so many and so important that to reduce the amount spent on research from £1,706,000 to £1,177,000 cannot fail seriously to affect progress. And progress, in the very nature of things, must be rapid in aeronautics, in the fighting Air Force no less than in civil aviation. As far as we are concerned, we cannot agree that to cut down research is anything but a short-sighted policy, and one which we may easily live to regret—some day when it is too late. Research cannot be expected to give immediate results, and now is the time when we should lay the foundation for the work which may prove of inestimable value in the future—at a time, probably, when it will be most urgently needed.

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What France is Doing While on the subject of the Air Estimates, it is not without interest to examine what others are doing, since obviously our policy must be to a large extent governed by the attitude of other countries towards the Air Arm. Nor is there any necessity for going far afield, our neighbour and ally France providing an excellent example of a very strong air policy. At the present time France has something like 160 squadrons on war footing, compared with our 18 or so. By the end of next year she will have about 220 squadrons. France has so encouraged aviation that her output towards the end of last year was in the neighbourhood of 150 machines per month. It is probably not far wrong to estimate the number of machines built in this country since the Armistice at 300.

France's expenditure on aviation is about 443 million francs. At par this is equivalent to £17,720,000, and bearing in mind the difference in pay in the two countries, and the fact that in France certain items, such as land and buildings and transport, come under other Votes, this figure is actually more ahead of our 11 million than appears at first sight. French Civil Aviation comes in for about 95 million francs, out of which approximately 45 million francs is allotted for subsidies. Compared with our £880,000, these are formidable figures, and the wisdom of reducing our Civil Aviation Vote by £516,000 may well be questioned.

The series of articles by Brig.-Gen. Groves in *The Times* expresses some very strong views, views which merit the very closest attention. We would urge all who are interested in aviation and in the future of the R.A.F. to read these very carefully. The importance of Civil Aviation to our air power is strongly emphasised in these articles, and we hope to refer to them in more detail next week. At present space does not allow of doing so, nor of dealing with several items in the Air Estimates, which appear to call for comment. With that we must leave it at present.

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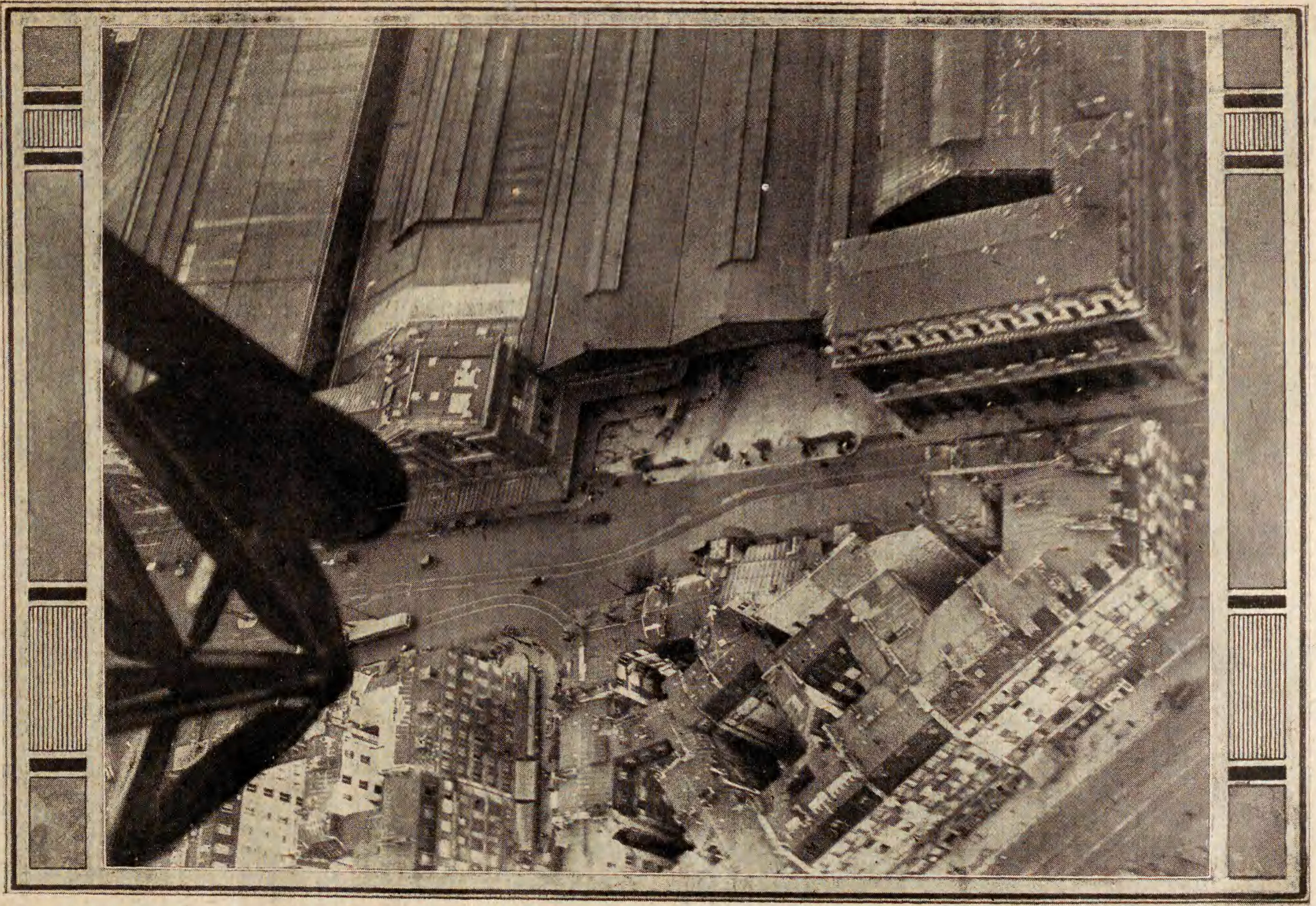
Italian Parachute Competition

FROM Rome it is reported that the Ministry of War is to organise a competition for parachute descents. First prize is to be of 30,000 lira, second 15,000 lira, and third 5,000 lira. Competitors will jump from an aeroplane flying at an altitude of less than 1,000 metres, and the prizes will be given for alighting, without incident, as near as possible to a predetermined point.



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LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE

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THE NAVY AND THE R.A.F.

FOLLOWING the statement of Mr. Amery, Parliamentary Secretary to the Admiralty, on the Navy Estimates, the Navy made its expected claim for a separate Air Service, Rear-Admiral Sir R. Hall moving, on March 16, "That in the opinion of this House, the naval Air Services should be put under the control of the Board of Admiralty for the full development of the efficiency of these services, for their better co-operation with the Navy, and for the most economical administration and expenditure." The gallant Admiral then proceeded to put his case for a separate Air Service. He contended that for some years to come the carriage of trade and troops at sea will be done by surface ships, and that we are faced with the problem of defending or attacking shipping carrying troops, which involves acknowledgment of maritime conditions of transport work. The advent of the air arm necessitates assistance by and defence for aircraft, but this did not mean, the Admiral said, that the air should act separately any more than the introduction of the submarine meant that the submarine should act separately. He thought that if there are two separate services the authorities of each will develop their own theories as to the best employment, and we should have two sets of people studying the problem of invasion in separate watertight compartments. No division is practicable, Sir R. Hall maintained, in the case of the sea and the air, working in combination to maintain control of a given water area for a prolonged period. The Admiral asked whether the Air Service is to decide what allocation of aircraft is to be made, maintaining that it cannot have the knowledge necessary as a basis on which to form its opinions. In minor strategy, the Admiral said, the air arm is part of the naval arm, and must be worked in combination with it. A separate air service necessitates a separate air staff and the development of a strategy of its own. When coming to the question of battle, and the tactical side of air operations, he contended that here also there must be a dissipation of effort by duplication. He admitted that the Air Force is capable of performing many important functions, but in battle it must be for the naval authorities to decide how many of these functions require to be developed. In fact, the Admiral contended that there is no place at sea for a separate air service. By way of showing, by an example, the fallacy of a separate service, the Admiral stated that one of the prime causes of the failure of the German submarine campaign was that in the German navy the submarine was practically an independent service, and its operations were not co-ordinated with those of the High Sea Fleet. By way of strengthening his claim for a naval air service, the Admiral stated that he did not know of any foreign nation which has a separate air force, and he did not know of any Admiral of a foreign nation who recognised a separate air force, nor did he know any distinguished British Admiral holding a high position at sea today who recognises a separate air force.

As regards the questions of economy and personnel, the Admiral called attention to the fact that we have a largely reduced Navy, with large barracks which are half empty, and staff colleges at Greenwich which will bear filling up. If we have our officers in the Navy who specialise in air, the Admiral thought that perhaps when the attractions of flying are not so great, or when old age creeps on them, they can give up active service and return as specialists, become staff officers in air, and eventually Admirals who know something about the air.

Viscount Curzon seconded the motion, and denied that the Admiralty were hostile towards the R.A.F. He referred to the various functions of aircraft as they are used today, but admitted that in the future aircraft would probably become even more important, and said he would not be surprised if, in the future, the Commander-in-Chief himself had to go up in an aeroplane in order to direct his fleet. He said that the Fleet has aircraft carriers, but neither the Admiral in command nor the Admiralty have any control or responsibility for the machines carried or for the personnel. The Air Ministry may withdraw pilots if they want to do so and send them to another quarter of the globe. In conclusion, Viscount Curzon said he would like the Government to consider whether some Committee could not be set up to enquire into the use of aircraft by both Services.

The Air Ministry : Government's Decision

Mr. Chamberlain, in reply to the matters brought up by Rear-Admiral Sir R. Hall and Viscount Curzon, said that if these matters had related solely to the Navy he would not have thought it necessary to intervene. But questions had been raised which could not be confined to a single Service, but which, in all their implications, affected the three fighting Services and the fighting Ministries. It seemed proper, he said, that the statement of Government policy should be made by a Minister, not the head of one of these various departments, but on behalf of the Government as a whole. Mr. Chamberlain pointed out that he was not laying down a policy for all time, but that in what he was about to state he was declaring the policy of the Government as things stand, and that it was essential that that policy should be known. He thought that the gentlemen who had moved and seconded the amendment had said everything that could be said in support of their amendment from their point of view. This was admittedly and essentially a rather narrow point of view. Mr. Chamberlain made a very excellent point in referring to the statement that it was not fair to take enterprising officers from the Naval Service for the service of the country in another sphere. He would point out that we have a common country, and that all these Services exist, and only exist, for the defence of that common country. We must therefore look at it, he said, from a wider point of view. Mr. Chamberlain then gave a brief, but most excellent review of what has been the history of the Air Service up to the present time. As there is always a danger that the steps which led to the formation of the R.A.F. may be forgotten, we publish this part of Mr. Chamberlain's speech in full as follows :—

"In 1912 a scheme for the creation of a Royal Flying Corps was laid before Parliament. The theory on which that scheme was based was that the needs of the Navy and Army differed, and that each required a technically developed arm respectively to sea and land warfare, but that the foundation of the requirements of each Service was identical—namely, an adequate number of efficient flying men. The aeronautical service therefore was to be regarded as one, and was designated at that time the Royal Flying Corps. It consisted of a naval and military wing, maintained at the expense and administered by the Admiralty and the War Office respectively. There was established, further, a single Royal Aircraft factory, common to both Services, and a central flying school, all graduating at this school to remain to specialise in naval and military flying, and in order to secure co-ordination between the two branches of the Royal Flying Corps an Air Committee was set up as a Sub-Committee of the Committee of Imperial Defence. My right hon. and gallant friend (Maj.-Gen. Seely) was the first Chairman of that Committee. But even from the first there was a tendency for the two Services to drift apart, and in 1914, before the outbreak of the War, the naval wing of the Royal Flying Corps had already changed its title to the Royal Naval Air Service, and with the outbreak of hostilities the separation of the two Services was virtually complete. That is the first stage in the history of this arm. When war broke out the War Office were responsible for the aerial defence of the country, but all the squadrons of the Royal Flying Corps were engaged in France, and at Lord Kitchener's request the Admiralty took responsibility for home defence against aircraft early in September, 1914. Therefore for the first two and a half years of the War expansion of the two branches of the Air Service was developed independently, both as to organisation and supply, by the naval and military authorities. What was the result ?

"My hon. and gallant friend proudly boasts that the Navy got all the best machines and all the best officers. How did it get them ? Was that distribution dictated by the country's needs at the moment, or by any consideration of the country's need ? It was dictated by a fierce inter-departmental competition in the market, the resources of which at that time were wholly insufficient to supply the Services. It was a haphazard and, therefore, a dangerous arrangement. It was an accidental, and, therefore, could not be a considered, arrangement. It resulted in overlapping, waste of effort, one Department bidding against another in the distribution and application of the resources of the country, not according to a considered view of the country's needs, but according to the relative skill and relative quickness of the different Departments in getting hold of what resources were available. Those are the great and glorious days the hon. and gallant gentleman holds up to us as providing that which his Amendment would provide, and which the present system does not.

"Towards the end of 1915 so patent were the facts that there arose a strong movement for co-ordination, though it was not at the time proposed to combine the two Services, because it was clear that for a considerable time to come the great bulk of the work in the air would be of a definitely naval or military character. There was already a strong body of opinion in favour of an Air Minister who should have entire control of the Services, and a status equal to that of the First Lord of the Admiralty or the Secretary of State for War.

"The next step in co-ordination was that in February, 1916, a Joint War Air Committee was appointed to collaborate in and co-ordinate questions of supply and design of material for the Naval and Military Air Services. That was not without some relation to the state of things on which my hon. and gallant friend (Sir R. Hall) so lovingly dwelt. The Committee failed to present an agreed Report, and it was brought to an abrupt end by the resignation of its chairman (Lord Derby). That committee was succeeded by an Air Board, constituted on May 11, 1916, under the Presidency of Lord Curzon. This Board was free to discuss matters of general policy in relation to the air, including combined operations of the Naval and Military Air Services, and to make recommendations to the Admiralty and the War Office thereon, as well as to discuss and make recommendations on the types of machine required for the two Air Services. If either Department declined to act upon its recommendations, the President had the right of reference to the War Committee. The Board was also charged with the task of organising and co-ordinating—observe how often the word co-ordinating comes in; I emphasise it because it means that the system was not working smoothly, that there was not one but two policies often clashing and constantly overlapping—the supply of material and to prevent competition between the two Departments. Finally, it was responsible for the co-ordination of research in aerial matters between all the bodies concerned.

"After further experience, in November of that year, 1916, the Government, after prolonged enquiry, decided on further developments, providing for the Admiralty and War Office to concert their respective aerial policies in consultation with the Air Board and submit their programmes of aerial production to the Air Board, which was to decide as to the extent to which the Departmental programmes were to be approved, having regard to the rate of production, the needs of other Departments and the respective urgency of the demands. Every one of these steps was necessary because the profound lack of co-ordination and of a central control had landed the country in difficulties and had failed to provide us with a satisfactory defence. A change of Government took place in December of that year, but the new Government confirmed the decision of its predecessor, and the new Air Board was actually constituted on February 6, 1917. Up to the middle of 1917 all the aerial output was absorbed by the older Services. The supply could not overtake the demand. The constantly growing series of activities to which aircraft was successfully applied outstripped the progress of manufacture, and forced us to apply all the machinery available for a purely naval or purely military purpose, and the building up of a reserve for an independent aerial campaign against Germany was impossible. By July, 1917, however, the Ministry of Munitions had the supply position well in hand. A deadlock appeared to have been reached both in the naval and military theatres, and it seemed conceivable that a sustained air offensive might contribute more powerfully than any other factor towards undermining the moral of the enemy and disposing him towards a reasonable peace.

"It was perfectly clear, however, that unless there was a properly constituted Air General Staff under an Air Board or under an Air Ministry, aviation output, however large, would continue to be absorbed by the two Services already existing. Accordingly, in August, 1917, the Government decided in favour of the principle of uniting the Air Services and of providing a special branch for the systematic raiding of German munition centres, and an Air Organisation Committee was appointed, under the Chairmanship of Gen. Smuts, to work out the details for an Air Ministry, an Air Council and a combined Air Force. The Air Council was set up by Order in Council on December 21, 1917. The independent Air Force was constituted on June 8, 1918, under the then General, now Air-Marshal, Sir Hugh Trenchard, who was placed directly under the Air Ministry, although for purely operation purposes Gen. Trenchard was under the supreme command of Marshal Foch. It was during this latter period, subsequent to the formation of the Air Ministry, that our Air Services achieved their maximum successes in the War. Although in 1918 a serious shortage in the supply of high-powered engines curtailed that programme, the limited amount of raiding which took place had a considerable effect on the enemy. It is well known that if the War had lasted a little longer the range of our bombing squadrons would have greatly increased and would probably have included Berlin. From that time to this the Air Force has remained a separate force under the Air Ministry.

"I hope the House does not think that I have taken too long with the summary, which I could not well have made shorter if I were to give the House all the events that led up to the formation of the Air Ministry and of a separate Air Board by an Act of Parliament on the decision of this House. It will be seen that it was war experience which led to the creation of the Air Ministry, and to the constitution of a separate homogeneous Air Force. It was not theory derived from speculation in the past, but it was practical experience after trying a great many other experiments, and the deficiencies which they left, which proved to the Government in the pressure of the War, and for the successful conduct of the War, the necessity of creating the system now in force."

Viscount Curzon: "After the Air Ministry was constituted did the Services retain control of the aeroplanes working with them, or were they controlled by the Air Ministry?"

Mr. Chamberlain: "The independent force was directly under the Air Ministry, subject to the supreme control of Marshal Foch. Air squadrons working with the Army were under the Army Command, and air squadrons working with the Navy were under the Naval Command. Now I return to the lessons which we derived and the inferences which we formed from this war experience. However elaborate the machinery for co-ordination, whatever the goodwill and the desire to co-operate between the different Departments, it was found during the War supremely difficult to achieve full efficiency in the Air Services so long as those Services remained divided, part under the War Office and part under the Admiralty. So long as the supply of machines and engines remained under the two Departments there resulted only a disastrous and wasteful competition. We were driven step by step to a greater concentration of responsibility for the Air, until by Statute the Air Ministry and the Air Board were constituted as they exist today. It was only after the Air Ministry was constituted, with its air staff, that the aeronautical aspects of the War were considered from a distinctly Air point of view and by aerial officers. Until that time the Air was under purely naval or military command, and was only thought of in terms of naval or military warfare.

"I do not want it to be thought that the Government are blind to the real difficulties which arise out of the present system. I do not pretend for one moment that it works with perfect harmony or smoothness or gives satisfaction to everybody, but our view is that the objections to the re-absorption of the Air Forces by the Army and Navy are far greater than any objections under the present circumstances and for the time to which we can look forward—as I have said before, I am not pretending to lay down a policy for all time—which can be raised against the existence of a separate Air Ministry and Staff. If the Air Services were required only as an adjunct to the naval and military Services there would be much to be said for their re-absorption, though I do not think that even then the case would be conclusive, for there would remain the necessity for preventing the kind of competition which took place with such unhappy results during the War.

"It is imperative that there should be the closest co-operation and the closest communication and understanding between the heads of the different Services of the needs, requirements and capabilities not only of their own Service, but of the other Services with which they have to act in common. These are points for which we must provide, but we have in addition to consider the development of the aerial forces in their own elements and use those forces for operations independent of both the Navy and the Army. Already great progress has been made in that direction. My right hon. friend, the Secretary of State for the Colonies, recently gave the House some very interesting information as to the success of the Air Force in carrying out independent action, and as to the use which we are making of it in Mesopotamia at the present time, and also in Somaliland, but not wholly independent there. The Government believe, then, that if the Air Service were reabsorbed by the Navy and the Army, this aspect of the service to be rendered by the Air Force would inevitably be relegated to the background. Sailors and soldiers would continue to think of the force in terms of their own Service, and would not pursue, and could not be expected to pursue, its development as an independent force outside the purpose with which it was associated, and for which they desired that it should be employed. Believing, however, as we do that the Air Forces have immense potentialities of their own, and in their own element, distinctive from their other and vitally important duties in connection with the naval and military services, the great importance of which is not in the least underrated, and convinced as we are in the future that the greatest danger to this country may well be from the action of air forces, rather than of naval or military forces, we consider that it would be a retrograde step at this time to abolish the Air Ministry and to reabsorb the Air Service into the Admiralty and the War Office.

"It is true that no other nation as yet has followed our example in this matter, but I think that I am correct in saying that some high authorities in other countries think that the course which we have taken is the right course, and are contemplating or discussing the advisability of following it in their own case. It is notorious that more than one great Power is most anxiously canvassing the whole situation, and I think it not unlikely, to put it no higher, that we shall find our example followed if we do not ourselves abandon it. The House will be anxious to know in these circumstances how we propose to secure the proper co-operation and co-ordination of the Services, and what rules we shall lay down to secure that the Army shall have the aid from the air which is required, and that the Navy shall have the aid from the air which it requires. This is a subject which has for a long time, and very carefully, been considered by a Standing Committee of the Committee of Imperial Defence, under the chairmanship of my right hon. friend the Lord President of the Council. As the result of that enquiry we have come to certain decisions, which I hope I may be permitted to give in their entirety, though they are not confined to co-operation between the Air Force and the Navy, because, as I have said at the beginning of my speech, it is impossible for the Government to treat this matter as the hon. and gallant Member for the West Derby Division of Liverpool (Sir R. Hall) very easily and fairly put it in moving his Amendment, as one to be decided in the light of naval considerations alone. We can only come to, and defend, our decision by a survey of the whole position. These are the conclusions at which we have arrived :—

"In the first place, that the Air Force must be autonomous in matters of administration and education.

"Second, that in the case of defence against air raids the Army and Navy must play a secondary *rôle*.

"Third, that in the case of military operations by land or naval operations by sea, the Air Force must be in strict subordination to the general or admiral in supreme command.

"Fourth, that in other cases, such as the protection of commerce and attacks on enemy harbours and inland towns, the relations between the Air Force and the other Services shall be regarded rather as a matter of co-operation than of the strict subordination which is necessary when aeroplanes are acting merely as auxiliaries to other arms.

"Lastly, the Government have decided to appoint a Committee which will, I say without hesitation, consist either of the Standing Committee or the Sub-Committee of the Committee of Imperial Defence to examine carefully into the system of naval and air co-operation, and to advise us how we can best secure that the Air Force should be enabled to render to the Navy, and in connection with the Navy other services, the aid that they may require."

Finally Mr. Chamberlain said : "To sum up what I have said, the Government believe that to abolish the Air Ministry, to reabsorb the Air Service into the services of the Army and the Navy, would be a fatally retrograde step. Even if it removed a little friction and improved and facilitated the co-operation between the Air Services and purely naval and military operations, which is very doubtful, it would unquestionably retard the development of the Air Services in their own element, in which it may be that the future of national defence lies. To take this step would be to bring back also all the evils of divided control which existed in this matter in the early part of the War. The decision of the Government to establish a separate Air Ministry was based, as I have said, on war experience. What is now required in order to ensure the success of the present scheme is close and intimate co-operation, and that the three Services should regard themselves as the common servants of the nation in endeavouring to attain a single object. This cannot be achieved so long as the existence of the Air Ministry and the Air Force remains in doubt, and the Government thought it right and fair to that service and to the distinguished officers who are at its head, and no less fair to the other two great Services, that they should define their attitude in this matter so that all may know what is expected of them and what system they would have to follow."

Maj.-Gen. Seely expressed satisfaction with the definite and final decision of the Government to maintain a separate Air Force and Air Ministry.

Rear-Admiral Sueter also expressed satisfaction with the very clear statement of Government policy, but regretted that the Government could not set up a Ministry of Defence.

Mr. Chamberlain then suggested that the amendment should be withdrawn.

Sir R. Hall : "I fear it will be a great disappointment to many Members who came to the House primed with speeches, but after the statement made by the Leader of the House I beg to ask leave to withdraw my Amendment."

THE AIR ESTIMATES

Air estimates for 1922-23, issued on March 17, show a net reduction on those for the current financial year of £7,516,477. The estimated gross expenditure is £15,666,500, but appropriations-in-aid are expected to realise £4,771,500, leaving a net total of £10,895,000. This sum includes war liabilities amounting to £959,500.

It is proposed to reduce the force by the equivalent of two squadrons, the decrease in officers and men provided for being 9,704. The totals for the two years compare as follows :—

Net estimates, 1922-23	£10,895,000
Revised estimates, 1921-22	18,411,477
Net reduction	£7,516,477
Numbers, all ranks, 1922-23	31,176
Numbers, all ranks, 1921-22	40,880
Decrease	9,704

The general abstract of the estimates gives the following net figures under the various heads of expenditure :—

Pay, etc., of the Air Force	£3,781,000
Quartering, stores (except technical), supplies, and transport	1,530,000
Technical and warlike stores	1,295,000
Works, buildings, and land	1,826,000
Air Ministry	680,000
Miscellaneous effective services	85,000
Civil aviation	364,000
Experimental and research services	1,177,000
Half-pay, pensions, and other non-effective services	157,000
Total	£10,895,000

As regards establishment, the numbers on the strength of the active force, exclusive of officers and men serving in India, are as set out below :—

Air officers	20	Airmen	22,195
Comm'd officers	2,909	Boys	1,700
Cadets	100		
Warrant officers	300	Total	31,024
N.C.Os.	3,800		

The remainder consists of 11 air officers, 122 commissioned officers, and 5 other ranks attached to the Air Ministry, and 14 commissioned officers engaged in experimental and research services.

War Liabilities

In expenditure the principal reductions are in pay (£1,023,010), quartering, supplies and transport (£1,575,000), technical and warlike stores (£2,463,000), works and buildings (£1,192,000), civil aviation (£516,000), and research services (£529,000). In the case of technical and warlike stores the principal heads compare as under :—

	1922-23. £	1921-22. £
Aeroplanes, seaplanes, and engines	786,000	1,837,000
Airships and airship engines	100	16,800
Aircraft technical and warlike stores	22,500	49,000
Armament and ammunition	139,500	249,500
Electrical stores	79,500	99,000
Miscellaneous engineering stores	22,500	31,000
Miscellaneous materials	66,500	116,000
Hangars	2,000	46,250
Mechanical and other transport	214,300	659,000
Petrol and oil	360,000	471,000

In the case of civil aviation the chief items of expenditure are : Civil aviation subsidies, £207,000 ; aerodromes, £38,000 ;

works and buildings, £61,000; meteorological services, £79,000; aerial routes (surveys, etc.), £15,000.

Appended are details of the war charges included in the estimates:—

Rewards to inventors and miscellaneous claims ..	£500,000
Liquidation of war contracts, reinstatement of public roads, and completion of necessary war services..	133,000
Compensation in respect of the occupation of land..	155,000
Reinstatement of lands and buildings on relinquishment, etc.	131,500
Liquidation of war contracts for experimental aircraft, etc.	40,000
Total war liabilities	£959,500

In an explanatory memorandum accompanying the Estimates Capt. Guest outlines the steps taken to give effect, where possible, to the Geddes Committee's recommendations, and the reasons which have prevented the adoption of certain of that body's proposals. He states:—

The net total of the estimates now presented is £9,935,500 for normal services and £959,500 for war liabilities, making £10,895,000 in all. The comparable figures for 1921-22 (original estimates) were £15,809,000 for normal services and £1,471,000 for war liabilities, making £17,280,000 in all. There is thus a reduction of about £6,400,000, or 37 per cent. A reduction of some 20 per cent. was, in compliance with the directions given by the Government to all departments, effected in the sketch estimates prepared in July, 1921, and laid before the Geddes Committee; the remaining savings have been effected subsequently on lines partly suggested by the Committee and partly arrived at independently. The process has been continuous, and some further reduction has even been made on the figure provisionally approved by the Government and embodied in the forecast of expenditure recently submitted to the House of Commons by the Chancellor of the Exchequer.

The estimates provide for an appropriation-in-aid amounting to £3,733,000 in respect of Middle East services. This sum is voted under Class V, 3, of the Civil Service Estimates, and is repaid by the Colonial Office to the Air Ministry. The figure includes provision for works and other ancillary services, and increased provision for armoured cars, the cost of which has hitherto fallen on Army Votes, the transfer of responsibility for these services being made in consequence of the recently approved schemes of Air Force control in Iraq and Palestine. Omitting these transferred services, the comparable figures for air units in the Middle East are £1,571,000 for 1921-22 and £1,750,000 for 1922-23, the latter being approximately the same as that laid before the Geddes Committee in the sketch estimates. The increase of the provision under certain subheads of the Votes for 1922-23 over that under the same subheads for 1921-22 is due to expenditure on the transferred services in the Middle East. These subheads are gross figures, the appropriations-in-aid, which include repayment for such expenditure, being shown in the final subhead of each Vote. The net figures for complete Votes are consequently a better basis for comparison between the two years.

The active strength of the Air Force will be reduced by the equivalent of two squadrons. The Geddes Committee contemplated that, failing some equal or greater reduction in the Navy or Army, a reduction of 8½ squadrons could be made. The Government have not felt able to accept this recommendation, but they have fallen in with the views of the Committee to the extent of directing that over and above the actual reduction of two squadrons the equivalent of three more squadrons should be withdrawn from Navy and Army co-operation and allocated primarily to Home Defence. These squadrons will still be available for co-operation work on special occasions when required. They will also be used for training purposes, thus enabling economies to be made in the training establishments.

The reduction of £5,500,000 on the sketch Air Estimates which the Geddes Committee believed to be possible (but which the Air Council were unable in large part to verify upon analysis) compares with a reduction of over £2,500,000 embodied in these estimates, a figure which would have been still higher had it not been for variations in appropriations-in-aid since the sketch estimates were framed. A considerable portion of this difference is attributable to the fact that, as explained above, in order not to denude the Navy and Army of Air co-operation, and in order to enable the nucleus of a force for Home Defence to be set up, all but two squadrons are to be retained.

The remaining recommendations of the Committee have received the most careful consideration, and effect is being given to them to a very large extent. To take the most important items of reducible expenditure, works services have been cut to bare minimum, and stocks of machines, engines, and spares will be drawn on without replacement wherever possible. Here, however, a word of caution is necessary. The "reconditioning" of machines is not a process of improvement and embellishment, but one of making machines safe to fly. Economies in this direction must be governed by a sense of the most serious responsibility. Apart from this it should be realised that the patching up of temporary buildings and living on stocks is essentially a process of deferment of expenditure which must tend to force Air Votes up again in future years, and is justified only by extreme financial pressure.

The general principles on which the training of the technical personnel of the Air Force is founded will be maintained, but in order to reduce the cost the existing scheme will be modified by lengthening the term of service of boy mechanics on completion of their training. A token sum of £20,000 has been included to provide for the inception of the scheme of an Auxiliary Air Force on a territorial basis. The same provision was made in the current year, but the Air Council have felt compelled, with much regret, to defer this expenditure for another twelve months. A severe scrutiny has been applied to the staff of the Air Ministry, and the expenditure forecasted last July has been reduced by nearly £150,000. The total reduction on the sum provided for the current year is £235,000.

The recommendations of the Geddes Committee in regard to civil aviation have been accepted in principle, but existing commitments have made it necessary to provide some £50,000 more than the committee believed would be required on that basis. The approved scheme for subsidies for cross-Channel flights, as published, which comes into full operation on April 1, remains unaffected.

A reduction of some £320,000 has been made on the sum provided in the sketch estimate for experiment and research. This falls appreciably short of the committee's recommendations, but it was found that existing objections and commitments would have accounted for the whole of the reduced figure which they suggested, and would have left nothing over for the development of new ideas during the coming year. This was a position which, in the case of a new science like aeronautics, it was hardly possible to accept, and provision has therefore been made, though on a very restricted scale, for some experimental orders to be placed in 1922-23.

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Our Prince's Departure from India

"The Air Force provided the last guard of honour at Kiamari," is the note made by *The Times* special correspondent, cabling from Karachi on March 17 an account of the departure from India of the Prince of Wales after his wonderful tour.

The Marseilles-Monaco Seaplane Contest

Last week we published a list of the entrants for the seaplane contest at Marseilles, a *Croisière* from Marseilles to Monaco. The following official entries by the Navy (competing *hors de concours*) are now to hand: Capt. Henri Lefranc (Hanriot, 130 Clerget); Second Mate Yves le Roux (G.L., 300 Renault); Lieut. Maurice-Réné Mas de Saint (G.L. 300 Renault); Second Mate Jean Riou (G. L. 300 Renault); Master-Pilot Alfred Fourchon (Hanriot, 130 Clerget); Second Mate Yves Lantz (F.B.A., 130 Clerget); First Mate Mathurin Le Hyarric (Hanriot, 130 Clerget); Mate Desire Pierre (Hanriot, 130 Clerget); Second Mate, Pilot Henri Priol (F.B.A., 130 Clerget); Ensign Raymond Protoche (F.B.A., 200 Hispano); Lieut. Jean Raffin (F.B.A., 200 Hispano); Second Mate Rousselet Gerasi (F.B.A., 200 Hispano).

Rotterdam-London Air Service

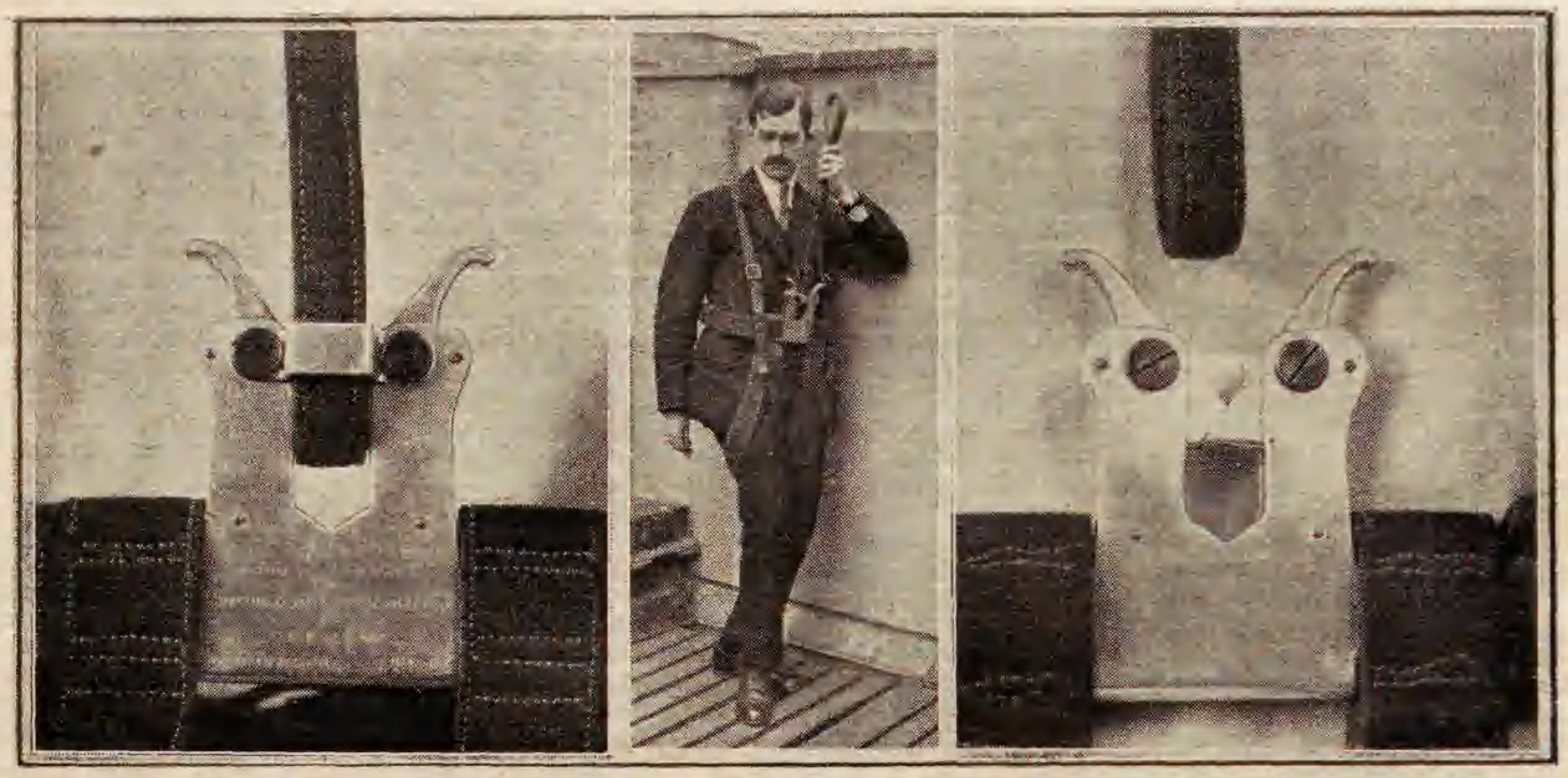
The Koninklijke Luchtvaart Maatschappij voor Nederland en Koloniën of Amsterdam inform us that they intend reopening the line Amsterdam-Rotterdam-London on April 18 with one daily service in both directions for the present. Later this service will be twice daily. The time table (summer time) of the one daily service will be as follows:—

Departure, London, 10 a.m.; arrival, Rotterdam, 1.30 p.m.; departure, Rotterdam, 1.45; arrival, Amsterdam, 2.15.

Departure, Amsterdam, 2.0 p.m.; arrival, Rotterdam, 2.30; departure, Rotterdam, 2.45; arrival, London, 5.30 p.m.

THE CALTHROP "H" TYPE PARACHUTE AND FRONTAL SUSPENSION HARNESS

IN the latest model "Guardian Angel" Parachute manufactured by E. R. Calthrop's Aerial Patents, Ltd., of 423A, Edgware Road, several very important improvements on the earlier types are to be found. The remarkably quick and reliable positive opening still forms the principle characteristic of this "H" type parachute, but its method of functioning has been very much simplified. As no doubt many of our readers are aware, in the original "Guardian Angel" parachute the silk body is folded between two aluminium discs, contained within a case in such a way that, as the parachute is withdrawn—by the fall of the load—it unfolds progressively from periphery to centre over the lower, or launching, disc, which serves to keep the walls of the parachute apart, and allows a column of air to become imprisoned within from the moment the periphery of the parachute emerges from the case. The parachute rigging, or tapes, it should be mentioned, are also folded in separate units below the launching disc, and similarly unfold by the pull of the falling load—the parachute body emerging, of course, as soon as the rigging is fully extended.



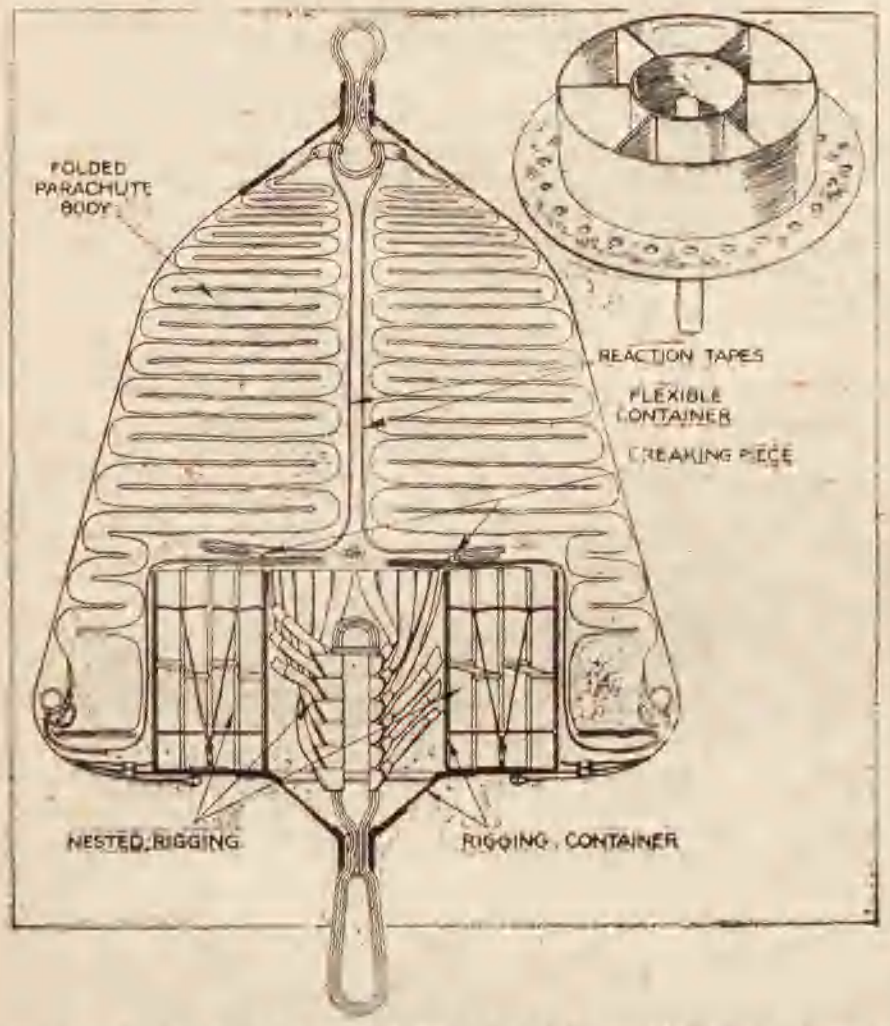
THE CALTHROP "H" TYPE PARACHUTE: The Frontal Suspension Harness, and the combined instant connector and quick-release, used in connection with this parachute.

In the "H" type, these aluminium discs are dispensed with, and the parachute body is folded in a series of vertical pleats and progressive horizontal folds within a flexible container, which is slung from the aircraft. The periphery is pleated edgeways at the base of the container, where, in the centre, is another container housing the rigging, which is folded in isolated units as before. Attached to the rigging container is the connecting loop to the life-line from the harness.

The action of the parachute is as follows. The weight of the falling load first pulls away the rigging container, the parachute body remaining in the main container on account of its centrifugal springing outwards. As the rigging container falls, the nested tapes unfold until momentarily checked by the reaction tapes, which extend from the top of the container and are attached by breaking cords to the rigging tapes. On these breaking pieces snapping the pull of the load comes synchronously upon the whole periphery of the parachute, which then issues instantly from the container. The periphery, having been held in a true circle pressing outwards inside the container, expands instantly to a circle of about 24 ins., thus providing a large opening by which the uprising air can enter the body—the principal characteristic of the "Guardian Angel" parachutes. The ventilator ring in the top of the parachute is held in the top of the container by breaking-pieces which snap when the body is fully extended.

In connection with this parachute, mention must be made of the new harness and combined instant-connector and quick-release. The question of attachment (of aviator) to the parachute is a very important one, and considerable thought and experiment has been given to this matter by Mr. Calthrop. There are some aviators who object to carrying the weight of a parachute—about 20 lbs. is the lightest that can be used with safety—on the body during normal conditions, whilst the restriction to freedom of movement, especially in the case where the aviator is connected by the life-line to the parachute (mounted on some part of the machine) all the time the machine is in flight, is a decided drawback. It would, therefore, be of great advantage if the aviator were free of any connection, and could, in the event of a catastrophe, instantly attach himself securely to his parachute, in order that he may make his jump without loss of time. Again, it has been found from past experience with parachutes, that when the parachutist reaches the ground, there is a period of from 5 to 7 secs. when the parachute, in passing from its vertical position to an angle of about 45°, exerts no pull upon the parachutist, even in a high wind. Afterwards the pull is again exerted, sometimes with considerable force and not without some danger to the parachutist. In fact, cases have been known, during the war, in which observers, having descended in safety from a burning kite-balloon, have been dragged by their parachutes through barbed-wire entanglements and terribly mutilated or killed. It is essential, therefore, that a parachutist should be able to release himself during the period of "slack" previously referred to. On the other hand provisions should be made whereby it is impossible for the parachutist to become disconnected, accidentally, from his parachute until the right moment.

All these points have been kept in view in designing the extremely ingenious instant-connector and quick-release employed on the "H" type "Guardian Angel." This device is exceptionally simple in construction and operation, and is absolutely fool-proof. It consists of only two moving parts (exclusive of springs) and can be operated by one hand. Briefly, it comprises two detents, or jaws, carried in a substantial aluminium frame-plate, which is secured in the waistbelt of the harness. These detents interlock through the action of springs mounted in the frame, and so form a bridge across a gap in the centre of the frame-plate. When the connecting loop from the parachute is pressed down on to the detents, they open and allow the loop to pass between them into the space below them. They then spring back into their original position, and the weight of the parachutist, the frictional resistance of the detent points in the lifting of the load through about ¾ in., together with the shortness of the operating levers, render it absolutely impossible for the detents accidentally to draw apart and release the connecting loop—so long as there is a load on the latter.

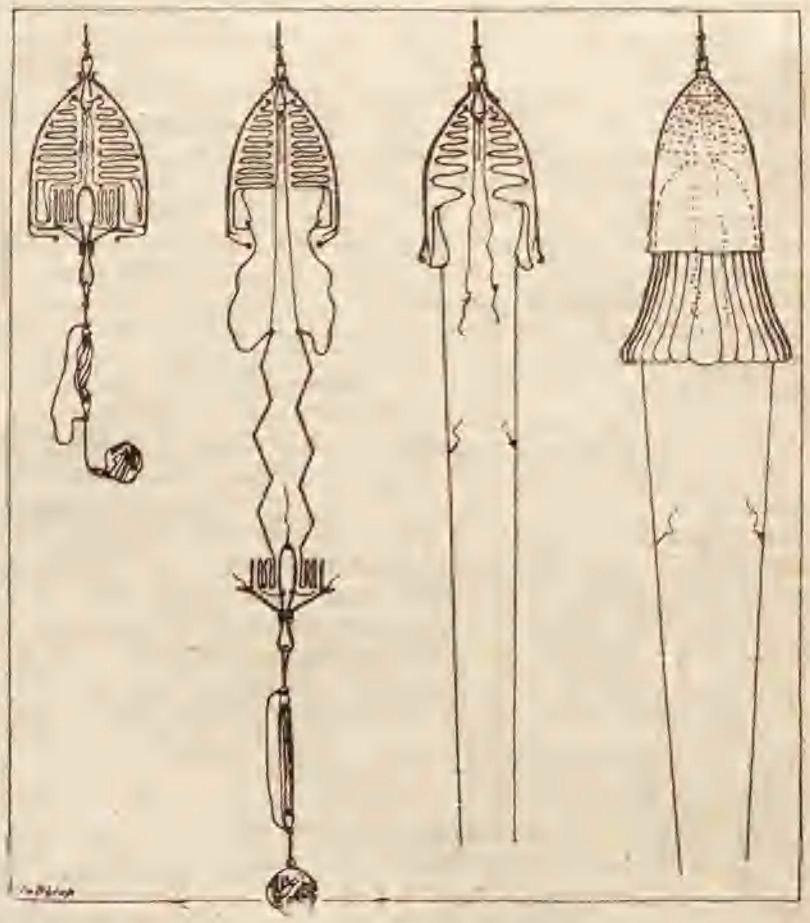


THE CALTHROP "H" TYPE PARACHUTE: Sectional drawing showing, more or less diagrammatically, the body folded in the flexible container. In the right-hand top corner is a detail view of the rigging container.

Neither detent can be operated when the load is on them, and both have to be operated to effect the connection on release. As soon as the pull on the loop ceases it is an easy matter to press the operating levers together and so unlock the detents, releasing the loop. Thus instant connection to the parachute and instant release on landing are obtained.

As regards the harness, little need be said further than that its design, the result of considerable experience, makes for the greatest possible comfort combined with safety, and that the connector-release is very securely built into the belt—it is not dependent on bolts or rivets—at the exact point where the stresses are concentrated upon the harness. A rigid and strengthened sector, with elastic connections at the ends, prevent undue compression on the aviator's ribs.

The weight of the complete harness, with shoulder straps, is 4 lbs. 11 oz., the weight of the connector-release being 1 lb. The weight of the "H" type parachute, in its container, is about 20½ lbs., and it is worthy of note that not only is this parachute extremely compact when packed—measuring about 18 ins. by 26 ins.—but it is so non-rigid and flexible in its container that it can be distorted without the least effect upon its speed and reliability of action. A modified device is now being worked out by Mr. Calthrop to enable a passenger to make a free jump in the air without the container being attached to the aeroplane.



THE CALTHROP "H" TYPE PARACHUTE: Diagrams showing four progressive stages in the operation of the parachute.

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS

ANNUAL GENERAL MEETING

THE Annual General Meeting will be held at the Club premises, 3, Clifford Street, London, W. 1, on Wednesday, March 29, 1922, at 6 o'clock.

Agenda

1. Chairman's Report.
2. To announce result of Ballot for Committee.
3. To elect President, Vice-President and Council for the ensuing year.

Committee

The following Members have been nominated for election to the Committee:—

Group-Capt. F. W. Bowhill, C.M.G., D.S.O., R.A.F.
Maj.-Genl. Sir W. S. Brancker, K.C.B., A.F.C.
Ernest C. Bucknall.
G. B. Cockburn.
Flight-Lieut. L. H. Cockey, R.A.F.
Col. F. Lindsay Lloyd, C.M.G., C.B.E.
Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P.
Lieut.-Col. Mervyn O'Gorman, C.B.
Air-Commodore C. R. Samson, C.M.G., D.S.O., A.F.C., R.A.F.
Sir A. Mortimer Singer, K.B.E.

Ballot papers have been posted to all Members, and should be returned not later than 12 noon on Tuesday, March 28, 1922.

COMMITTEE MEETING

A meeting of the Committee was held on Wednesday, March 15, 1922, when there were present: Brig.-Genl. Sir Capel Holden, K.C.B., F.R.S., in the Chair; Mr. Ernest C. Bucknall, Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., Lieut.-Col. Alec Ogilvie, Lieut.-Col. M. O'Gorman, C.B., and H. E. Perrin, Secretary.

Election of Members

The following new members were elected:—

Flight-Lieut. C. H. Hayward.
Arthur Ernest Johnson.

Committee Election

The nominations for election to the Committee were reported.

Entrance Fee

It was decided to suspend the Entrance Fee of £5 5s. for new members up to 100 elected during the next six months.

New members elected during this period will pay an annual subscription of £7 7s. only.

Gordon Bennett Balloon Race

It was reported that the Club had made entries for three balloons to compete in the Gordon Bennett Balloon Race to be held at Geneva on August 6 next.

Racing Committee

The report of the Racing Committee was received and adopted.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

LONDON TERMINAL AERODROME

Monday Evening, March 20.

Details of the new services and time-tables are now becoming available. The Messageries Aériennes have arranged an extensive programme for the coming summer, which includes a new weekly service between London and Marseilles. This service, which is to be operated with "Goliaths," will leave London at 8 a.m. and arrive at Marseilles at 4.45 p.m. Two halts will be made *en route*—one for an hour at Paris, and the other, a short stop of 15 minutes at Lyons. The return machine will leave Marseilles at 7 a.m. and arrive at Croydon at 3.45 p.m., although passengers may break their journey at Paris and come on to London by a later 'plane.

The Messageries Paris service is to be increased next month to two machines a day in each direction, and in June an additional machine will be put on, leaving the terminals at 5 a.m. This machine is intended for the carriage of newspapers and mail, although, should passengers be forthcoming at this early hour, arrangements would no doubt be made to accommodate them.

The through air-fare to Marseilles is to be £17 17*s*., and to Lyons £12 12*s*. Goods will be carried at from 5*s*. to 3*s*. 9*d*. a pound (according to weight) to Marseilles, and from 3*s*. 9*d*. to 1*s*. 4*d*. to Lyons.

The Messageries will, in addition, run their service between Paris and Havre in connection with the arrival of liners from America.

This Company have also opened London offices in the Haymarket, and have obtained the agency for the French companies running air services from Paris through central Europe, and also for the Toulouse-Casablanca line.

The New Air Offices on the 'Drome.

There is still intense activity in the erection of offices. The roof of the one for "Daimler Airways" is now being fixed, and the Marconi Company are erecting an office alongside it.

Handley Page Transport have managed to rent a brick building alongside the tarmac in front of the Customs' House—a position which is undoubtedly the best on the aerodrome—and are busy turning it into offices.

Lloyd's have taken an office on the aerodrome, and their representative is now installed. This is very cheering to civil aviation enthusiasts, who see in the fact that this office is in actual being a definite triumph for air transport.

The K.L.M. have again changed their minds as to their Amsterdam service. They now intend to commence on April 18 with a single service in the morning, which is to be increased on May 15 by the addition of an afternoon service. They do not intend to run their service between Amsterdam and Hamburg this year; but the Danish Company are in negotiation with the Danish Government for a subsidy to run an air-mail service from Copenhagen to Amsterdam to connect with the night boats to and from England. This service will probably be run with D.H.9's.

The French Air Minister, M. Eynac, came over by "Goliath" during the week to attend the quarterly Anglo-Franco-Belgian Air Conference. He was met on the aerodrome by Gen. Sykes, who also accompanied him on Friday morning when he arrived at the 'drome to return to Paris by air at 9.30 a.m. Unfortunately the weather at that time was unfit, and M. Eynac with his staff returned to London to catch the 11 o'clock boat-train. It seemed as though they had little faith in the weather office, which told them the weather would clear later. This in fact it did, several machines flying between London and Paris during the day, and actually beating the boat-train by hours.

Trial of a New Aero-Engine Silencer

Invented by Maj. Grant, of the Disposal Company, a new aero-engine silencer was tested during the week on a D.H.9 flown by Mr. Larry Carter.

The silencer appeared to be quite effective, and, as it is both light and fairly cheap, some of the regular air expresses may be fitted with it shortly.

After much hard labour, workmen managed to dig an enormous hole into the solid chalk to accommodate the new 7,000 gallons' petrol tank; but apparently they dug it in the wrong position. At any rate, it has been carefully filled up, and a new hole is being excavated some ten yards nearer the new hangars.

Capt. Muir of the Surrey Flying Services had one of that company's joy-ride Avros out during the week-end, and business was quite brisk. There should be quite a lot of joy-riding this summer, now that the aerodrome is more attractive; and especially if the crowds which are expected to visit the air-races begin to realise what is going on daily at the station.

The swinging illuminated landing-sign, which has been built by the Gas Accumulator Company, has now been erected at the aerodrome, away in the south-east corner. It is shaped like a huge wind-vane, with side arms, so that from the air it appears like a landing "T." The central light, which shines through lenses along each of the three arms of the "T," sends out a beam of 27,000 candle-power. The "T" can be seen 12 miles away, while the wind-direction will be distinguishable from a distance of from two to three miles. If the sign is found satisfactory, it is intended to erect two or three on pieces of ground which would be suitable for emergency landing. As the light is automatic in action, no attendant would be needed.

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IN PARLIAMENT

R.A.F. in Mesopotamia

Mr. Malone asked the Secretary of State for Air whether the flights from Egypt to Mesopotamia are the only routine flights carrying mails, etc., undertaken by the Air Ministry; whether this work was organised by the department of the Chief of the Air Staff or of the Controller-General of Civil Aviation; and which Department now controls this service, and why?

Capt. Guest: The answer to the first part of the question is in the affirmative; as regards the rest of the question, the carrying of mails is, at present, incidental to flights by service machines undertaken for training or for passing machines to Iraq by air in preference to the more expensive sea route. The responsibility accordingly rests with the service branch of the Air Ministry. I look forward to the future organisation of regular air mail services on this route by commercial air enterprise.

Helicopters

Mr. L'Estrange Malone asked whether it is intended to hold a State competition for helicopters; what prizes are offered; what are the conditions; and when will the competition take place?

Capt. Guest: The Air Ministry have decided to offer a prize of £50,000. The conditions under which entries will be received will be announced as soon as possible.

Mr. Malone asked whether the Air Ministry have been following the experiments made by helicopters in various countries; what conclusions have been arrived at by his experts as to the practicability of helicopters for war or civil purposes; and whether he intends to make any practical experiments with helicopters in his Department?

Capt. Guest: The answer to the first question is in the affirmative; to the second, that the advantages of a practicable helicopter for both military and civil purposes are considered sufficiently important to warrant investigation and experiment; to the third, that such experiments are already in progress.

British Airships

Sir H. Brittain, on March 14, asked the Secretary of State for Air whether any foreign group has entered into negotiations for the purchase of the British airships; and, if so, from what country?

Captain Guest: The answer to the first question is in the negative; the second does not, therefore, arise.

R.A.F. Reserve

Sir H. Brittain, on March 15, asked the Secretary of State for Air whether he is aware of the methods now being adopted by France for the creation of a reserve of officers for her air force; whether anything of a similar nature is being carried out in this country; and what is our total number of reserve officers in this arm of defence?

Captain Guest: I am aware of the general organisation of the Air Service in France, but the methods adopted there are not altogether applicable to a country which depends on voluntary enlistment and not on conscription. I am glad to say that the scheme of organisation of our Air Force Reserve is complete, and the Regulations will be promulgated shortly. A commencement of the manning of it will be made this year with the short service officers who will be passing to the reserve on the completion if their period on the active list. I am not in a position as yet to give the numbers asked for.

Enemy Air Raids Compensation

Sir F. Flannery asked the Financial Secretary to the Treasury the period within which the £100,000 allocated to be used for compensation to the sufferers from air raids during the War in the most necessitous cases will be distributed; and whether the case of Mr. Robert Pilgrim, nurseryman, of Braintree, Essex, whose premises were destroyed six years ago in an air raid, can now be favourably considered, the application having been made by Mr. Pilgrim to the Board of Trade Department shortly after injury and again on 20th May, 1920, in accordance with the promise made to this House by the Prime Minister that all suffering by air raids would be compensated?

Mr. Young: The sum of £100,000 is the estimated amount required to meet awards by the Royal Commission, presided over by Lord Sumner, up to March 31, and a further sum of £4,900,000 is being provided for 1922–23. Individual cases are a matter for the Royal Commission.

Aeroplane Squadrons

Mr. Raper, on March 16, asked the Secretary of State for Air how many effective squadrons of aeroplanes are owned by, respectively, Great Britain and France, stating how many effective machines and pilots are calculated per squadron; and, so far as Great Britain is concerned, how many of these effective squadrons are at present stationed in this country for home defence?

Captain Guest: As regards the first part of the question, the differences in organisation of the Air Services of Great Britain and France make it impossible to supply, within the limits of a parliamentary answer, comparative figures which would be of any value. The present strength of the Royal Air Force, in terms of active units, is 32 squadrons, of which the number stationed in England for all purposes is 12. I would ask the hon. Member to wait for my speech on Air Force Estimates, in which I hope to be able to deal briefly with the question of home defence.

Ex-Pilots

Mr. Raper asked the Secretary of State for Air if he can now see his way to grant to ex-Air Force pilots the same facilities as are accorded both in France and the United States to enable those who desire keeping in practice, so far as the actual flying of machines is concerned, thereby maintaining at a minimum expense a most useful type of Reserve?

Captain Guest: The regulations for the Air Force Reserve, when they become operative, will provide for periodical flying practice by officers belonging to it. But, as my hon. friend has previously been informed, I do not think that provision from public funds of free facilities for flying could be justified in the case of persons who have no Reserve liability.

RADIOLOGICAL RESEARCH

By Dr. V. E. PULLIN, Director of Radiological Research, Royal Arsenal, Woolwich.

THE paper under above title, read by Dr. Pullin on March 16 before the Royal Aeronautical Society, was one of unusual interest, dealing as it did with a subject which has not yet received in the aviation world the attention which it appears to deserve. Lieut.-Col. O'Gorman was in the chair, and after introducing the lecturer called upon him to read his paper. As a great part of the paper was in the nature of an explanation of the lantern slides shown, of which there were about 50, it is impossible for us to report this section of the lecture. The following synopsis of the introductory remarks may, however, help to give those not intimately acquainted with the subject a general idea of the problems involved and of the apparatus used in radiological research.

The object of the lecture, Dr. Pullin stated, is to show the present position of radiology with regard to its usefulness in affording a means of inspection of various materials, and more especially the materials and parts used in aeroplane construction. At the present time a good deal is written about X-rays, and those who are working on the subject have to combat two extreme points of view: on the one hand, the popular idea that X-rays can penetrate anything, and, on the other, the idea that the whole subject is all very well as a laboratory piece of apparatus—in other words, a toy, but of no value whatever to the practical man.

The lecturer said he wanted to show exactly what X-rays are capable of doing now, what modern apparatus and technique can achieve, and also what the limitations are and how far it will be possible for research to overcome them within a reasonable time. In the first place, he gave a general sketch of the activities of the Radiological Laboratory in the Research Department at Woolwich. The whole idea of radiological research there is to apply radiology as far as possible in every direction to the needs of the fighting services. The Department is not concerned at all with pure research for its own sake, and only undertakes such problems when they form a very definite means towards a practical Service end.

The apparatus required for inspection purposes, which form one of the main directions of work of this Laboratory, are as follows:—(1) An X-ray tube capable of a heavy output of rays and designed to run for long periods. (2) A convenient high-tension electrical transformer with a suitable rectifying device. For general inspection or factory use, the installation should be portable, and, perhaps most important of all, the whole apparatus must be absolutely safe both as regards X-ray and electrical dangers. Such a set, to have a maximum value, must also possess a simplicity of control in order that it may be put into the hands of comparatively unskilled workers.

Dr. Pullin stated that he did not propose to discuss in any way the physics of X-rays, but would merely refer to what are the essential pieces of apparatus required: a source of high-tension uni-directional current, an X-ray tube, protection for the operator, and also a method of registering the rays after passing through the specimen. For our present purpose we need consider only the high-tension transformer as a source of high-tension current, and as it may be taken generally that the penetrating power of the X-rays produced depends entirely on the voltage which is applied to the tube, it is clear that transformer design affords a very large field for research in general radiology.

For example, a transformer designed to give an (R.M.S.) voltage of 150,000 should, all other things being equal, enable us to penetrate three inches of steel, and with modern technique should enable us to detect a flaw of about $\frac{1}{64}$th of an inch. The current required for the operation of an X-ray tube must be uni-directional. It is therefore necessary to provide a device which shall rectify the alternating current delivered by the transformer. Here again is another subject for research.

The next and most important piece of apparatus is, of course, the X-ray tube itself, and if the lecturer had the time it would be possible, he said, to say quite a lot on this subject. He only proposed to ask the audience to remember that the best type of tube for the work under consideration is that which is known as the hot cathode type, in which the production of X-rays depends upon the emission of electrons from an incandescent filament. The great advantage of such a tube is that it is capable of very accurate control, and it is more or less consistent in its performance. The next point for consideration in an X-ray installation for inspection work is that of protection for the operator and workers from X-ray and allied dangers. In addition to the danger of shocks, the presence of high-tension electricity in the atmosphere is associated with certain obscure physiological conditions which may prove very harmful. It is therefore essential that all high-tension apparatus should be carefully protected, and, further, that any room in which an X-ray installation is continually operated should be thoroughly well ventilated.

Regarding the dangers due to X-rays, these are of the greatest importance, because the physiological effect of the ray is not by any means understood. It is known that one type of X-radiation produces skin disease which does sometimes manifest itself in a severe form, but, fortunately, this particular form of radiation may be eliminated by a suitable system of screening. There is another type of radiation which is produced at the same time which will penetrate a considerable thickness of almost any protective material, and it is probable that these rays have a much more serious physiological effect, probably on the blood and deeper tissues. The problem is, then, to provide protection for the operator from the whole of this radiation.

The next item on the list of apparatus is, perhaps, one of the most important from the point of view of the practical man. It is the method of registering the rays. It is not necessary to refer here to the photographic method, which, although valuable when examining certain of the heavier specimens, does not apply when considering the question of routine examination, which has proved of so much service in aircraft construction. In this respect we need only consider the fluorescent screen, which forms a means of rapid visual examination. The visual examination depends, roughly, on three factors:—(1) the screen itself, (2) the optical arrangement of the installation, (3) the physiological characteristics of the observer.

The choice of screen is important. X-ray screens in general are made of a coating of granular fluorescent substance on a card or other material.

The fluorescent substance generally used is platino-cyanide of barium. Another cheaper but efficient type of screen is now made which is coated with a different fluorescent material, and is known commercially as a white salt screen. The points about the choice of screen for this work are: (1) luminosity under the influence of the rays, (2) contrast, (3) granularity, (4) fatigue.

Fluorescent screens vary considerably on each of these points. For instance, with regard to luminosity, a difference of as much as 25 per cent. was observed between one commercial screen and another. With regard to a comparison between the two types of screen referred to, there is very little to choose. Perhaps in general a platinum screen is superior, but this is more than compensated for by the far smaller cost of the white salt screen. The construction of the optical arrangements is important. Examination should always be made indirectly—that is, by means of a mirror. All light should be excluded as far as possible, as the presence of stray light detracts enormously from the efficiency of observation.

The physiological characteristics of the observer vary considerably. One man may prove to be an excellent observer, while another may fail almost entirely to appreciate fine detail. The eye may to a certain extent be rendered more sensitive by remaining for about five to ten minutes in the dark, but, of course, visual acuity varies considerably in different people. A good observer must possess an acute sense of contrast in illumination. It is a well-known fact that it is much easier to appreciate such contrast when illumination is brilliant than when it is feeble. Consequently we must aim at brilliant illumination of the screen, but this means a heavy current through the X-ray tube, and at the present time really brilliant illumination of the screen is not possible when examining metal structures.

The research is proceeding along the lines indicated, and progress in every direction is to be looked for, but at the same time the use of X-rays at the present state of development is certainly not properly appreciated. This applies more especially to those who are engaged in manufacture and inspection of aircraft, which by reason of the lightness of the parts renders the radiological examination comparatively simple; the one important essential is that skilled attention shall be devoted to suitable design of the installation.

Another point of noteworthy importance is that radiological examination is absolutely reliable. The enormous importance that attaches to the security, workmanship and materials of an aeroplane—a matter always of life and death—demands that no method of inspection which adds or may add so much to the security of the structure as a whole can be ignored without the fullest possible investigation.

Slides were then shown illustrating general radiological inspection work.

The majority of these were radiographs of objects not connected with aircraft construction, although some illustrated well-known aeroplane components. One slide showed an aeroplane spar with internal cross-grain which was not visible externally; others illustrated what appeared to be defects in welding elevator and *aileron* king posts. The most glaring example was, however, furnished by a slide showing a radiograph of a control lever in which the end of the pivoted portion was not pushed sufficiently far into the main tube, the two pins which were intended to secure the two parts to one another passing through the main tube only. A quantity of solder at the outer end was all that kept the control tube attached to its swivelling base. Had this control tube been mounted in the machine an accident would almost certainly have happened.

The Discussion

The Chairman, Lieut.-Col. O'Gorman, said that some seven years ago he visited a large French aircraft factory not far from Paris, and he discovered that this establishment had a radiological research department. This was, however, of a very dangerous nature, he was told, and he was not allowed to see very much of it. Great satisfaction was expressed with the work which could be carried out, although apparently the only defect which had ever been discovered by the aid of radiological examination was a small crack in a certain component. As this crack was easily visible by ordinary inspection, the value of the installation seemed somewhat doubtful. He hoped that modern work was of more value. He then asked the audience to consider the paper open for discussion.

Col. Briggs thought that, as metal construction is now coming to the fore, any means which would enable one to detect flaws was of importance, and especially for metal propellers, where there was a great deal of welding, radiological inspection might be of considerable help. He thought that the A.I.D. might make more use of it, and wanted to know if it would be possible to have a portable plant which could be used by the A.I.D., and how much such a plant would cost.

Mr. Manning said that he had watched with great interest the various slides, and noted the dark spots and light spots, but he was somewhat at a loss to interpret the radiographs, and would like more information regarding the manner in which an inspector could interpret the information conveyed by the radiograph.

One member of the audience, whose name we failed to catch, asked if it was usual, during inspection, to turn the specimen over for examination, so that a defect which in one view appeared as a hole might be revealed in another position as a line or crack.

Mr. Kaye, of the N.P.L., stated that the A.I.D. already had an apparatus at the N.P.L., and that a certain amount of work had been carried out. He thought, however, that we still had a long way to go before we could popularise X-ray inspection. The work was often laborious, and the workers must be allowed to do the work in their own way and immediate results not expected. He expressed the hope that the Geddes Committee would be sympathetic to this kind of research work.

Mr. Bowden said he could see one way in which radiology could be the means of saving an enormous amount of money. If it were possible to increase the penetration to about 6 ins., so that ingots of this size could be examined, he thought there was an enormous future for X-ray work. He understood that, in the case of a ship, the power curve increased as the cube of the speed. He hoped that the curve representing the penetration of X-rays, on a basis of voltage, would not be found to increase in a similar manner, so that to increase the penetration from 3 to 6 ins. would mean impracticable voltages.

Col. O'Gorman said he was not so critical as some of the speakers, but thought that radiology might be found to be a great help in aircraft construction. For one thing, if, as he was not quite convinced, radiography did show defective welding, it would be of the very greatest value. Welding might then come back into aircraft construction, since good welding was extremely satisfactory in aircraft. It was the bad weld which was dangerous, and at present we had no means of detecting the bad weld, with the consequence that welding had to be abandoned for stressed parts. When, he said, two pieces of 25-ton steel were welded together it was often found that, as a result of the heat, the metal near the weld had its strength decreased to about 10 tons. If radiology could detect this change in the structure of the steel it would be of enormous value, and we, as aircraft engineers, should welcome any weapons which would enable us to make our structures more safe without making them heavier. He then called upon the audience to pass a hearty vote of thanks to the lecturer.

Dr. Pullin had another appointment, and asked to be allowed to reply to the various questions in writing.

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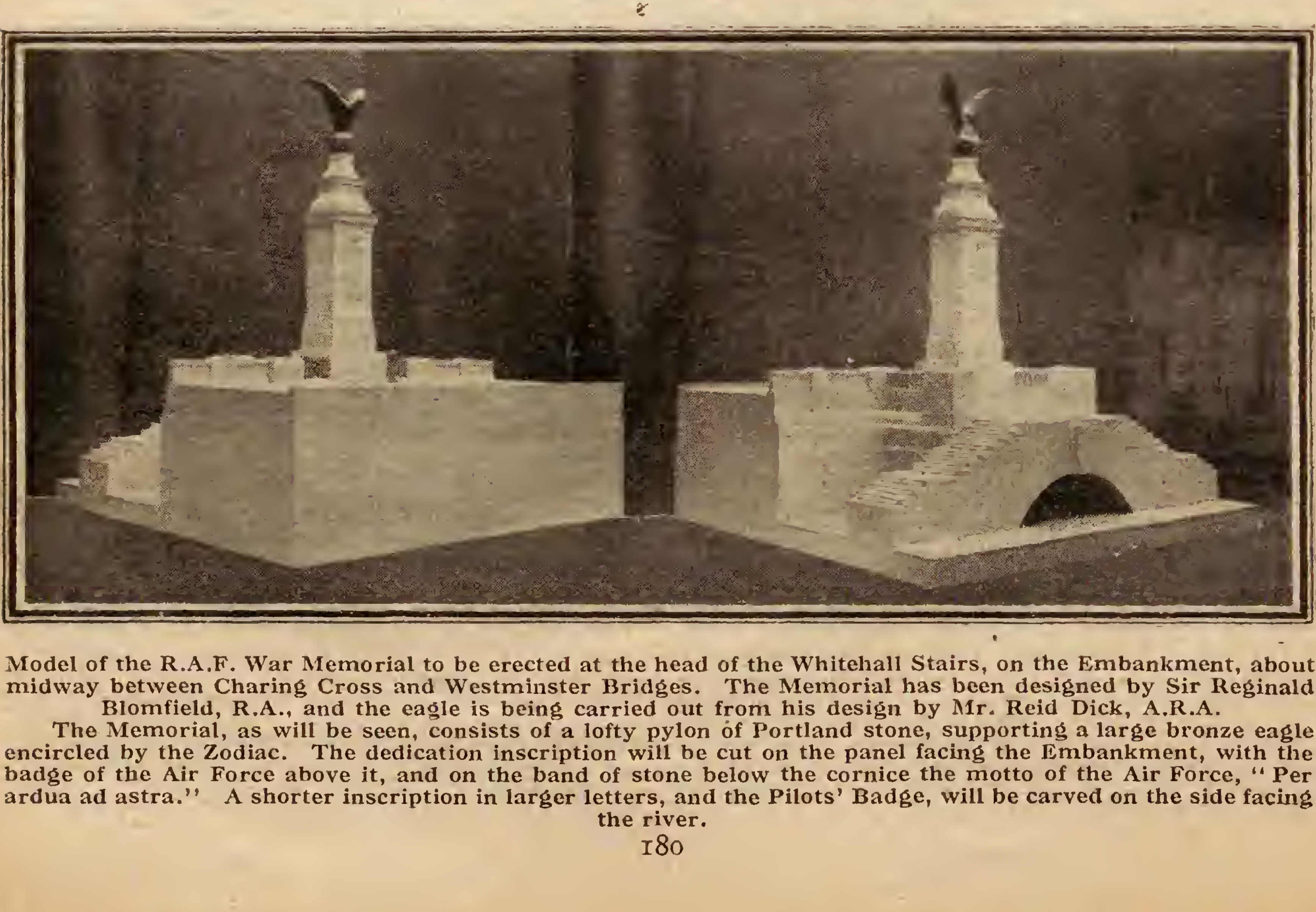

Model of the R.A.F. War Memorial to be erected at the head of the Whitehall Stairs, on the Embankment, about midway between Charing Cross and Westminster Bridges. The Memorial has been designed by Sir Reginald Blomfield, R.A., and the eagle is being carried out from his design by Mr. Reid Dick, A.R.A.

The Memorial, as will be seen, consists of a lofty pylon of Portland stone, supporting a large bronze eagle encircled by the Zodiac. The dedication inscription will be cut on the panel facing the Embankment, with the badge of the Air Force above it, and on the band of stone below the cornice the motto of the Air Force, "Per ardua ad astra." A shorter inscription in larger letters, and the Pilots' Badge, will be carved on the side facing the river.

THE ROYAL AIR FORCE

London Gazette, March 7, 1922

General Duties Branch

Flying Officer R. de L. Stedman is granted a permanent commn., retaining his present substantive rank and seny. ; Dec. 12, 1919 (*Gazette* Dec. 12, 1919, appointing him to a short service commn. is cancelled).

The following are granted short service commns. as Flying Officers, with effect from and seny. of dates indicated :—W. F. Hamilton ; Feb. 23. C. A. Mason ; Feb. 22.

The following Flight Lieuts. are restored to full pay from half pay :—C. P. O. Bartlett ,D.S.C., Feb. 24 ; G. E. Wilson, Feb. 24.

Stores Branch

Flying Officer H. N. Stevens is granted a permanent commn., retaining his present substantive rank and seny. ; June 17, 1920.

Memoranda

Capt. G. H. Warner relinquishes his temp. commn. on ceasing to be employed, and is permitted to retain his rank ; Feb. 15. Lieut. (acting Capt.) A. E. N. Fortescue, M.B.E., relinquishes his temp. commn., and is permitted to retain rank of Capt. ; Feb. 17. Sec. Lieut. (Hon. Lieut.) A. Duthie is transfd. to the unemployed list ; May 10, 1919 (substd. for *Gazette* May 20, 1919.

London Gazette, March 10, 1922

Air Vice-Marshal Sir W. G. H. Salmond, K.C.M.G., C.B., D.S.O., is appointed Director-General of Supply and Research, Air Ministry, *vice* Air Vice-Marshal Sir E. L. Ellington, K.C.B., C.M.G., C.B.E. ; February 23.

General Duties Branch

Flying Officer P. N. Melitus is granted the hon. rank of Flight-Lieut. on promotion to Capt. in Royal Warwicks Regiment ; January 15. Flight-Lieut. C. E. Wardle to take rank and precedence as if his name appeared in the Air Force List immediately below that of Flight-Lieut. W. S. Caster, M.C. Reduction to take effect from February 2. Flying Officer T. H. Moon is placed on h.p. Scale B ; February 25. *Gazette*, August 10, 1920, concerning Flying Officer A. C. Sanderson, D.F.C., is cancelled.

Memoranda

Three Cadets are granted hon. Commns. as Sec. Lieuts., with effect from the dates of their demobilisation.

Permission granted to the following officers to retain rank of Sec. Lieut. is withdrawn on their joining the Army :—W. R. Wright, J. T. R. Wynn ; January 19, 1921.

Gazette, February 28, 1919, concerning Sec. Lieut. (Hon. Major) G. A. E. Chapman, is cancelled.

London Gazette, March 14, 1922

General Duties Branch

Flying Offr. C. S. Gray is placed on the Retd. list on account of ill-health contracted on active service ; March 15. Squadn. Leader E. L. Conran, M.C., is placed on half-pay, Scale B (from Feb. 14 to April 12 inclusive).

Stores Branch

Flying Offr. V. G. A. Bennett is granted permanent commn., in the rank stated, with effect from Sept. 12, 1919, and is transferred to the Stores Branch for accountant duties, with effect from Feb. 1 ; *Gazette* Sept. 12, 1919, appointing him to a short service commn. is cancelled. Flying Offr. (actg. Flt. Lieut.) H. F. Fuller is granted a permanent commn. as a Flt. Lieut. for accountant duties ; Oct. 25, 1921. The seniority of all officers granted commns. in the Stores Branch for accountant duties is provisional only. The final seniority list of all such officers will be promulgated when the establishment is completed.

Memorandum.

Lieut. G. A. Denty relinquishes his temp. commn. on ceasing to be empld., and is permitted to retain his rank ; Feb. 23.

London Gazette, March 17, 1922

General Duties Branch

The follg. Pilot Offrs. on probn. are confirmed in rank :—J. G. Shackleton ; March 5. C. E. B. Winch ; March 7.

The follg. Flying Offrs. are placed on h.p., Scale B :—E. Burton ; March 11. V. Croome ; March 10.

Flying Offr. W. A. Berry is granted hon. rank of Flight Lieut. on promotion to Capt., 4th D.G. ; Sept. 17, 1921.

Memoranda

Three Cadets are granted hon. commns. as Sec. Lieuts., with effect from dates of their demobilisation.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

Air Vice-Marshal J. F. A. Higgins, C.B., D.S.O., A.F.C., from Headquarters Inland Area (on ceasing to be attached to the Air Ministry) to R.A.F. Depôt (Inland Area) (Supernumerary.) Whilst attending R.N. Staff College for Senior Officers' War Course. 7.3.22.

Group Capt. I. M. Bonham-Carter, O.B.E., from No. 11 (Irish) Wing to Headquarters, R.A.F., Ireland. 17.2.22.

Wing Commander G. F. Prettyman, D.S.O., O.B.E., from R.A.F. Depôt (Inland Area), to command No. 11 Wing Headquarters (Inland Area). 1.3.22.

Wing Commander N. J. Gill, C.B.E., M.C., from R.A.F. Depôt (Inland Area) to command Aeroplane Experimental Establishment (Coastal Area). 1.3.22.

Wing Commander A. V. Bettington, C.M.G., from Headquarters, No. 11 (Irish) Wing to R.A.F. Depôt (Inland Area). 17.2.22.

Wing Commander N. Goldsmith, O.B.E., from Aircraft Depôt, Egypt (Middle East Area) to command M.T. Repair Depôt (Inland Area). 13.2.22.

Squadron Leaders.—G. H. Bowman, D.S.O. D.F.C., from R.A.F. Depôt (Inland Area) to command No. 8 Squadron (Iraq Group). 24.2.22. W. S. Douglas, M.C., D.F.C., from No. 6 Flying Training School (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. C. W. H. Pulford, O.B.E., A.F.C., from R.A.F. Base, Gosport (Development Flight) (Coastal Area) to R.A.F. Staff College (Inland Area). 3.4.22. C. F. A. Portal, D.S.O., M.C., from R.A.F. Cadet College (Flying Wings) (Cranwell) to R.A.F. Staff College (Inland Area). 3.4.22. B. E. Smythies, D.F.C., from No. 3 Flying Training School (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. W. A. McClaughry, D.S.O., M.C., D.F.C., from Air Pilotage School (Cadre) (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. L. L. Maclean from No. 2 Flying Training School (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. K. R. Park, M.C., D.F.C., from School of Technical Training (Men) (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. J. T. Babington, D.S.O., from No. 6 Flying Training School (Inland Area) to R.A.F. Depôt (Inland Area). 3.4.22. J. V. Steel, O.B.E., from R.A.F. Depôt (Inland Area) to School of Technical Training (Men) (Inland Area). 20.3.22. G. F. Breese, D.S.C., from No. 238 Squadron (Cadre) (Coastal Area) to R.A.F. Depôt (Inland Area). 14.3.22. J. C. M. Lowe from Air Ministry (Director-General of Supply and Research) to Air Ministry (Directorate of Operations and Intelligence). 6.3.22. G. Blatherwick from Central Flying School (Inland Area) to School of Photography (Inland Area). Supernumerary.) 3.4.22. T. W. Elsdon, from No. 29 Group Headquarters (Coastal Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) 6.2.22. D. Harries, A.F.C., from R.A.F. Airship Base (Coastal Area) to Headquarters (Coastal Area). (Supernumerary.) Pending closing down of R.A.F. Airship Base. 24.2.22. H. C. Fuller, from R.A.F. Airship Base (Coastal Area) to Headquarters (Coastal Area). (Supernumerary.) To remain attached to Pulham Airship Station. 24.2.22. P. Babington, M.C., A.F.C., from Egyptian Group Headquarters (Middle East Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) 3.3.22.

Flight Lieutenants.—H. E. Flavelle from R.A.F. Depôt (Inland Area) to Headquarters No. 1 School of Technical Training (Boys) (Halton). 22.2.22. J. W. Woodhouse, D.S.O., M.C., from No. 1 Flying Training School (Inland Area) to Central Flying School (Inland Area). 13.3.22. A. Lees from No. 6 Flying Training School (Inland Area) to Central Flying School (Inland Area). 13.3.22. J. K. Summers, M.C., from No. 5 Flying Training School (Inland Area) to Central Flying School (Inland Area). 13.3.22. B. McEntegart from No. 2 Flying Training School (Inland Area) to Central Flying School (Inland Area). 13.3.22. H. G. Bowen from R. A. F. Depôt (Inland Area) to Central Flying School (Inland Area). 13.3.22. J. J. Williamson, A.F.C., from No. 100 Squadron (No. 11 (Irish) Wing) to Central Flying School (Inland Area). 13.3.22. T. M. Walker from Research Laboratory and Medical Officers School of Instruction (Inland Area) to Headquarters No. 1 School of Technical Training (Boys (Halton). 27.2.22. A. C. Ransford, from Research Laboratory and Medical Officers School of Instruction (Inland Area to R.A.F. Depôt (Inland Area). 27.2.22. A. C. Snow, from R.A.F. School (India) to R.A.F. Depôt (Inland Area). 31.1.22. L. N. Hollinghurst, D.F.C., from No. 5 Squadron (India) to R.A.F. Depôt (Inland Area). 31.1.22. D. A. Stewart, M.C., D.F.C., A.F.C., from No. 216 Squadron (Middle East Area) to R.A.F. Depôt (Inland Area). 13.2.22. F. G. M. Williams from R.A.F. Depôt (Inland Area) to No. 10 Group Headquarters (Coastal Area). 1.3.22. H. McWilliams Daniel, M.B., from R.A.F. (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). 3.3.22. J. H. O. Jones from R.A.F. Base, Gosport (No. 210 Squadron) (Coastal Area) to R.A.F. Base, Gosport (Observers' Training Flight) (Coastal Area). 1.3.22. O. C. Bryson M.C., A.F.C., A.M., from R.A.F. Base, Gosport (Observers' Training Flight) (Coastal Area) to R.A.F. Base, Gosport (No. 210 Squadron) (Coastal Area). 1.3.22. G. E. Wilson from Half-pay List to No. 4 Flying Training School (Middle East Area). 24.2.22. E. S. Goodwin, A.F.C., from Marine and Armament Experimental Establishment (Coastal Area) to No. 216 Squadron (Middle East Area). 24.2.22. A. Coningham, D.S.O., M.C., D.F.C., from Central Flying School (Inland Area) to No. 55 Squadron (Iraq Group). 24.2.22. C. P. O. Bartlett, D.S.C., from Half-pay List to No. 30 Squadron (Iraq Group). 24.2.22. H. M. Massey, M.C., from No. 39 Squadron (Inland Area) to No. 8 Squadron (Iraq Group). 24.2.22. F. N. Hudson, M.C., from R.A.F. Cadet College (Flying Wing) (Cranwell) to No. 6 Squadron (Iraq Group). 24.2.22. R. A. Courtney, M.B.E., from No. 11 Wing Headquarters (Inland Area) to Headquarters (Iraq Group). 24.2.22. J. H. D'Albiac, D.S.O., from No. 4 Flying Training School (Middle East Area) to No. 47 Squadron (Middle East Area). 13.2.22. F. R. Alford, M.C., from No. 10 Group Headquarters (Coastal Area) to Armament and Gunnery School (Cadre) (Inland Area). 6.3.22. H. S. Shields, M.C., from No. 208 Squadron (Middle East Area) to R.A.F. Depôt (Inland Area) (Supernumerary). 8.2.22. W. R. Reith, M.D., A.M., from No. 1 School of Technical Training (Boys) (Halton) to R.A.F. Depôt (Inland Area). For duty as Medical Officer. 7.3.22. R. E. H. Daniel from Air Ministry (Directorate of Training and Organisation) to R.A.F. Depot (Inland Area) (Supernumerary). 5.3.22. E. B. C. Betts, D.S.C., D.F.C., from R.A.F. Depôt (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. E. B. C. Betts, D.S.C., D.F.C., from H.M.S. "Pegasus" (Mediterranean Group) to R.A.F. Depôt (Inland Area) (Supernumerary). 28.2.22. G. H. White from No. 1 School of Technical Training (Boys) (Halton) to No. 4 Squadron (Inland Area). 15.3.22. D. H. Dabbs from No. 3 Flying Training School (Inland Area) to No. 4 Flying Training School (Middle East Area). 21.1.22. G. C. Pirie, M.C., D.F.C., from R.A.F. Depôt (Inland Area) to School of Army Co-operation (Inland Area). 10.3.22. J. B. Cole-Hamilton from Boys' Wing (Cranwell) to R.A.F. Staff College (Inland Area). 3.4.22. G. M. Lawson, M.C., from Armament and Gunnery School (Cadre) (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. H. S. Kerby, D.S.C., A.F.C., from No. 1 School of Technical Training (Boys) (Halton) to R.A.F. Staff College (Inland Area). 3.4.22. W. B. Farrington, D.S.O., from Headquarters, R.A.F., Cranwell, to R.A.F. Staff College (Inland Area). 3.4.22. W. R. Dyke Acland, D.F.C., A.F.C., from H.M.S. "Argus" (Coastal Area) to R.A.F. Staff College (Inland Area). 3.4.22. C. H. Hayward from R.A.F. Depôt (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. N. W. Wadham from R.A.F. Base, Leuchars (Coastal Area) to R.A.F. Staff College (Inland Area). 3.4.22. R. M. Drummond, D.S.O., M.C., from School of Army Co-operation (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. E. B. Beauman from No. 10 Group Hdqrs. (Coastal Area) to R.A.F. Staff College (Inland Area). 3.4.22. H. S. Powell, M.C., from No. 11 Wing Hdqrs. (Inland Area) from R.A.F. Staff Col. (Inland Area). 3.4.22. H. H. McLeod Fraser, from Central Flying School (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 3.4.22. D. W. Clappen, from Central Flying School (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 3.4.22. E. N. E. Waldron, from Central Pay Office (Inland Area) to No. 4 Stores Depôt. 20.3.22. A. L. Neale, M.C., from R.A.F. Depôt (Inland Area) to No. 39 Squadron (Inland Area). 15.3.22. R. J. O. Compston, D.S.C., D.F.C., from R.A.F. Depôt (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). 15.3.22. T. L. P. Harries, M.B., from R.A.F. Depôt (Inland Area) to No. 1 Flying Training School (Inland Area). 8.3.22. R. M. King, to R.A.F. Depôt (Inland Area). On attachment to Royal Air Force from Army Dental Corps. 21.2.22. A. Briscoe, M.B., from No. 20 Squadron (India) to No. 28 Squadron (India). 16.10.21.

SIDE-WINDS

IN view of the very great importance to modern aviation of reliable instruments of all kinds, it is not surprising that this part of the equipment of aircraft should come in for a good deal of study. As an instance, mention may be made of the fact that on March 13 a party of students from the Royal College of Science and Technology paid a visit to the Cricklewood works of Messrs. S. Smith and Sons (M.A.) Ltd.

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THEY were particularly interested in the calibrating department, where airspeed indicators, pressure gauges, petrol level indicators, revolution counters and altimeters are calibrated and tested. They were shown the special overload test on the Smith pressure gauges, whereby the ordinary 5 lb. gauge is subjected to a pressure of 20 lbs., and a 100 lb. gauge to a pressure of over 300 lbs. before it is finally accepted for shipment to the customer. They were also interested in some special airspeed indicators which have been made up for the new Handley Page London-Paris machines, for fitment in the passenger cabins. Both the altimeter, airspeed indicator and clock are arranged with highly polished bezels and silvered dials, which harmonise with the general arrangement of the cabin and have a more artistic appearance than the standard pattern of black instruments. Besides visiting the aviation section of the works the party made a general tour of inspection of the various machine and assembly shops, the stores and despatch department, canteen and recreation rooms, dance hall, etc.

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WE have received from the Bristol Aeroplane Co., Ltd., copies of an interesting little booklet dealing with their gas starter for aero engines. This starter, which was described in FLIGHT on December 1, 1921, is suitable for engines having six or more cylinders, and a cubic capacity up to 2,500 cubic ins. A feature of the starter is that, as there are no gears between the starter and the engine, the starter may be installed in any convenient place within 20 ft. of the engine. The weight of the unit is only 46 lbs. The booklet gives a very clear illustrated description of the starter and its method of working, and we should recommend all interested in the subject of engine starters to obtain a copy. Finally, it might be mentioned that the price of the starter is £85 delivered at the Filton works. This figure does not include the cost of the distributor, which varies according to the type of engine.

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THERE was a time, and looking back it does not seem very long ago, when the running of an aero engine was a delicate business. The engines required very careful attention, and even then they had to be dismantled and overhauled after very short periods in the air. The modern aero-engine is quite a different proposition in this respect, and by way of an example it may be mentioned that quite recently a Napier "Lion" used on the London-Paris services completed 20,000 miles without having been taken down. This is striking testimony to the manner in which these engines stand up to their work, and is, of course, mainly due to the fact that their weight is so low in relation to the power developed that they can be run normally at about 60 per cent. of their power and still give the machines sufficient cruising speed.

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WE learn from Barimar, Ltd., of 10, Poland Street, W. 1, that they are not involved in the present engineering dispute, and that, therefore, there is no ban on the employment of Barimar experts. Mr. C. W. Brett informs us that welding work is plentiful, and is being carried on as usual.

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R.A.F. Club.

THE following arrangements have been made by the Committee for the two forthcoming dances at the R.A.F.C. :—

Thursday, March 23, 9.30 to 2.30. Tickets, 10*s.* 6*d.* Dinner served from 8 p.m.; 5*s.*

Thursday, April 6, 9 to 1. Tickets, 7*s.* 6*d.* Dinner from 7.30 p.m.

The number of dance tickets will be limited in each case to 200.

Members desiring to reserve tables should make application to the Steward. Music will be provided by the Kendal Grimston Quintette.

The small dining-room will be set aside between 7 and 8 p.m. for members desiring to dine in the Club who do not wish to dine in the large dining-room. The large dining-room will be opened to members wishing to dine lady guests, but the number of tables will be limited to admit of members dining in the dining-room also.

THE LONDON AERO-MODELS ASSOCIATION

COMPETITION No. 2 for R.O.G. Duration for prizes given by Mr. Louch and Mr. Wilson. First, £1 1*s.*; second, 10*s.* To be held on Wormwood Scrubbs on Sunday, April 16, at 11 a.m. Models limited to 4 ozs. in weight; no other restrictions. Judges, Mr. Wilson and Mr. Gray.

Competition No. 3 for R.O.G. Duration, limited to enclosed models weighing not less than 8 ozs., any power. Loading limit (minimum), 6 ozs. to the sq. ft. for monoplanes and 5 ozs. per sq. ft. for biplanes. To take place on Wimbledon Common at 11 a.m., start 11.15 a.m., May 7. Flights timed from release of propellers. Prizes given by Messrs. W. G. Evans and Sons: first, 25*s.*; second, 10*s.*; third, 7*s.* At least two flights per competitor. Judges to be appointed later.

Competition No. 4. Prize given by Mr. D. A. Pavely, value 10*s.*, awarded to member who first makes duration of 60 secs. R.O.G. with enclosed model. Will members take special notice of Competition Rules Nos. 1 and 3?

S.E. Section

Report by Official Observer (Mr. L. G. H. Hatfull) as follows: A meeting of the above Section was held at Blackheath at 8 a.m. on Sunday, March 12. Messrs. Brown, Rippon, Wilson, Cummings and Hatfull attended. Mr. Scott was also present. All were flying tractor models, and a very interesting exhibition took place. At 9.30 an impromptu "Aerial Derby" was held, Mr. Wilson winning with 15 flights. The course was triangular, bases being about 250 yds. apart. An enjoyable competition was concluded in under half an hour. Conditions were very favourable, there being very little wind. The meeting closed at 10 a.m. Competition Secretary, Mr. C. A. Rippon, 52, Fairbridge Road, Holloway, N.19. Hon. Sec., A. E. Jones, 48, Narcissus Road, N.W. 6. Meetings held every Thursday evening at General Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, at 7.30.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: **cyl. = cylinder; I.C. = internal combustion; m. = motors**

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published March 23, 1922

31,568. J. V. MARTIN. Landing-wheels for aircraft. (175,706.)
32,455. J. F. H. DE V. VANDEVELDE. Aeroplane control mechanism. (154,897.)
33,406. G. L. AND D. A. SAUNDERS. Inclinometers. (175,771.)
33,689. E. R. CALTHROP. Parachutes. (175,780.)
34,230. C. R. FREEMANTLE. Wind-screens. (175,798.)

APPLIED FOR IN 1921

Published March 23, 1922

11,350. J. H. W. GILL. Screw propellers. (175,922.)
19,399. LUFTSCHIFFBAU ZEPPELIN GES. and P. JARAY. Gas valves for lighter-than-air aircraft. (167,749.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued*

(Continued from p. xiv.)

LEATHER CLOTH—
New Pegamoid Ltd., 134, Queen Victoria St., E.C. City 9704 (2 lines). "Pegamoid," Phone, London.

LUBRICATING OILS—
Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2. Central 1156 (3 lines); "Cheery," Cent. London.

MACHINING—
Arnott & Harrison, Ltd., Hythe Road, Willesden Junction. Willesden 2297.
Monk Engineering Co., Ltd., Coventry. Coventry 807; "Assistance," Coventry.

MAGNETOS—
British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry. Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)
Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

METAL PARTS AND FITTINGS—
Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.
Grahame-White Company, Ltd., Hendon, N.W. 9. Kingsbury 120.
London Office: 32, Regent Street, Pall Mall, S.W. 1. Regent 2084.
Monk Engineering Co., High St., Coventry. Coventry 807; "Assistance," Coventry.
Rubery, Owen & Co., Darlaston. Darlaston 87; "Roofs," Darlaston.

MODELS—
Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

MOTOR CARS AND MOTOR BICYCLES—
Auto-Carriers (1911), Ltd., 181-182, Hercules Rd., Westminster Bridge Road, London, S.E. 1.

NIGHT LANDING LIGHTS—
Allen-Liversidge, Ltd., amalgamated with Imperial Light, Ltd., 106, Victoria St., S.W. 1. Victoria 4155; "Aceterator," Sowest, London.

PARACHUTES—
E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

PETROL—
Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.
Shell-Mex Ltd., Shell Corner, Kingsway, W.C. 2. Holborn 2303-4; "Shelzine," Westcent, London.

PHOSPHOR BRONZE AND GUNMETAL—
Clifford, Charles, & Son, Ltd., Fazeley Street Mills, Birmingham. Central 3634 (4 lines); "Clifford," Birmingham.
Keeling, A. D., Ltd., Caroline Street, Birmingham. Central 440 (3 lines); "Nickel," Birmingham.

PHOTOGRAPHIC APPARATUS—
Kodak, Ltd. (Wratten Div.), Kingsway, W.C. 2.

PROPELLERS—
Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.
Lang Propeller Ltd., Weybridge, Surrey. 520-521, Weybridge; "Aerosticks," Weybridge.

RADIATORS AND RADIATOR REPAIRS—
Serck Radiators, Ltd., Warwick Road, Greet, Birmingham. Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—
Rubery, Owen & Co., Darlaston. Darlaston 87; "Roofs," Darlaston.

SPARKING PLUGS—
Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15. Putney 2132, 2133. "Kaalgee," Phone, London.

SPRAYING PLANT—
Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1. Holborn 2041; "Aerography," London.
Midland Fan Co., Ltd., 46, Aston Rd., Birmingham. Central 3463; "Blast," Birmingham.

STABILIZERS—
Auto Controls, Ltd., 19, Regent Street, Piccadilly Circus, London, S.W. 1. Regent 3649.

TAPES AND WEBBING—
MacLennan, John, & Co., 115, Newgate St., E.C. 1. City 3115; "Vanduara," Cent. London.

TESTING—
Tait-Cox & James, c/o S. Heckstall Smith, F.R.Ae.S., 4, Golden Square, W. Gerrard 3489.

TIMBER—
Owen, Joseph, & Son, Boro' High Street, S.E. Hop 3811; "Bucheron," London.

TUBES, ALUMINIUM—
British Aluminium Co., Ltd., The, 109, Queen Victoria St., London. City 2676; "Cryolite," Cent. London.

TYRES AND WHEELS—
Palmer Tyre, Ltd., Shaftesbury Avenue, W.C. 2. Gerrard 1214; "Tyricord," Westcent, London.

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A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport
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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Mar. 26–April 2	**Nice Meeting**
Mar. 30	**Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.**
Mar. 31	**Lecture, "Aircraft Design" by H. P. Folland, before I.Ae.E.**
April 7	**Lecture, "Some Outstanding Problems in Aeronautics," by Professor L. Bairstow, before Students' Section, R.Ae.S.**
April 17	**R.Ae.C. Race Meeting, at Waddon**
April 17–19	**Seaplane Contest, Marseilles**
June 1	**Entries close for Schneider Cup Race**
June 5	**R.Ae.C. Easter Race Meeting, at Waddon**
June 23–25	**International Competition for Touring Aeroplanes, Brussels**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22 ...	**Coupe Deutsche (300 kil.)**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT

THE series of articles in *The Times* by Brig.-Gen. Groves, under the title "Our Future in the Air," which should be read by all who have the welfare of the Empire at heart, have aroused an interest so widespread as to rivet the attention not only of all sections of the community at home, but, without doubt, also the majority of European nations. For sheer logic of argument and lucidity of exposition the articles have never been surpassed in any debate on questions of air policy, and had it been at all possible to do so we should have liked to publish them in full. That, however, is entirely out of the question, and we must perforce confine ourselves by referring to Gen. Groves' main points.

Our Future in the Air

Broadly speaking, the argument advanced by Gen. Groves is that there is one way, and one way only, in which the Empire can safeguard itself against attack from the air: by the establishment and maintenance of an offensive-defensive long-distance "striking force" which shall be capable of attacking the centres of any potential invader and paralyse him before he has had time to get ready to attack us. This "striking force," it is contended, must consist of bombers drawn from a subsidised, organised and well-developed Civil Aviation, protected by the fighting machines of the R.A.F.

Gen. Groves calls attention to the way in which Germany, handicapped as she has been since the War, is building up, or preparing to build up, air power under the guise of Civil Aviation, and points out that France has good cause for anxiety, and is well justified in developing by all means her air power. He proves that aerial preparedness on any other basis than that of a "striking force," the main body of which is fed by Civil Aviation, is quite impracticable, and would involve the expenditure of absurd sums of money and the maintenance of huge *personnel*.

In connection with the possibility of converting commercial aeroplanes into bombers, Gen. Groves calls attention to the paradoxical attitude of our Government, which, while agreeing with our Allies that German Civil Aviation may constitute a danger, owing to the possibility of converting machines for military purposes, yet refuses to admit that British Civil Aviation is, or would be if it existed, of any military value in the event of a war. This in spite of recommendations made by the Civil Aerial Transport Committee and other representative bodies. Instead of fostering Civil Aviation, the Government, as represented by the Air Ministry, has pursued an archaic militarist policy which has virtually ruined the aircraft industry.

The arguments advanced by Gen. Groves, in the main the same as have been put forward in FLIGHT for the past three or four years, maintain that Civil Aviation is not a form of locomotion which must stand or fall by its commercial success, but is rather to be looked upon as a form of national insurance. It is no manner of use saying that we cannot afford Civil Aviation. Looked upon from our point of view, and that of Gen. Groves, we simply cannot afford, if only from the mere self-preservation point of view, not to develop it. The maintenance of an Air Force of sufficient proportions adequately to meet the requirements of the units co-operating with the Army and Navy, for home defence, for "policing" in the East, etc., would at present, for reasons of economy, be out of the question. By making a better and fuller use of Civil Aviation this expense could be greatly reduced, while at the same time giving all the advantages of the most rapid means of communication. The result of this failure on the part of the Government to recognise the potential value of Civil Aviation has been that the Navy will find itself in a serious position owing to lack of squadrons for naval duties, while in the case of the Army the position is very nearly as bad.

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The Remedy

Having outlined the present unsatisfactory position, Gen. Groves proceeds to summarise what, in his opinion, is the course we must adopt in order to secure an adequate defence against invasion by air. The aims of British air policy, Gen. Groves states, should be :—

1. First and foremost, to build up as rapidly as possible and in the most economical manner a Striking Air Force for home defence. If this is not done the heart of the Empire, England itself, will be open to sudden direct attack from the air.
2. To provide the Navy and Army with the specialised air forces essential to their efficiency.
3. To create a Royal Air Force organisation to carry out duties at present performed by the two other Services where such duties can be effectively and more economically so performed.
4. Last, but not least, to maintain and develop the aircraft industry. This will be secured automatically if the above specified aims are achieved.

The only possible method for us to create and maintain a defensive air fleet is by making use of Civil Aviation, by subsidies if necessary, and to organise and develop it in such a manner that the bulk of the *personnel* and *matériel* shall be instantly available in the case of a war. Gen. Groves suggests that, in addition to the escorting fighting machines, which are specialised aircraft to be developed by the R.A.F., the squadrons of converted civil bombers should be led by "Service Bombers" acting as formation leaders.

As regards the question of administration, Gen. Groves emphasises that unless there is the closest co-operation between the Service and Civil departments of the Air Ministry the policy outlined obviously cannot be realised. At the present moment it is no secret that this co-operation does not exist. We therefore cordially endorse the suggestion that it would be well to have Civil Aviation more strongly represented on the Air Council, and this might be done by placing it, as Gen. Groves says, "under the wing of the Under-Secretary of State for Air." There would then be two members of the Air Council responsible for Civil Aviation, one politically and the other administratively.

No less important is the question of Air Force units required for tactical co-operation with the Army and Navy, and we entirely commend the suggestion of Gen. Groves that, failing a Ministry of Defence, it might be advisable to add to the Air Council, as *ex officio* members, a representative from the Admiralty and one from the War Office. We are quite certain that both Navy and Army fully realise the vital importance of the air to their Services, and the inclusion of representatives on the Air Council should go a long way towards establishing better relations. The proposed reductions in the squadrons allotted for co-operation with the Navy and Army cannot but be felt to a very great extent by these Services, and the gain which it is expected to realise thereby—three squadrons for home defence—is extremely small. As a matter of fact, regarded as anything beyond a mere nucleus, three squadrons for home defence are totally inadequate.

In conclusion, Gen. Groves claims as an essential that, in view of the fact that our first line of defence is now the R.A.F., the post of Air Minister should be held by a statesman of Cabinet rank. We hardly think anyone will seriously quarrel with that contention, as it follows as a logical corollary of the paramount importance which the air is assuming, indeed already has assumed.

As we have already stated, the views expressed by Gen. Groves have, for the greater part, been voiced in these columns time after time, and it is therefore with the deepest satisfaction that we welcome his extremely valuable contribution to the discussion of our air policy. He has made many very frank statements, but he has not, we think, put forward a single one which cannot be justified or has already been substantiated. His reasoning is so logical that his arguments are incontrovertible, and it is sincerely to be hoped that his timely warning will be taken to heart before it is too late. To quote his own words, "Let the leaders of light and learning in this sphere not forget that, in accordance with the teaching of history, those who cease to learn fail to lead."

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China's Air Service Wilting

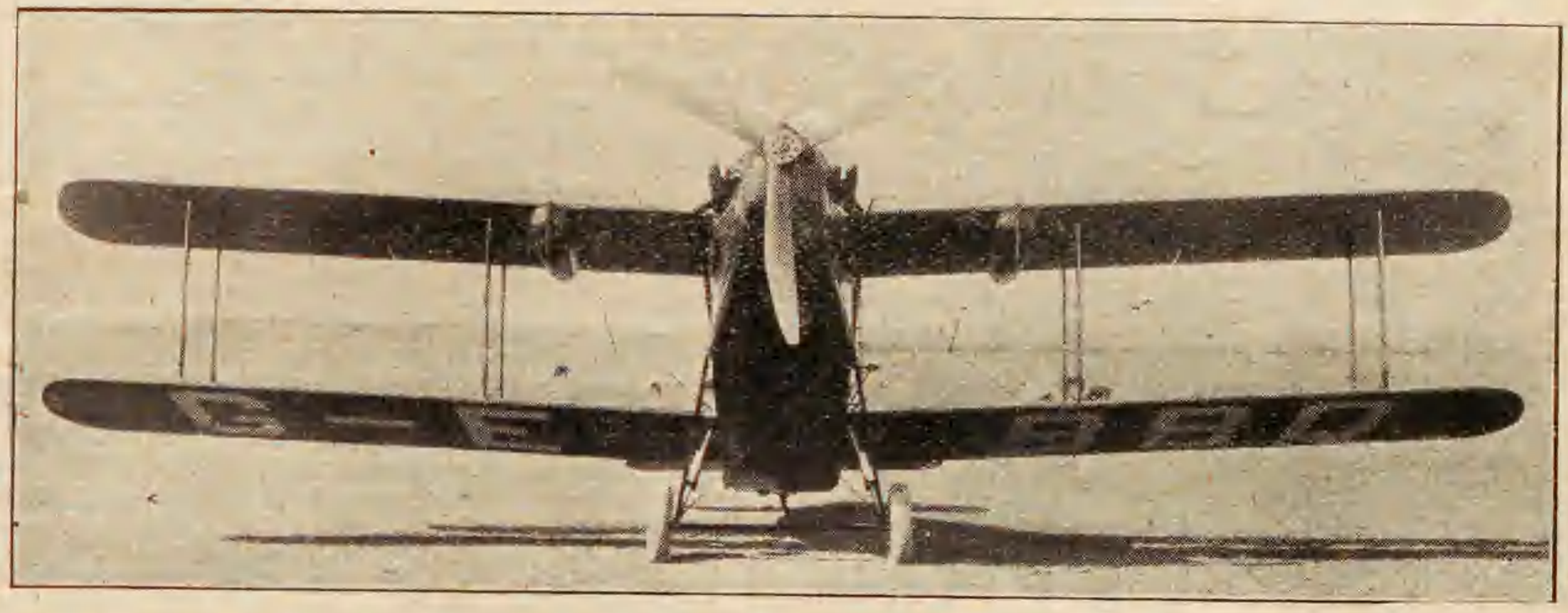
CHINESE "finance" was ever a thing to be marvelled at, and one of the latest enterprises to suffer at its hands appears to be the Air Service which was inaugurated last year under such favourable auspices with the assistance of Messrs. Vickers, Ltd. It seems that the cash provided, which should have gone to run the service to a commercial success, has filtered away through the Government inaptitude until nothing remains for wages, coupon interest, or anything else—without some financial miracle happens. From latest reports it looks as if the whole scheme may easily become another monument to Chinese methods of how not to do it

THE D.H. TYPE 34 COMMERCIAL BIPLANE

First Machines Ready

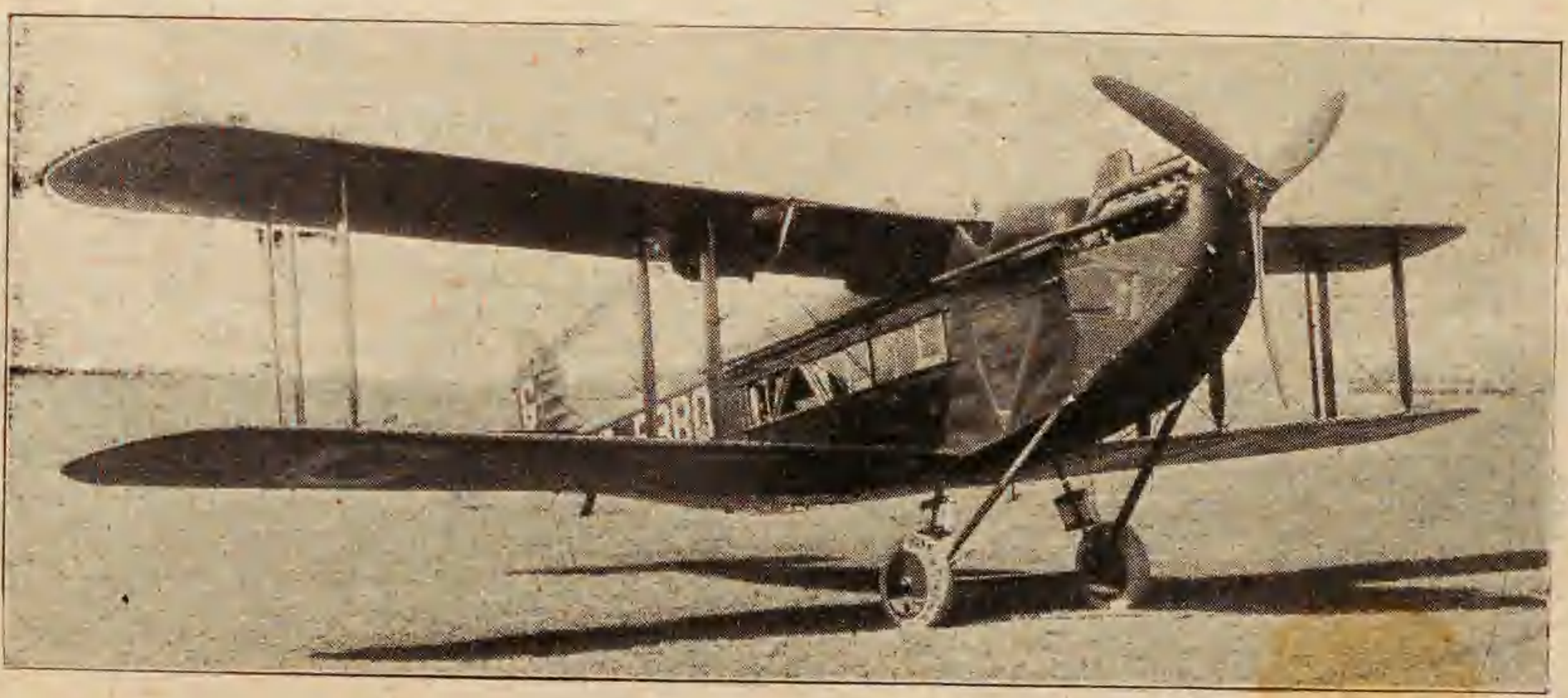
IN our issue of January 5, 1922, we published general arrangement drawings and a brief preliminary description of the D.H.34 biplane, Napier "Lion" engine, then in course of construction at the Stag Lane Works, Edgware, of the de Havilland Aircraft Co., and promised to give further particulars and illustrations when the machines were completed. This week we are able to fulfil our promise, and some of the more interesting and novel details of the 34 are illustrated in the accompanying sketches. For the use of the photographs we are indebted to the Daimler Airway, for whom the first of the machines to be finished are intended. Quite a number of 34's are coming through the works, and on our visit last week we inspected several in the new buildings recently erected at Stag Lane. Some of these machines are painted all over in "pillar-box" red, this being the colour chosen by Daimler Airway for their machines. Others are painted the particular blue which one associates with the Instone Air Line, and it was learned that these were, as a matter of fact, being built for that firm. With such up-to-date flying stock, the air lines should do good business during the coming season, and already there are indications of considerable competition, which, we are always being told, is good for trade.

The D.H.34 resembles, as regards outward appearances, the famous "18's," which have done such good work on the London-Paris services for a couple of years now, and we understand that, as a matter of fact, it has been the aim of the designers to retain the aerodynamical features of the 18, which were found excellent, while at the same time introducing such improvements in construction and fitting-out as have been shown in practice to be desirable, or which have been asked for by the operational firms who are to use the machines. There is every appearance in these machines of the closest co-operation between constructor and user, and the result cannot fail to be a considerable improvement. In the past the constructor has been handicapped by not knowing exactly what the user wants, while the user, on the other hand, has found fault with certain features of machines, which were due to the lack of realisation of his requirements on the part of the constructor. It is quite evident that only by close co-operation can we hope to attain success, and, as already stated, the D.H.34 bears traces of such co-operation. This is highly gratifying, and is decidedly a step in the right direction.

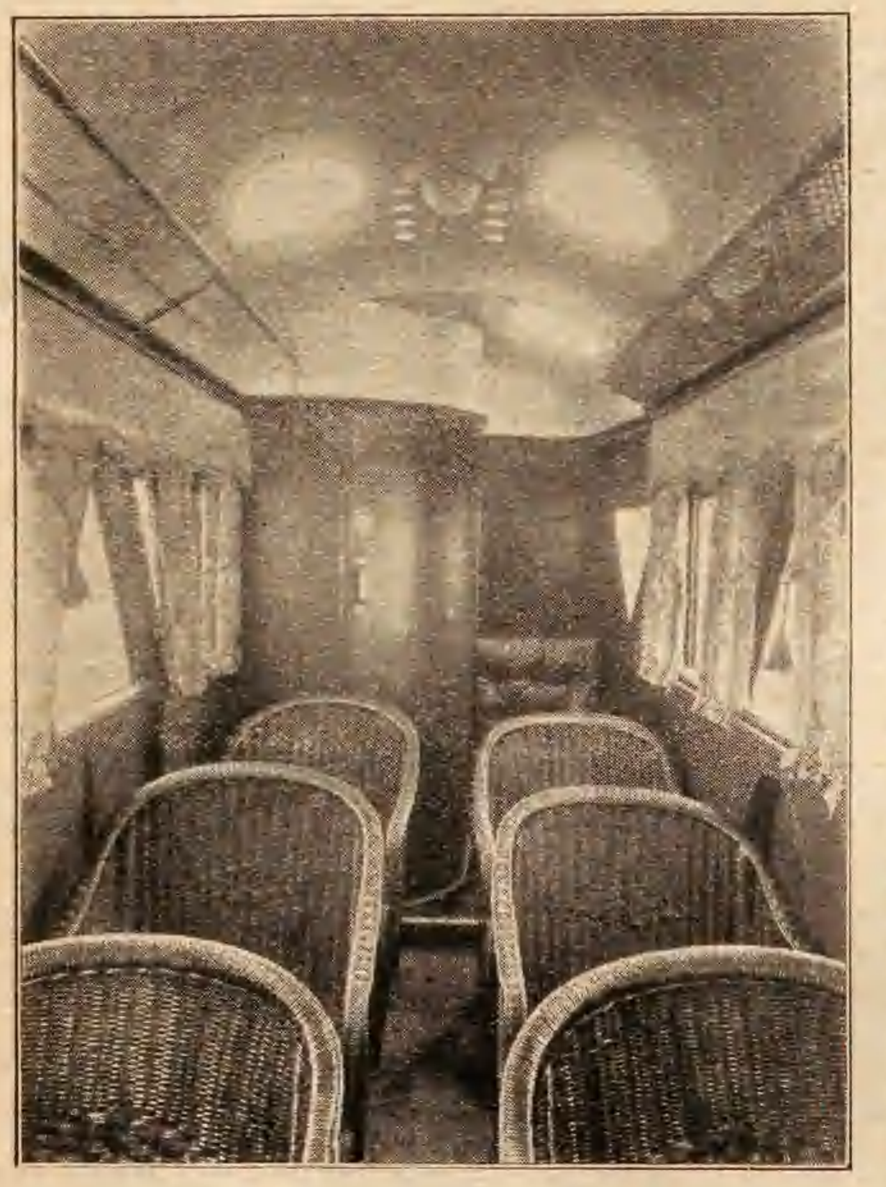


THE D.H. 34 : Front view. Note petrol tanks under top plane.

While thus retaining the good aerodynamical features of the 18, the D.H.34 is, in reality, quite different as regards its construction and also, to a certain extent, in the manner in which component weights are disposed. The most notable departure in this respect is the placing of the pilot in front of the wings, instead of far aft in the *fuselage*, behind the cabin, as he was in the 18. There are, we believe, several reasons for this innovation. To begin with, the cabin is considerably larger than that of the 18, and even if shifted forward it would have brought the pilot very far back. Also, the forward position of the pilot will probably result in a better view, although this is, perhaps, open to discussion. In the 34 the pilot has an excellent view on one side, but the engine certainly appears to restrict the



THE D.H. 34 : Three-quarter front view.



THE D.H. 34 : View inside cabin, looking aft.

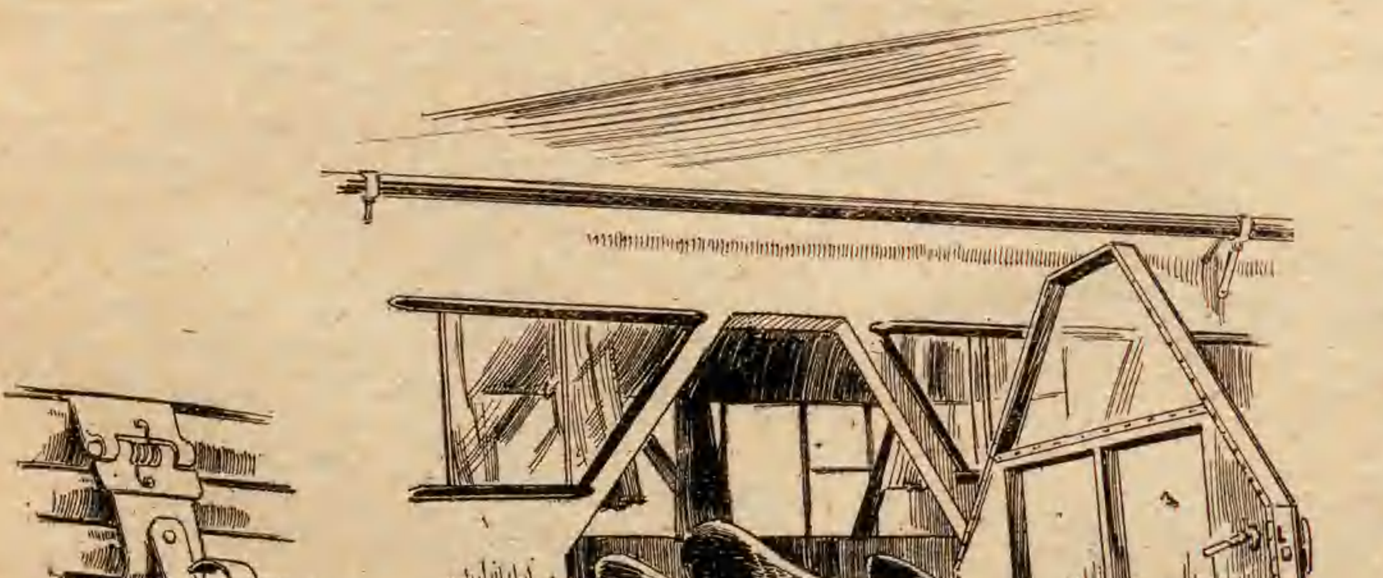
view forward, and to the other side. However, most pilots would probably prefer the forward placing of the seat, although after being used to the 18's, the change must appear somewhat bewildering at first. One advantage of the present arrangement is that the cabin is well separated from the engine, not only by two bulkheads but also by the space occupied by the pilot's cockpit. As very long exhaust pipes are fitted, there should be comparatively little noise in the cabin, and we understand that, as a matter of fact, it is quite easy to converse during the journey.

As regards construction, the 34 differs from the 18 mainly in the manner of building up the *fuselage*, the whole of which in the 34 is built up of triangulated struts, the framework being covered throughout with three-ply wood. This form of construction has been found in practice to stand up well to wear and tear, and to require little or no attention beyond the usual cleaning of the cabin. With a wire braced structure there is always the possibility of wires stretching and necessitating trueing-up. In the construction of the wings there is less change, the general design of spars, ribs, and fittings being similar to that of the 18 wings, although the dimensions are somewhat different, the wing section not being the same as that of the 18.

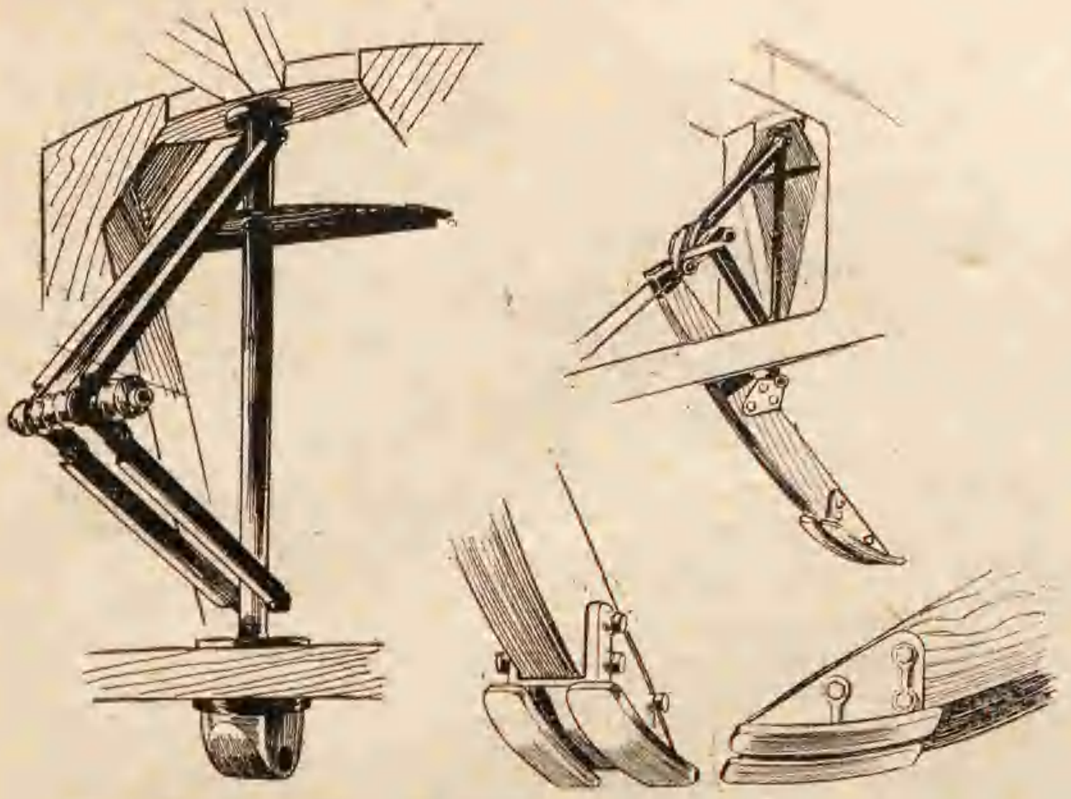
The undercarriage is similar to that of the 18, or rather to its later version as exemplified in the 29 monoplane. It consists of two simple Vees, of which the front legs are rigid while the rear are telescopic and provided with rubber shock absorbers and oleo damping gear. A feature of this undercarriage is its great resiliency, and its height which brings the machine down at a large angle of incedence when the tail skid is on the ground, thus enabling it (the machine, not the ground) to be pulled up very quickly on landing. While on the subject of undercarriages, it might be mentioned that the very substantial tail skid, the details of which are shown in some of our sketches, is provided with an easily renewable cast-iron shoe, so that replacements can be easily and quickly carried out. At the same time, a cast-iron shoe is cheap to manufacture, and its frequent renewal is not a large item in the expense sheet.

As in the 18, and 29 monoplane, the Napier "Lion" engine is mounted as a separate unit, attached to the main *fuselage* structure by four bolts, and separated from the pilot's cockpit by a fireproof bulkhead. The underslung radiator is cowled-in, but swivelling slats in the front of the cowling allow of varying the amount of air admitted, the air escaping through an opening under the bottom of the *fuselage*. One advantage of this placing of the radiator, quite apart from any question of cooling, is that it can be removed without interfering with the propeller, whereas a nose radiator usually necessitates taking the propeller off in order to remove the radiator.

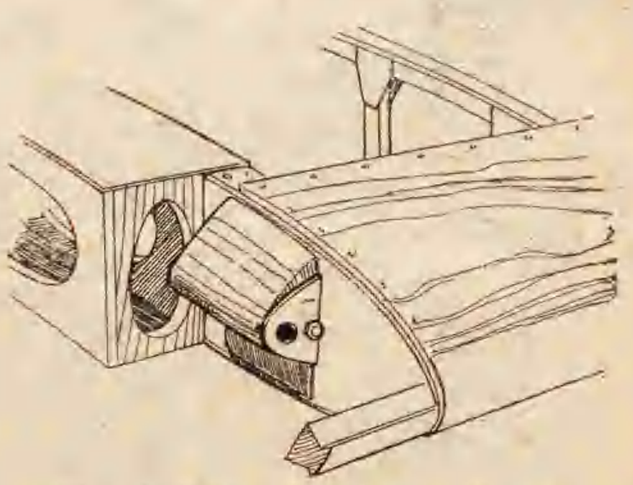
The general appearance of the D.H.34 is well shown in the accompanying photographs. One of these shows the cabin, which has seating accommodation for nine passengers. The seats are of the wicker-work type, having their legs resting in sockets in the floor, and being secured by leather straps, which prevent the legs from coming out of the sockets. At the same time, all the chairs can be easily removed, should it be desired to use the machine for goods or other cargo. As a result of practical experience, it has been found that it is often desirable to be able to transport a spare engine from Paris to London, or *vice versa*, and consequently provision has been made for allowing this to be done. The cabin door, which is on the starboard side, is of a peculiar shape, and just allows of passing a Napier "Lion" through. Owing to the insufficient width of the cabin it is not, however, possible to turn the engine unless the two rear cylinders are removed first. In order to avoid the necessity for doing this, a circular opening has been cut in the port side of the cabin wall, through which the propeller



The D.H. 34 : Sketch showing door of cabin, and folding ladder by means of which passengers enter. Inset shows the small spring clip which locks ladder in position when folded.



The D.H. 34 : Some details of the very substantial tail skid. This is of the steerable type, and consequently the point of attachment of the rubber shock absorbers swivels with the skid. The shoe is of cast iron, and is easily renewable.



The D.H.34 : Some details at the root of the lower plane.

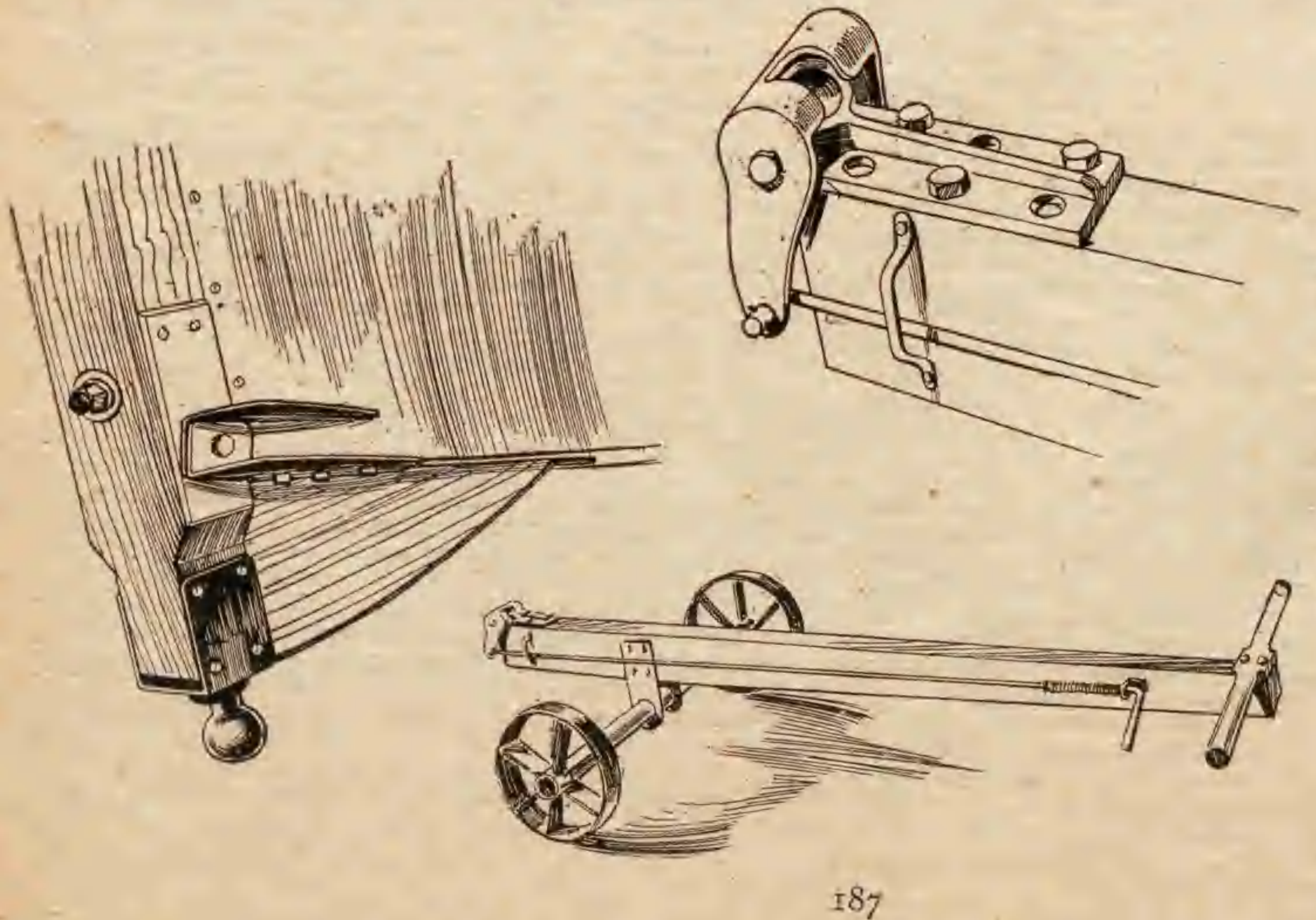
boss and a small portion of the forward part of the crank-case can pass, thus allowing of swinging the engine round.

The cabin itself is very roomy, there being about 7 ft. head room in the centre. Provision has been made for heating and ventilation. The former is effected by hot air from a muff around the exhaust pipe on the starboard side, led to perforated boards under the floor, *via* a diffuser box having a movable flap by means of which the amount of air can be regulated by the passengers themselves. Cold air is passed to this box from a trumpet projecting through the roof of the cabin just aft of the pilot's cockpit, and the regulator is so connected up that at the same time as the hot air is admitted the cold air is cut off, or *vice versa*. In this manner it is hoped that an agreeable temperature may always be maintained without giving a draught. The foul air is sucked out of the cabin by louvres in the roof.

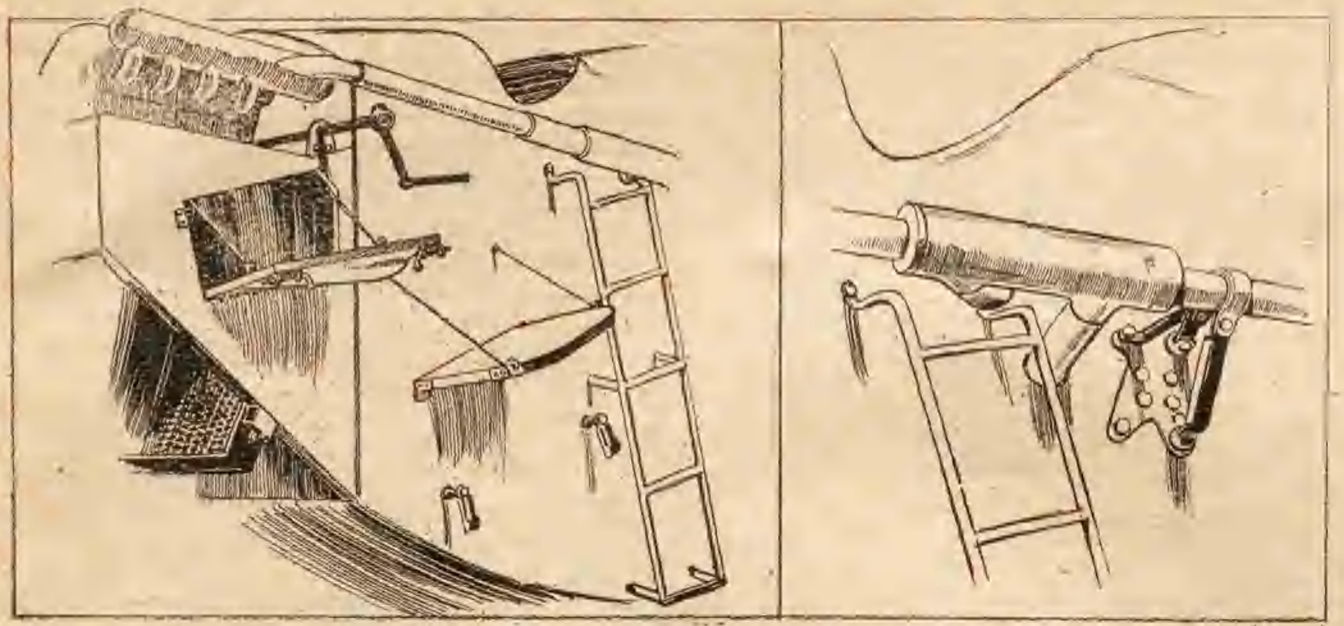
In addition to the question of ventilation and heating, the problem of lighting has also received attention. The windows in the side give a fair amount of light, but in order to get the cabin as light as possible, additional fabric-covered, roof lights are provided. Some of these also serve as emergency exits. For night flying the machine is thoroughly equipped, not only as regards lighting the cabin itself, but also with the necessary navigation lights, Holt flares under the wings, etc. The power for the lighting is obtained from a dynamo driven by the engine, a special gear-box having been provided, with a short shaft running through the engine bulkhead to the dynamo placed on a shelf to the right of the pilot. The current for the wireless outfit is obtained from a wind-mill driven generator, mounted on a shelf on the port side of the machine.

As regards instruments, etc., the 34 is very well equipped, and in fact it probably carries a more complete set than any machine at present in use. The pilot has a good deal to look after, and there is little fear of him getting bored on a trip, what with flying the machine, keeping his course, watching a number of dials, etc. In his cock-pit there is a seat for an engineer, navigator, or any passenger who prefers to travel "outside." Probably for the London-Paris service it will not be necessary to carry a navigator, and presumably the spare seat in this cockpit will usually be occupied by a passenger.

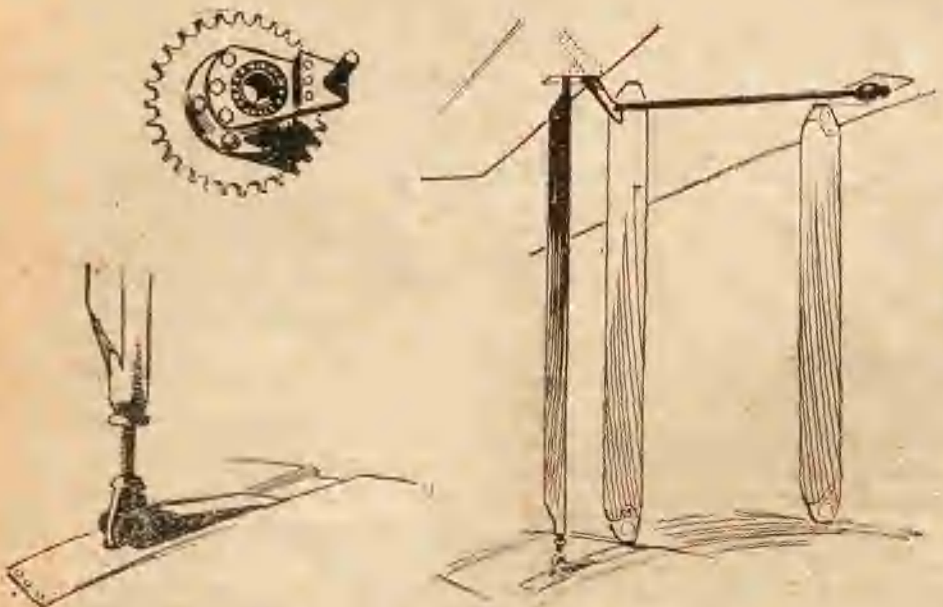
A great deal of attention has been given to such items as affect the running of the machine in actual service. For instance, the doors in the engine housing have been so designed that they hinge so as to project horizontally, being supported when in this position by cables. They thus form platforms



The D.H.34 : Sketch showing details of the trolley used for supporting the tail when wheeling the machine about on the ground. The ball on the stern post rests in the socket on the trolley, where it is locked in position.



The D.H.34 : The sketch on the left shows the folding platform and engine starting handle, and also the ladder leading up to the pilot's cockpit. On the right is the muff around the exhaust pipe from which the cabin is heated. Note the swivelling bracket, which allows the exhaust pipe to expand.



The D.H. 34 : Some details of the ailerons control system. In the top left-hand corner may be seen the small crank arm, working on ball bearings, which is operated from the control stick via rods and chain. The aileron strut is adjustable for length.

on which mechanics can stand while making adjustments to the engine. The value of this in the case of a forced landing will be apparent. Normally, without these platforms, it would be a matter of the greatest difficulty for the pilot or engineer to reach, for example, the sparking plugs, assuming that the machine had been forced down by sooted plugs. With the platforms it is an easy matter to get at any part of the engine, even when no steps or other appliances external to the machine are available.

The Napier "Lion" is started by means of a starting handle on the port side, and a platform, which folds flat against the side of the *fuselage* when not in use, is provided for the engineer to stand on. Thus the antiquated method of swinging the propeller is to be done away with entirely. It is features such as these, which may seem but small items in themselves, which make for smooth working, and we think that this is really the first time we have seen such subjects seriously considered. In the past there has been too much tendency to let the mechanics scramble about on machines as best they might, providing, in the best of cases, a step on a strut or a foot plate on a wing. We therefore, welcome these improvements as a sign of that co-operation between constructor and user to which we have already referred.

The petrol system comprises two tanks, mounted some distance out, under the top plane. Their height is not sufficient to give direct gravity feed, but a low-pressure pump, delivering petrol through Blaisdell "Petro-Flex," should not be a source of any trouble, even if one might have preferred to see direct gravity feed incorporated. On the front of each petrol tank is a level gauge, which can be easily read from the pilot's seat.

The controls are of the usual type, except that several features from the D.H. monoplane have been incorporated. Thus all controls and control surfaces work in ball bearings, and the use of cables is reduced to a minimum. Wherever cables have to be guided, a short length of metal rod is incorporated, passing through a guide of large area, so that there should be no question of cables wearing out. The system of differential movement of *ailerons*, first tested in the monoplane, has been incorporated in the 34. Short crank arms, working in ball bearings, are housed in the top plane under the front spars. From these, tubes run to the upper *aileron* king posts, while struts connect upper and lower *ailerons*. In the *aileron* control system there should be no question of cable stretch and but little adjustment be required, although provision has been made for adjustment of the length of the *aileron* struts if necessary.

We are informed that the first of the 34's was tested on Sunday, March 26, and was found to handle very well indeed, Mr. Cobham being, we believe, the pilot. Following are the main characteristics of the D.H.34 :—Length, 39 ft. ; span, 51 ft. ; height, 12 ft. ; wing area, 590 sq. ft. ; weight of machine empty, 3,365 lbs. ; useful load, 10 passengers with luggage, or about 2,000 lbs. ; total loaded weight, about 6,300 lbs. ; power loading, 13.8 lbs./h.p. ; wing loading, 10.5 lbs./sq. ft. ; cruising speed about 105 m.p.h. ; range, 3½ hours at cruising speed.

As already mentioned, the first of the 34's are to be put on the London-Paris service by Daimler Airway, while others are to be used by the Instone Air Line on the same route. The machines should prove a distinct improvement on the 18, although that machine has an excellent record, and we think that with the D.H.34, one more step has been made towards the ideal commercial aeroplane.

* * *

Policing Iraq by Aircraft

Sir Percy Cox, High Commissioner of Iraq, made his first inspection by air of part of the country lying along the Euphrates on March 21, when he visited Fahad Beg Ibn Hadhdhal, Sheikh of Amarat, at his headquarters, about 30 miles N.W. of Hit. He was accompanied by his staff and a Royal Air Force guard of honour.

The party, we learn officially, left Baghdad in three Vickers "Vernon" machines, one of which also carried stores for armoured cars, with an air escort of 12 machines.

The Amarat, who are well armed and number 5,000 rifles, range the eastern half of the Hamad as far north as Dair az Zaur. The tribe is regarded as friendly to the British. The effect of the visit and the demonstration of air power by the assembled aircraft, and of machine-gun fire by armoured cars, which were also present, is reported to have been very impressive. The flight, which covered about 300 miles out and home, partly following the course of the Baghdad-Cairo air line, was accomplished successfully on the day of the inspection, by the 15 machines engaged.

The Vickers "Vernon" machines which were used for conveying the official party are twin-engined troop-carrying aeroplanes that have been sent recently to Iraq to augment the air units stationed there, and are destined to take an important part in the garrisoning of this vast territory when it comes entirely under Royal Air Force control.

The machine is capable of carrying a load of nearly two tons, and can accommodate 12 persons, with full military equipment, in addition to the pilots, water, and food supplies.

THE 1,000 H.P. NAPIER AERO ENGINE

Some Additional Particulars

IN our issue of February 23, 1922, we published a brief description of the 1,000 h.p. Napier aero engine, nicknamed the "Cub." We are now able to give a few further particulars, although a very detailed description is not yet permitted by the Air Ministry. The "Cub," it will be remembered, has 16 cylinders, arranged in four banks of four each, somewhat in the formation of a letter X, although the angles between the cylinder banks are not the same at the top as at the bottom. The bore of the cylinders is 6¼ ins., and the stroke 7½ ins. The normal brake horse-power of 1,000 h.p. is developed at a speed of 1,800 r.p.m. The total swept volume of the engine is 3,681·6 cubic ins., and the compression ratio is 5·2 to 1. A spur gearing reduction gear brings the speed of the propeller down to 752 r.p.m., which allows of a large diameter efficient propeller being fitted.

The direction of rotation of the engine is anti-clockwise, viewed from the propeller end, and the propeller revolves in the opposite direction.

It is now permissible to state that the petrol consumption is very good, tests having demonstrated it to be ½ pint per horse-power per hour. At full throttle, therefore, the engine will consume approximately 63 gallons or 430 lbs. of petrol per hour. For a three hours' journey a *bagatelle* of 1,300 lbs. of petrol would have to be carried. Since, however, a machine in which an engine of this power would be installed would carry probably at least 20 passengers, and cover about 400 miles in three hours, the figures for petrol are not nearly as terrifying as they may appear to be at first sight. As a matter of fact, the consumption is, of course, very good, and there is reason to believe that if the necessary number of passengers could be assured, a machine fitted with this engine would be a very good commercial proposition. We hope that before long it may be found possible to instal a "Cub" in a commercial machine. At present the engine is being put into a military machine of extraordinary promise, and it will be interesting to see her behaviour in the air. No reference is, however, permissible at present.

In connection with the problem of starting an engine of this power, it is of interest to mention that the "Cub" is provided with a distributor for a gas starter. As the choice of starters of this type is not a very wide one, it may fairly safely be guessed that this will be a "Bristol." Already this starter has been used successfully on engines of smaller power, and has demonstrated that it is thoroughly sound in principle.

As soon as it becomes permissible to do so we hope to publish a more detailed description of the Napier "Cub."

NOTICES TO AIRMEN

Austria : Conditions Governing Flight

1. In consequence of the admission of Austria into the League of Nations the provisions of the Treaty of St. Germain-en-Laye relating to Allied aircraft flying over Austrian territory are no longer in force.

2. Foreign aircraft flying over or landing on Austrian territory must be provided with a permit issued by the Austrian Ministry of Roads and Communications.

(No. 24 of 1922.)

Institution of Aeronautical Engineers

ON March 22, a party of twenty members with their friends visited the works of the De Havilland Aircraft Co., Ltd., at Stag Lane Aerodrome, Edgware. By the courtesy of the Company, Mr. C. C. Walker showed the party all the details of the numerous machines which were in course of construction. They were especially interested in the new monoplane which is putting up such a good performance in weight carried per horse-power.

In the evening, a Paper was read before the Institute at the Engineers' Club, Coventry Street, by Mr. W. O. Manning, M.I.Ae.E. (Hons). The title of the Paper was "Seaplane Design," and many members took advantage of hearing the Paper, the following taking part in the Discussion: Major Hume, Captain Nicolson, Capt. Sayers, Major Wright and Mr. Evans.

France : Antibes, Le Bourget and Beauvais

PREVIOUS Notices to Airmen relating to France have been amplified and amended in regard to, 1, *Antibes*—Customs Seaplane Station; 2, *Le Bourget*; and 3, *Beauvais*.

(No. 26 of 1922.)

France : Landing Grounds, etc.

CAUTIONS and care notified relating to France in regard to:—1. *Berck-sur-Mer*; 2. *Beauvais*; 3. *St. Quentin*; 4. *Carcassonne*. (No. 28 of 1922.)

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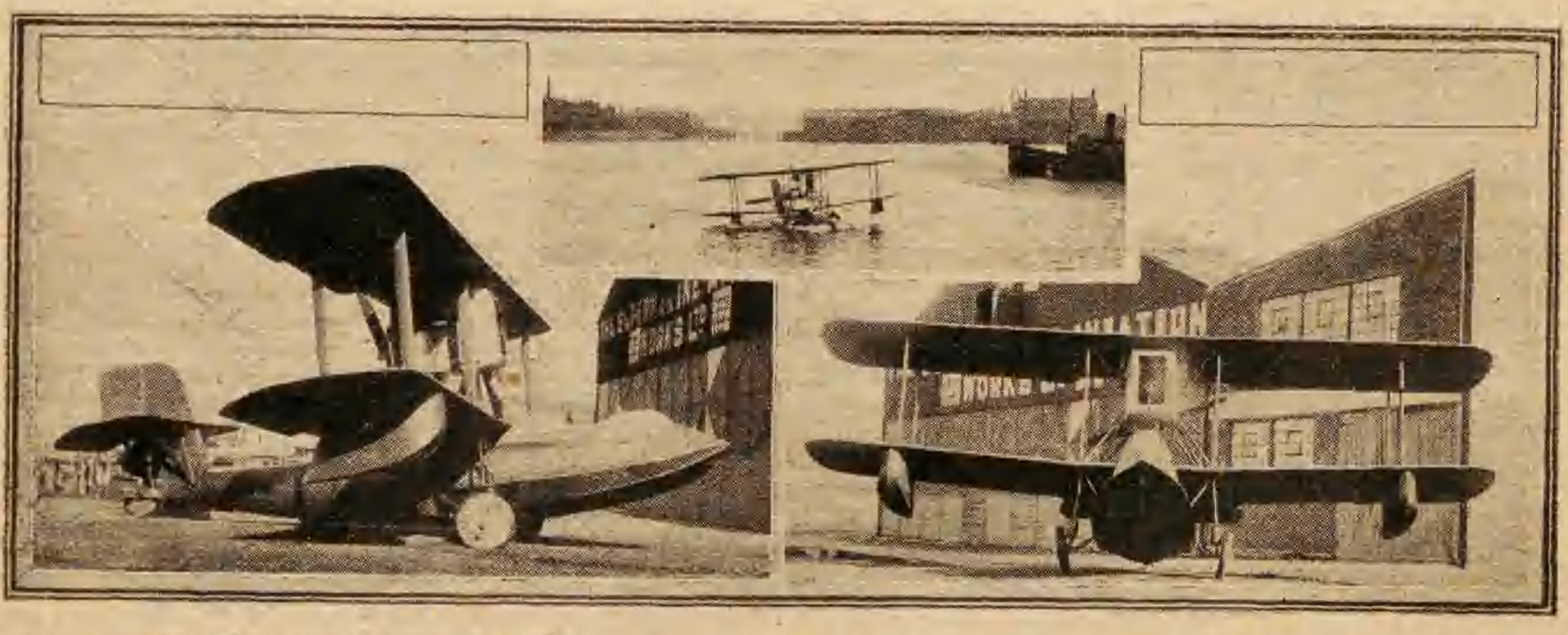
The next Paper, "Aircraft Design," will be read by Mr. H. P. Folland at the Royal Society of Arts, at 8 p.m., on March 31.

Portuguese and Atlantic Flying

FROM Lisbon it is reported that two Portuguese aviators contemplate an aeroplane trip across the Atlantic, from Portugal to Brazil. But as the time for starting was down for March 22–23, we are left wondering.

Our Airships' Doom

CABLE advices from New York, under date March 25, record the appearance in the chief newspapers of the offer by the British Government of the four airships R.33, 36, 37 and 80, with or without aerodromes, hangars and other equipments. Getting the aircraft across the "pond" is all right, but the shipment of the aerodromes arouses our curiosity.



A SUPERMARINE SINGLE-SEATER FIGHTING SCOUT AMPHIBIAN : Three illustrations of the "Sea King, Mark I," fitted with 300 h.p. Hispano-Suiza engine. This machine is capable of all the usual tricks of a land aeroplane, being capable of being looped, rolled, spun, etc.

LONDON TERMINAL AERODROME

Monday, March 27, 1922.

STORMY weather over south-east England and the Channel interfered with the smooth running of the London-Paris Air Service at the beginning of the week. On Monday, the only machine to get through from Paris to Croydon was a D.H. 18 on the Instone service. Mr. Robins, who was piloting this machine, said that it snowed continuously all the way from Lympne to Paddock Wood, and that it was impossible to recognise any of the familiar landmarks. It was only by flying low and "hugging" the railway line that he was able to keep to his course. The inward Handley Page landed at Hawkinge, and the two French machines got down before they reached the Channel. All the machines from Croydon to Paris got through.

On Tuesday, the gale having increased, the service was entirely suspended, the only machine to fly at all being one of the Messageries Spads, which had landed in Northern France the day before, and which managed to fly on to Croydon. The normal air services were resumed on Wednesday, although some of the cross-Channel boats did not venture to leave port.

Saturday reproduced some of the activity of last summer, the aerodrome being alive with cars bringing both passengers and sightseers.

The Instone Air Line now bring their passengers to the aerodrome in a super-motor-char-à-banc. This is equipped as comfortably as a limousine car, but will, of course, seat a greater number of passengers. This car is also used to bring parties of interested people to the aerodrome on a sightseeing tour. The Instone Air Line are of the opinion that the air-station should be one of the popular sights of London, and one which all visitors should come to see just as they visit other places of popular interest. This idea has also occurred to the Lepaerial Travel Bureau, who are commencing a similar scheme of conducted sightseeing parties from London to the air-station. Arrangements are being made, also, to provide short flights for those who wish.

The Value of Air Speed in Business

THE negotiations for the manufacture of Napier "Lion" engines in France are now nearing completion, and Napiers' managing director, Mr. Vane, is at present in Paris in connection with this matter. On Saturday morning he discovered that certain papers which were required at a meeting in Paris that afternoon were still in London. Being familiar with the possibilities of air transport, however, that did not worry him overmuch. Telephoning to Napiers' West-End offices, he asked Mr. F. H. Jones to catch the 12.15 "air-express" and bring the papers over to Paris. Mr. Jones, who did not leave New Burlington Street until 11.30, was in Paris with the required papers shortly after 3 p.m.

Rumour has it that Mr. Michael Collins, the President of the Irish Free State, has been in communication with the British air transport companies with the idea of arranging for an air service to Dublin. It is understood that the Irish Free State are prepared to offer a subsidy, but the terms are not yet known. This air-line would, of course, come under the heading of inland services, and the Air Ministry have already announced their willingness to subsidise a service of this character. Although somewhat off the direct route, it is probable that Manchester would be made a stopping-place, should this scheme materialise.

Mr. Shaw tested the new D.H. 18 for Handley Page Transport on Saturday. The machine is very fast and climbs well. Later in the day Mr. Olley made the necessary six landings, piloting this machine, in order to have it put on his licence.

Mr. Bradley, who was with Aircraft, Transport and Travel and has now joined the Instone Air Line, piloted the Instone D.H.4A to Paris on Sunday.

Mr. MacIntosh made a double trip on the Handley Page company's "Bristol," leaving Paris in the morning and returning on the same machine on the 12.30 service.

The New Daimler Airway

A NUMBER of the Daimler Airway pilots and mechanics put in an appearance on the aerodrome today. Mr. Hinchliffe, who is to be chief pilot, and also aerodrome manager at Paris, was here with Mr. Duke in attendance. This company are due to commence operations next Monday, but there will have to be a tremendous last minute "hustle" if everything is to be ready.

Grands Express have just completed an agreement with the municipal rulers of Lausanne, Switzerland, which gives them a monopoly of air transport to and from that city. They are still running their week-end service from Paris to Lausanne, and there is a possibility that there will be a through one-day connection to London this year.

The Messageries Aériennes are now using their Goliaths to a greater extent on the London-Paris service, although we are still awaiting the advent of one of the Renault-engined Goliaths. On Saturday, their inward Goliath from Paris was compelled to land at Lympne, owing to weather. The passengers proceeded to London by train, and the machine flew up to Croydon the next morning.

The Bulk Storage Fuel Schemes

THE big 7,000 gallon petrol tank that the Anglo-American Oil Company are putting down has now been lowered into its correct hole in the ground, and the pipes are being laid out to the hangars. Digging operations are proceeding for the tank that the British Petroleum Company are installing.

During the week, lighting experts were examining the red Strontium flare on the top of the permanent hangars with a view to improving it, and providing it with a permanent housing. I understand it is as effective as was expected, and that the Air Ministry officials are quite satisfied with it.

Captain Muir, of the Surrey Flying Services, was taking joy-riders for flights during the week-end. He tells me that the firm have a large number of bookings to attend fêtes and fairs during the summer. For May, in fact, they are quite booked up.

The service to Constantinople is to be run this summer. It will be a continuation of the present service from Paris to Warsaw, branching off at Prague. The route will be by way of Vienna, Budapest, Belgrade and Bucharest. It will be opened in stages. The last stage, that from Bucharest to Constantinople, will be opened on July 14. The through fare from London to Constantinople is to be £37 16s., and when the Instone night service is running, it will be possible to reach Constantinople 40 hours after leaving London.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN MARCH 5 AND MARCH 18, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods				
Croydon-Paris	47	94	21	36	45	h. m. 2 58	Bristol G-EAWY (2h. 15m.)	B. (3), Br. (1), D.H. 4 (2), D.H. 18 (2), G. (7), H.P. (2), Sp. (5), V. (1).
Paris-Croydon	49	138	11	42	43	2 48	D.H. 18 G-EAWW (1h. 56m.)	B. (3), Br. (1), D.H. 4 (2), D.H. 18 (2), G. (7), H.P. (1), Sp. (7), V. (1).
Totals for 2 weeks ...	96	232	32	78	88			

Note: One flight (1 pass.) between Croydon-Amsterdam made on 13th.

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ Including certain diverted journeys.

THE AIR ESTIMATES DEBATE

ON March 21, upon the Air Estimates being presented to Parliament, Captain F. E. Guest, Secretary of State for Air, said he first desired to give expression to the satisfaction which had been felt, not only by those in charge of the Department, both Ministers and senior officers, but by the whole Royal Air Force, with the announcement made last week by the Leader of the House in connection with the separate and autonomous existence of the Ministry. Two of the foundations upon which they would rest now and in the future were—(1) that the Air Force must be autonomous in matters of administration and education, and (2) that in the case of defence against air raids the Army and Navy must play a secondary *rôle*. There were two great countries in which this subject was causing a great deal of interest, almost, he might say, consternation, due entirely to the unsatisfactory state of affairs existing in them. In America, he understood that the highest opinion was, at least, divided, and that some of the most influential opinion was very much impressed by the separate organisation in England. In France, where the Government had given a great impetus to aviation, a Commission had reported to the Chamber Committee on Military Affairs that in their opinion aviation would never have its proper influence and take its proper place until it was given complete autonomy and independence. It was quite clear that what we had been doing was being very closely watched, and he would not be surprised if our example was very shortly followed.

Previous to the economies effected under the recommendations of the Geddes Committee, the Air Force consisted of 32½ fighting units. The reductions in service strength which had been effected under those recommendations were the equivalent of two squadrons, and the reductions in their training schools might also be considered to be the equivalent of two more service units. So that they were, in fact, the equivalent of four service units weaker than they were before the Government went into the question of economies. They had still at their disposal 31½ service units, and of these 19½ were abroad, allocated as follows: India, six; Iraq, eight; Egypt, three; Palestine, one; and the Mediterranean, doing naval co-operation work, 1½. There were twelve at home, of which one was doing miscellaneous work—that was the communication squadron at Kenley; one was practically permanently allocated to Army co-operation; three were in reserve; and three would be, under the scheme which he would outline, their first modest contribution for home defence. The work done by the Air Force in different parts of the Empire, such as the North-West Frontier and Somaliland, illustrated the fact that Air Force action was less temporary than Army action, and proved two things—one, that under certain conditions, such as the patrolling and policing of semi-civilised portions of the Empire, the Air Force was quicker in action, cost far less, and, in its power to take life, more humane; and (2) that the effects were certainly not less lasting than those which were obtained by military expeditions.

Emphasising that they had already had evidence of the remarkable effect of aeroplanes in quickly suppressing outbreaks, Captain Guest gave several well-known instances, one being that against Sheik Mahmud, which was settled in a week with eight aeroplanes, as against the use, three years previously, of two brigades operating for two and a-half months in an exactly similar outbreak.

There was another point which the House would appreciate, and it was that in these countries the only way in which military forces could keep tribes in subjection was by placing garrisons in the semi-civilised areas. That was just asking for trouble. It offered the one opportunity that the natives were looking for, and that was something to come and sit round and strike at in the hope of eventually getting some rifles or some loot. They had, he regretted to say, had several detachments cut off in that country, but they proposed in the future, when the transfer took place, to adopt the more modern method of patrolling the country from a distance and of keeping their base well back among friendly tribes, and far out of reach of any marauding bands. In Iraq also an opportunity was afforded of carrying out one of their operational performances which might carry in its train the beginning of civil aviation there, and that was the development of the Trans-Jordania route. During the year they had established that line by air as a communication between Cairo and Baghdad. Both from the operational and the training point of view, this was a great advance. By this means quantities of official and public mails were carried from Cairo to Baghdad. It was used for reinforcements, and it would very shortly be used for the evacuation of troops from Baghdad to Cairo. It enabled them to send to the eight squadrons of Baghdad all their spares, new machines, and impedimenta by this route in two or three days, instead of packing them all in crates and sending them round by the Persian Gulf and taking twenty-four days to do it. The whole of this route was covered in two flights. The total distance was about 900 miles, and the record flying was seven and a-half hours. There was a story of a forced landing in connection with this route which showed that they were rapidly becoming the handy men which their sister Service had claimed to be for so long. Some time ago an aeroplane fell from the formation owing to some kind of casual trouble. It came to the ground somewhere in the desert 500 miles from anywhere. The personnel were picked up by another aeroplane, and the disabled craft was left in the desert. In a few hours by means of transport the necessary spare parts were brought to it by another machine. It was repaired in the middle of the desert, and within three days from the time of the accident the aeroplane had flown away to its original destination.

After referring to what was being done in training the Air Force at Cranwell College, Lincolnshire, and at Halton, Captain Guest said that some new schools had been opened this year for intensive flying training for older officers. The greatest things were hoped from the Staff College at Andover, which was quite a new departure, and was the first of its kind in the world. We were the only nation who would have the advantage of a highly-trained Air Staff, and the Air Force could no more be run efficiently without a trained staff than the Army or the Navy. The problems were just as complicated, just as far-reaching, and quite different. A school of armaments and gunnery was being started at Eastchurch, and for the purposes of night flying an Anti-Aircraft Co-operation School at Biggin Hill had been opened. The method of technical training adopted in the Air Force was on quite new lines. Instead of spending large sums of money in building technical colleges, they were making use of the great civilian universities and colleges.

Reviewing developments in the realm of research during the last twelve months, Captain Guest said their activities had been largely directed to securing greater safety and comfort in travelling by aeroplane. A most important number of instruments for safer navigation of aircraft had been invented and brought into use. Great advance had been made in fire precautions. They had also developed air-cooled engines, which were a great advantage from the point of view of safety. Advance had been made in the direction of silencing engines, and study was now being directed to silencing the propeller. The new types of machines brought out this year were not many, but one was very important, and it was very hard to determine what place exactly the amphibian would play in aerial performances in the future. He was trying to arrange for scientific research to be carried on continuously, chiefly by the scientific bodies outside the Air Ministry, with financial assistance from the Government.

In regard to new responsibilities undertaken by the Air Ministry, he said that acceptance of the command of the forces in Iraq was the first practical experiment in the economical substitution of one arm for another. He could not guarantee success. They might get their set-backs just as other arms of the Crown had, but they thought they could satisfy those who resided in that land that those set-backs would be only temporary, and that they need have no fear that because of this substitution their lives would be in more danger. Referring to the decision of the Cabinet to hand over to the Air Ministry the responsibility for air defence against air attack, Captain Guest said it struck him at once that at night time it would be quite impossible to form a line of demarcation between the land and the sea, and that unless the command were unified, we should have both the Army and the Navy each feeling it incumbent upon them to have its own system of defence against air raids. The only defence against air raids was by fighting in the air. It was no good imagining that surrounding our cities and coasts with batteries of anti-aircraft guns would really serve the purpose required. That was the last line of defence. The first line of defence was carrying the fighting into the enemy's area. That, coupled with air fighting in its highest form, was the only method by which an invasion of that character could be overcome and repelled.

In regard to home defence the Air Ministry were availing themselves of the experience of other countries. Provision for home defence was made on a much larger scale by other countries, but, of course, their conditions in each case varied considerably. The Americans were no guide to us, but they had roughly twenty-seven squadrons within their own areas, although their Service was in its infancy. Italy had made a start, and had something like 400 machines to-day. In Japan there was considerable development, but the biggest development had been in France, which, having had experience of invasion by aircraft, was determined it should not occur again if it could be at all defeated. The Air Force for home defence in France consisted of sixty to seventy squadrons, apart from those available for Army and Navy co-operation, and there were reports of a very largely increased programme. The French squadron was made up of eight aeroplanes for fighting and twelve aeroplanes for bombing. The strength of our squadron was twelve machines (in war, eighteen). In this connection, he thought the article in *The Times* by a distinguished late officer of the Flying Corps was of great interest. Another point of importance was that the Air Force would form a link between the forces that fought on sea and on land. The Army and Navy were dependent for assistance in the air for all future manœuvres, but the Air Service could act perfectly well without either. If it were to break down the barriers which had for so long existed between the Army and Navy, by providing a common meeting ground for the two Forces, it would be a great advantage to those branches of the Service and to the nation as a whole.

There were three recommendations of the Geddes Committee in regard to the Air Force with which the Government disagreed. The first was the total abolition of eight and a-half squadrons at home which were used for Army and Navy co-operation. This, it was said, would effect economies amounting to £2,500,000, though the figures by which the calculation was arrived at were confused. But what was entirely ignored was the fundamental argument that those squadrons were the only reserves from which the officers and men required for the squadrons overseas were to be obtained. The second recommendation of the Geddes Committee, from which the Government differed, was the abolition of the boys' training school. He feared that without the school the skilled men required by the Service could not be obtained. For the technical knowledge needed in the Service fifty-four trades had to be learned. As to Halton expenditure, they were within 20 per cent. of completion of all the buildings, and then the organisation they had wanted ever since the end of the War would be completed. Moreover, they had economised towards that by prolonging the service by two years. The Geddes Committee were wrong in suggesting that the re-conditioning of machines was simply intended to make the machines pretty. On the contrary, it increased the life of a machine from three years to four. He recognised that this had a disadvantage. If there were no new orders for machines, the civil industry would collapse.

Captain Guest having dealt generally with the figures in the Votes themselves, said the exact economy effected in the Estimates under the recommendations of the Geddes Committee was £6,500,000. Half a million of that was a reduction in war liabilities, and therefore they could not claim more than £6,000,000, or 37 per cent. of their original estimated expenditure. He wished to take that opportunity of informing those outside that the Air Ministry would in future grant no more commissions than they could guarantee careers for. They had also decided to make a further experiment with non-commissioned pilots by recommendation and selections from men under twenty-five and not above the rank of Sergeant, or below that of leading Aircraftsman.

Proceeding to outline a new scheme of internal organisation at the Air Ministry, he said that up to the present the Service side has been represented on the Air Council by one member only, the Chief of the Air Staff. Now he proposed to place the Council more on a footing with the Board of Admiralty and the Army Council, and to broaden the basis of responsibility. The Chief of the Air Staff would continue to be senior member of the Council, and would have control of the Operations, Intelligence, Training and Works Department, but he would be relieved of all duties connected with discipline, personnel, organisation, equipment, and transportation. The Director-General of Supply and Research and the Director-General of Personnel would share those duties. Dealing with the Civil Aviation Vote of £350,000, he said £200,000 of it was taken up with subsidies and £80,000 by meteorology. As it would take a considerable time to bring this Department into conformity with the reduced scale of the other Departments, he had invited Sir Frederick Sykes, whose appointment as Director-General would normally terminate on April 1, to retain his post for a further period of one year. The contraction of civil aviation was in no way the fault of the Department over which Sir F. Sykes presided. It was the difficulties of the times in which they lived that were responsible. It might be that in time to come this side of their work would expand.

With regard to the position of the airships, he said that the Government had reluctantly come to the decision to hand over the entire fleet to the Disposals Board. On the subject of the cross-Channel services, he said that he was very much in favour of maintaining them, as they acted as a demonstration and an advertisement of what was now possible. He also regarded them as the initial stages in the future development of schemes of Imperial communication. We had, as an Empire, a much more vital interest in civil aviation than any other country. It was the definite policy of the Ministry steadily to develop the further links in the Imperial chain, and as soon as the various stages were safely opened to hand them over to civil aviation to be developed on commercial lines.

It was his duty to look beyond the horizon and to the probable future, and when one considered the rapid advances during the last ten years it was impossible not to indulge in some flight of imagination. Two hundred miles an hour was now a normal rate, and 560 miles' continuous flight an ordinary performance. With the exception of fog, weather was now a negligible consideration. From the point of view of national defence, he held that the force was now powerful enough to defend our shores against invasion from the air. It was his belief that in the next few years powerful aircraft would progressively expand in areas in which enemy ships could not move with impunity. This would bring about further economies in ships of war. The possibilities of the bomb dropped from above were so far only partially explored; but it had been shown that they were terrible. One bomb dropped from the air could destroy the most powerful battleship in a few minutes. In ten years' time he believed that a combat between the forces of the air and the forces of the sea would have become a grotesque and pathetically one-sided affair. In the field of transportation he could see aeroplanes conveying small portions of artillery to the lines of operation, so dispensing with vulnerable lines of communication. When the finances of the nation justified the capital expenditure, such expenditure would give a substantial return in the decrease of blood and treasure in the minor wars in which an Empire like ours was constantly engaged.

The Air Force was a wondrous creation. It was a service of young men, enthusiastic men, led and inspired by an incomparable chief. It was this service which would eventually have to meet the first clash of war should it ever come again. The battle in the air would be joined before the Army reservist had reached the station or the battleship had got up steam. That was the duty of the Air Force, and it was with this forecast that he confidently submitted the Estimates to the House.

Major-General Seely congratulated the Air Minister on his lucid statement, and also on the result of the careful enquiry made by the Committee of Imperial Defence, which had definitely disposed of attacks made upon the establishment of a separate Air Ministry and a separate Air Force. He rejoiced also at the decision that the education of the airman was to be altogether distinct from that of men of other forces. He pleaded with the Secretary of State to try to prevent the standardisation of manuals, and not to let his manuals increase too fast. Let him keep the education of the Royal Air Force what it really should be—a thing constantly seeking new methods and new ideas. He urged that the Secretary of State should have a seat in the Cabinet, with the First Lord of the Admiralty and the War Minister. This should be the rule—all three should be in the Cabinet or none should be in the Cabinet. He regarded it as a very serious thing to give up all practical research into airships while other nations were carrying on researches, and he could not believe that it was wise completely to abandon experiments in this matter. So far as economy was concerned, he thought they had probably gone quite as far as it was safe to go.

He had been furnished with some remarkable figures as to what the French were doing. His figures differed very slightly from those of the Secretary of State, and only in one particular from those given by General Groves in *The Times*. At the end of last year the French had 126 squadrons of eight or nine machines each, and of these only four-nineteenths were abroad. If their present programme was carried out, the French Government would have 220 squadrons, of which from 165 to 170 would be at home, in order to maintain the integrity of their country. The Air Minister told them that for this specific purpose he had three units. No one had ever seen what an air attack would be like. We were going to have air attacks in 1919, and as he was partly responsible for preparing them, he knew that the facts and figures given by General Groves were perfectly accurate. Nobody ever attempted to bomb a place with more than fifty aeroplanes during the War, but it would be quite easy, and no doubt would be done if ever they went to war, to bombard with 300 aeroplanes, which would carry, not the little bombs that were carried by the thirty-six aeroplanes that raided London, but bombs at least ten times that weight and at least four or five time the effective power per weight of projectile dropped. It was hopeless to attempt to protect yourself against raids with 300 aeroplanes. It took 32,000 men to protect London against the raids of thirty-six machines, and then they only made it more difficult for them. He urged that in order to meet the new kind of danger in future we must have the most highly skilled staff and men, and we must have the power of expansion. We had a very much larger proportion of skilled pilots than any other country, and he believed that in technical training we were as great as, if not greater than, any other country. But in power of expansion we were ridiculously short, as compared with other nations. We should, therefore, so encourage civil aviation as to have a reserve by which in an emergency our machines could be greatly increased.

Lieut.-Colonel Moore-Brabazon said that for over a hundred years the Navy had been the spoiled darling of the nation. But it was for one reason only, and that was that they could defend us. But a vast change had taken place. If the Channel were dried up, could the Navy defend us? Something tantamount to that had occurred when the air became an avenue of attack. Consequently the Navy could no longer be responsible for the defence of the country. He had heard it said that the Navy alone could protect the commerce of the country on the high seas. During the War the Navy was unable to do that without the assistance of air power. In these circumstances, was it not logical to put a Service which could not do a thing under a Service which could? Surely, people realised now that the Navy today was obsolescent. The poor Air Force was attacked from every side, but that force did know that they were a power for economy. We had a certain amount of money to spend on defence, and we must use it to the best advantage. From the point of view of defence, the Air Force must take first place. And yet, while £130,000,000 was allotted to the Army and Navy, only £10,000,000 was allotted to our first line of defence.

Sir W. Joynson-Hicks said the next war would be a war in which women and children would be bound to suffer as much as men, and would probably break out without the possibility of our knowing twenty-four hours beforehand. We were as vulnerable from the air as France was, and it was ridiculous to say we were prepared for the future with half a dozen Service squadrons at our disposal. He asked whether any arrangement had been made with regard to the new kingdom of Egypt for our hold upon Egypt as an air centre. He was one of those who believed that the air was destined in the future very largely to supersede both the Navy and the Army. Knowing all that the Air Service did during the War, knowing what those of them who believed in the Air had prophesied, he wanted the House to approach the question from the point of view that the Air in the next few years was going to be the paramount Service, and was not going to be looked upon merely as an auxiliary. The question would be, how much money it was desirable to transfer from the Navy and the Army to the Service which would gradually take the place of these two great Services.

Field-Marshal Sir H. Wilson said soldiers and sailors were as fully alive to the coming powers of the air as anybody in the Air Force. It was because they wanted to have all the power possible from the air that they disliked an independent Air Force, and not because they disparaged the air. That it was absolutely essential to guarantee a supply of air machines, and even of personnel, as between the Navy and the Army was certain; but he challenged the contention that because they did that they must go another step, and have an Air Force independent of the Navy or the Army. So far as he knew, we were the only country that had decided to have an independent Air Force. What was happening now was that in order to become autonomous the Air Force was duplicating practically every service in the Army and the Navy, at a time when we were very hard up.

He did not quite understand the decision—that the Air should take over anti-air defence at home. Here we were duplicating a complete little service; for it was quite certain that in any future theatre of operations there would have to be anti-aircraft. We were spending very little money on, and getting very little from, civil aviation. If a big war came, the Air Force would require an enormous expansion. He therefore pleaded strongly for a big sum of money to be devoted to civil aviation, on which we should have to depend for such expansion.

Lord H. Cecil said that no discipline and management of the Air Force was possible unless that Force was independent, and he hoped that the Government would not fritter away their wise decision to maintain a separate Air Force by, under the name of co-operation, conceding any control of discipline, promotion, or training either to the Navy or to the Army. As to home defence, there was no advantage in having only three squadrons. Either they must compete with Continental nations, or they must make no attempt whatever. The arguments used filled him with the conviction that the whole thing was impossible. An air struggle between two European Great Powers could only result in the total destruction of both.

Colonel Wedgwood said the debate was highly valuable. What we had to do now was to instil into the minds of the Admirality and War Office some conception of the power and capacity of the new arm. Most people must now see that the Navy was not our first line of defence, but rather the Air Force.

A discussion then followed upon an amendment put forward by Lieut.-Col. W. Guinness to the following effect: "In the opinion of this House, to enable the best use to be made of the Air Service, all defence forces should be represented on and their activities co-ordinated by the Committee of Imperial Defence, which should meet regularly and frequently; and that a Minister, who is not departmentally responsible for any of the fighting Services should be appointed as permanent Vice-Chairman of the Committee, to take the Chair in the absence of the Prime Minister."

Mr. Churchill ultimately replied to the whole discussion by saying the question of first importance raised by the debate was, "Ought there to be a separate Air Service?" But, surely, for the time being, at any rate, there was in existence a separate Air Service established by Act of Parliament. It was born in the convulsions of the Great War. The only question now was whether we should go back on our experiences derived from the War and repeal the Act setting up the Air Ministry. The developments which were in progress in the War were, owing to our having run short of Germans, never reached. Had it been continued another year, or a year and a-half, people would have seen an entirely new consideration brought into the whole struggle. Military science as it was at the close of the struggle must be our starting point for the future. A separate Air Force existed by Act of Parliament, and extraordinarily strong arguments would have to be adduced by those who wished to make a change. We must be sure that in the great developments which were taking place we had leadership in all forms of aerial war from a defensive point of view. The greatest form of defence would undoubtedly be offence. Did the House think the Air Service would get its chance if it were separated into two parts—one handed over to the Navy and the other to the Army. The whole prejudices of the higher officers of the Army and Navy must lead them to depreciate the possibilities of this new and subversive element. As to the relations of the Air Force and the Navy, he felt that it was the business of the Air Force to cater for the Navy, just as it catered for the Colonial Office. They knew how easily the relations of the Army with the Air Force in France were adjusted in the course of the War. But the Navy was more specialised in some ways, and it would be a great mistake for the Air Ministry not to put the Admiralty at their ease in this matter. A Committee had been set up to examine the question, and he believed that they would be able to come to an agreement.

The point was not the division of the responsibility as if it were booty to be shared, but the harmonious association of the three Services in the discharge of a common duty. There was no final solution of a harmonious kind of these difficulties except in a Ministry of Defence. But they could not possibly achieve that at the present time. The practical steps which it was open to them to take were being taken. The creation of the brain of a common service was to be the subject of an enquiry by a sub-committee of the Committee of Imperial Defence. A system of training which would unite officers of middle rank in the three Services ought not to be delayed, and the sub-committee was being set up with directions to formulate such a scheme. He thought that was all it was wise and practicable for them to do this year.

The amendment was then withdrawn.

PERSONALS

Married

Capt. CHARLES STEWART TOUZEAU LAVERS, D.F.C., elder son of Mr. and Mrs. C. H. Lavers, Clarence Road, St. Albans, was married on March 15, at The Abbey, St. Albans, to ELSIE, younger daughter of Mr. and Mrs. A. H. SMITH, "Norland," Woodstock Road, St. Albans.

To be Married

The engagement is announced between M. PHILIP E. HARRISSON, late the Buffs. and R.A.F., eldest son of Major A. H. P. Harrisson, late the King's Regiment, and Mrs. Harrisson, of Greenhill Farm, Farnham, Surrey, and NESTA, only daughter of Mr. and Mrs. F. P. NEVE, of Johannesburg, South Africa.

A marriage has been arranged, and will take place at the Parish Church of Lochbroom on June 7, between Sqdn.-Ldr. H. A. HEWAT, R.A.F., M.S., younger son of the late R. G. Hewat and of Mrs. Hewat, 2, North Charlotte Street, Edinburgh, and ISOBEL MARGARET, elder daughter of Lieut.-Col. J. W. FRASER, C.M.G., and Mrs. FRASER, of Leckmelm, Garve, Ross-shire.

ROYAL AERONAUTICAL SOCIETY NOTICES

Lectures.—The remaining lectures of the present session are as follows: March 30, Capt. G. de Havilland on "The Design of a Commercial Aeroplane"; on April 6, at 5.30 p.m., M. Louis Breguet will read a paper on "Aerodynamical Efficiency and the Reduction of Air Transport Costs."

Election of Members.—The following Members were elected at a meeting of the Council held on March 21:—

Associate Fellow.—Squad.-Ldr. J. Sowrey, A.F.C.

Students.—G. F. Law, A. E. Woodward Nutt, A. D. Patwardham, E. J. D. Townesend, T. E. Waldeck.

Member.—Capt. S. H. Starey.

Foreign Members.—Lieut.-Cmdr. R. Arisaka, I.J.N., Capt. D. Tiselius, R.S.N.

Associate Fellowship Examination.—The Council have decided, as a result of representation which has been made to them, to hold the examination for Associate Fellowship in September next, instead of in April this year, as it has been found that this would be more convenient for the majority of Students who desire to sit for the examination, owing to their studies having been delayed by the War. Intending applicants should forward their names to the Secretary not later than July 31.

W. LOCKWOOD MARSH,
Secretary

CELLON DEVELOPMENTS

"Cerric" Productions

"DOPED with Cellon" has become what one might call a standard aeronautical term, meaning, in simple language, that the fabric, or whatever it is, has received a special treatment whereby it is rendered fit to carry out its functions. Our readers, however, are thoroughly conversant with the nature of doping fabrics, etc., and with the high qualities of Cellon, but we venture to state that few realise the enormous amount of research and laboratory work entailed in the production of an efficient dope, such as Cellon. The manufacturers of the latter dope, "Cellon (Richmond), Ltd.," have during the past dozen years or so carried out a considerable amount of research in the matter of the various cellulose constituents suitable for use as aeroplane dopes.

As a result, not only were they able to produce a full range of highly efficient dopes suitable for all conditions, but the extensive knowledge obtained of the properties of the cellulose and other components involved has opened up a new and remarkably wide field for their application other than for aeroplanes dopes. Although not connected directly with aviation, a brief reference to this new "side line" of Cellon's will, we think, interest many of our readers. It consists, metaphorically speaking, of various processes for "doping" innumerable articles of everyday use and so preserving their surface, or giving them an artistic finish.

The "dope" employed is not the same as the aeroplane dope, but varies according to the particular use to which it is being put. In each case, however, cellulose forms the base one way or another, and a thin hard film—polished or matt—covers the surface of the article treated. The variety of articles that can be treated—and the variety in character of the treatment—with "Cerric" productions, as they are called, is really astonishing, as may be gathered from the following examples:—

"Cerric" Enamels: These are applicable wherever a matt or highly-finished glossy surface is required, as for fancy boxes, tins, baskets and other fancy articles, table tops, trays, ornaments, etc. The enamels are made in all colours, and are easily and quickly applied either by spray, brush or dipping; they dry—very rapidly—with an "egg-shell" finish, a glossy surface being obtained by buffing or by a final coat of "Cerric" varnish. "Cerric" enamels are not affected by hot articles standing on them, nor by spirits, water, petrol or oil. We have seen several examples of ordinary, unglazed clay pottery, treated with "Cerric" in a variety of colours, glazed and matt, and it must be admitted that the finish and artistic effect were equal to any high-class fire-glazed pottery; clay pottery so treated is water-proof.

"Cerric" White Enamel, or "Porcelac," gives a porcelain-like surface to the articles to which it is applied, and being antiseptic and washable is specially suitable for surgical fittings, sanitary, and hospital furniture, or bath-room, etc., fittings. "Cerric Black Enamels give "Dead Matt," "Matt," "Semi-Matt," or "Glossy" finishes, and do not require stoving, and do not chip or crack. These enamels are suitable for motor accessories, lamps, instruments, and woodwork.

"Cerric" Lacquers greatly facilitate all forms of lacquer work, they are colourless, and may be applied by spray, brush or dipping to any metal article without affecting its colour. Coloured lacquers in all standard shades of gold, or any special colour, are also produced.

French Polishing is an exceedingly tedious process, requiring also no small amount of skill for the best results. By the use of "Cerric" Wood Solutions exactly similar effects may be given to wood surfaces by spraying, instead of the usual lengthy operations obtaining in French Polishing, but with this advantage: they withstand the action of spirit, water, petrol, etc., and are not effected by the contact with hot articles. They are transparent, the wood being treated with "Cerric" wood filler, and then stained the desired shade, before the application of the solution.

Bronzing—for picture frames, mouldings, mounts, furniture, fancy goods, etc.—may also be done by means of the "Cerric" Bronzing Medium, which gives a beautiful finish that does not crack or chip and prevents tarnishing and rusting. A metallic powder of any desired shade is mixed with "Cerric" Medium and applied to the article by spray—or special Medium can be supplied for applying by brush or by rollers.

Other "Cerric" products consist of Leather Solutions in black and all colours (the leather does not lose its flexibility by the use of these solutions); Artificial Leather Solutions for leather cloth and leatherette paper, in all colours, waterproof and flexible; Wall Paper Solutions, Matt or Glossy, also waterproof; transparent colours for electric lamp bulbs, etc.; and "Cerric" Paper Varnishes, for show cards, posters, etc.

Thus, our readers will see that the uses to which these various "Cerric" products—originating from the "Cellon" Aeroplane Dopes—can be put are many, and their advantages over existing methods very considerable in several cases.

THE ROYAL AIR FORCE

London Gazette, March 21, 1922

General Duties Branch

Flying Offr. E. D. H. Davies is granted a permanent commn., retaining his present substantive rank and seny. ; Sept. 16, 1919. *Gazette*, Sept. 16, 1919, appointing him to a short service commn. is cancelled. Flight Cdt. G. C. Shepherd, having successfully passed out of the R.A.F. (Cadet) College, is granted a permanent commn. as a Pilot Offr. ; Feb. 27. C. V. A. Bucknall, late Lt., the Inniskilling Drgns., is granted a short service commn. as a Flying Offr., retaining his original seny. in the R.A.F. ; March 7. W. A. Chase is granted a short service commn. as a Flying Offr. with effect from and with seny. of March 7. Flying Offr. L. H. I. Bell is placed on Retired List on account of ill-health ; March 22. Flying Offr. E. S. Robins resigns his permanent commn. and is permitted to retain rank of Lt. ; March 22. Flight Lt. B. C. Meates is transferred to Reserve, Class A ; March 22.

Medical Service

J. C. T. Fiddes, M.B., is granted a short service commn. as a Flight Lt., with effect from and with seny. of March 6. Squadron Ldr. R. I. Roe, O.B.E., M.B., relinquishes his short service commn. on account of ill-health, and is permitted to retain rank of Maj. ; March 22.

Stores Branch

The follg. are granted short service commns. as Flying Offrs., with effect from, and with seny. of, Feb. 25 :—S. A. Martindale, C. W. Rugg, C. N. Scott.

The follg. are granted short service commns. for Accountant duties as Flying Offrs. on probation ; Feb. 20 :—J. Baines, J. J. Caiger, F. C. Chalmers, W. E. Ennis, W. E. Fisher, M.C., A. W. Gray, R. W. Leamon, W. E. V. Richards, R. G. D. Thomas, A. E. Vautier, M.C.

NOTE.—The seny. of offrs. granted commns. in the Stores Branch for Accountant duties is provisional only. The final seny. list of all such offrs. will be promulgated when establishment is completed.

Memoranda

Capt. R. H. Moore relinquishes his tempy. commn. on ceasing to be employed, and is permitted to retain his rank ; Feb. 15.

The permission granted to Lt. G. G. Moore to retain his rank is withdrawn on his joining the T.A.

London Gazette, March 24, 1922

General Purposes Branch

The follg. are placed on half pay, Scale B.—Flight Lieut. H. G. Bowen ; March 18. Flying Offr. B. Ankers, D.C.M. ; March 13.

Stores Branch

The date of transfer to the Stores Branch of Flight Lieut. D. W. Wilson is Jan. 13, 1921, and not June 17, 1920, as *Gazette*, May 24, 1921. Fligth Lieut. H. V. Jerrard is restored to full pay from half pay ; March 20.

Memorandum

Sec. Lieut. R. C. Taylor relinquishes his temp. commn. on ceasing to be empld., and is permitted to retain his rank ; March 21, 1919.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

Group Captain U. J. D. Bourke, C.M.G., from Half Pay List to Command Inland Area Aircraft Depôt (Inland Area). 10.4.22.

Wing Commander J. G. Halahan, C.B.E., A.F.C., to Command R.A.F. School (India). 9.2.22.

Squadron Leaders.—A. C. Winter, O.B.E., from No. 24 Squadron (Inland Area) to No. 4 Flying Training School (Middle East Area). 10.3.22. M. G. B. Copeman from Armament and Gunnery School (Cadre) (Inland Area) to Headquarters (Middle East Area) (Supernumerary). To command No. 2 Armoured Car Co. (on formation). 10.3.22. B. P. Henry de Roeper, A.F.C., from School of Photography (Inland Area) to No. 1 Flying Training School (Inland Area). 20.3.22. H. E. Bell, M.B., from Headquarters No. 11 (Irish) Wing to Headquarters, R.A.F., Ireland. 17.2.22. J. T. Whittaker, M.C., from R.A.F. Depôt (Inland Area) to Command No. 28 Squadron (India). 7.3.22. H. E. M. Watkins, A.F.C., from Seaplane Training School (Coastal Area) to Headquarters, Iraq Group (Supernumerary). To command R.A.F. Rest Camp (on formation). 7.3.22. F. C. Williams, O.B.E., from No. 4 Stores Depôt to Headquarters, Iraq Group (Supernumerary). 7.3.22. W. Millett, from Headquarters, Inland Area, to Headquarters, Iraq Group (Supernumerary). 7.3.22. C. S. Wynne-Eyton, D.S.O., from Headquarters, No. 11 (Irish) Wing, to Headquarters, R.A.F., Ireland. 17.2.22.

Flight Lieutenants.—P. C. Livingstone, D.P.H., from No. 28 Squadron (India) to No. 20 Squadron (India). 16.10.21. H. Carmichael Irwin, A.F.C., from R.A.F. Airship Base (Coastal Area) to Headquarters (Coastal Area) (Supernumerary). 24.2.22 ; and to R.A.F. Base, Leuchars, 15.3.22. W. A. Kingston, from R.A.F. Airship Base (Coastal Area) to Headquarters (Coastal Area). (Supernumerary.) Pending closing down of R.A.F. Airship Base. 24.2.22. S. Nixon, O.B.E., from R.A.F. Airship Base (Coastal Area) to Headquarters (Coastal Area). (Supernumerary.) To remain attached to Pulham Airship Station. 24.2.22. J. E. M. Atherley, from R.A.F. Depôt (Inland Area) to Armament and Gunnery School (Cadre) (Inland Area). 24.3.22. H. V. Drew, A.F.C., from R.A.F. Airship Base (Coastal Area) to No. 10 Group Headquarters (Coastal Area). 15.3.22. L. Whitworth, A.F.C., from R.A.F. Airship Base (Coastal Area) to R.A.F. Depôt (Inland Area). 15.3.22. C. H. N. Nunn, from R.A.F. Depôt (Inland Area) to Armament and Gunnery School (Inland Area). 1.4.22. J. F. Roche, from Instrument Design Establishment (Inland Area) to Experimental Section, Royal Aircraft Establishment (Inland Area). 1.4.22. J. C. Thomas Fiddes, M.B., to Research Laboratory and Medical Officers' School of Instruction (Inland Area). On appointment to Short Service Commission. 6.3.22. R. M. King, from R.A.F. Depôt (Inland Area) to No. 207 Squadron (Inland Area). 16.3.22. C. B. Cooke, from Inland Area Aircraft Depôt (Inland Area) to Aircraft Depôt (India). 7.3.22. A. P. V. Daly, from School of Technical Training (Men) (Inland Area) to No. 60 Squadron (India). 7.3.22. A. T. Williams, from Boys' Wing (Cranwell) to Headquarters, Iraq Group (Supernumerary). 7.3.22. J. Leacroft, M.C., from R.A.F. Cadet College (Flying Wing) (Cranwell) to Headquarters, Iraq Group (Supernumerary). 7.3.22. E. L. Ardley, from No. 27 Squadron (India) to No. 1 Wing Headquarters (India). 20.2.22. J. A. Slater, M.C., D.F.C., from No. 5 Flying Training School (Inland Area) to No. 4 Flying Training School (Middle East Area). 8.3.22. F. M. Rope, from Aeroplane Experimental Establishment (Coastal Area) to Headquarters, Iraq Group. 7.3.22. W. R. Cox, M.C., A.F.C., from R.A.F. Cadet College (Flying Wing) (Cranwell) to Headquarters, Iraq Group. 7.3.22. C. F. Horsley, M.C., from No. 24 Squadron (Inland Area) to Headquarters, Iraq Group. 7.3.22. H. B. Russell, A.F.C., from No. 39 Squadron (Inland Area) to Headquarters, Iraq Group. 7.3.22. H. E. P. Wigglesworth, D.S.C., from R.A.F. Depôt (Inland Area) to Inland Area Aircraft Depôt (Inland Area). 20.3.22. H. J. Roach, A.F.C., from R.A.F. Depôt (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). 20.3.22. H. G. Bowen from R.A.F. Depôt (Inland Area) to Half-pay List. Pending embarkation overseas. 18.3.22. H. V. Jerrard, from Half-Pay List to R.A.F. Depôt (Inland Area) (Supernumerary). 20.3.22. J. C. T. Fiddes, M.B., from Research Laboratory and Medical Officers School of Instruction (Inland Area) to R.A.F. Depôt (Inland Area). 20.3.22. N. S. Douglas from Egyptian Group Headquarters (Middle East Area) to No. 56 Squadron (Middle East Area). 19.2.22. L. Wanless-O'Gowan, from Staff of Military Attaché, Tokio, to R.A.F. Depôt (Inland Area) (Supernumerary). 17.1.22.

IN PARLIAMENT

Air Attachés

MR. RAPER asked whether France has decided to withdraw her Air Attachés ?

Captain Guest : I am not aware of any general withdrawal by France of her Air Attachés, but their number has been recently reduced from seven to four.

Mr. Raper : Is it not a fact that France has withdrawn her Air Attachés, and, if that is so, will he then agree to withdraw our Air Attachés ?

Captain Guest : No. The facts do not bear out the suggestion of the hon. Member. The number reduced by the French Government is from seven to four, but one in London still remains.

Halton Air Station

MR. RENDALL on March 20 asked the Secretary of State for Air whether all the land and premises owned by the Government at Halton, Dorset, are now occupied by the Air Ministry ; if not, in whose hands the remainder is ; for what purposes the Air Ministry is using the Halton property ; and how many airmen, mechanics and cadets he intends shall be stationed at Halton when the buildings now in progress are completed ?

Capt. Guest : The answer to the first and second questions is, about 60 per cent. of the original land and premises, the remainder being either sold or about to be sold by the Disposal and Liquidation Commission ; to the third, as a training station for mechanics and also as a hospital serving a group of stations ; to the fourth, about 3,000.

PUBLICATIONS RECEIVED

Acoustics of Moving Sources with Application to Airscrews. By Prof. G. H. Bevan, F.R.S. Aeronautical Research Committee Reports and Memoranda, No. 684. August, 1920. London : H.M. Stationery Office. Price 6*d.* net (post free 7*d.*).

Experiments on Rigid Airship "R.29." By J. R. Pannell and A. H. Bell. Aeronautical Research Committee Reports and Memoranda, No. 675. January, 1920. London : H.M. Stationery Office. Price 1*s.* 6*d.* net (post free 1*s.* 7½*d.*).

Technical Note No. 84. *New Data on the Laws of Fluid Resistance.* By C. Wieselsberger. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 86. *Surface Area Coefficients for Airship Envelopes.* By W. S. Diehl. National Advisory Committee for Aeronautics, Navy Buildings, Washington, D.C., U.S.A.

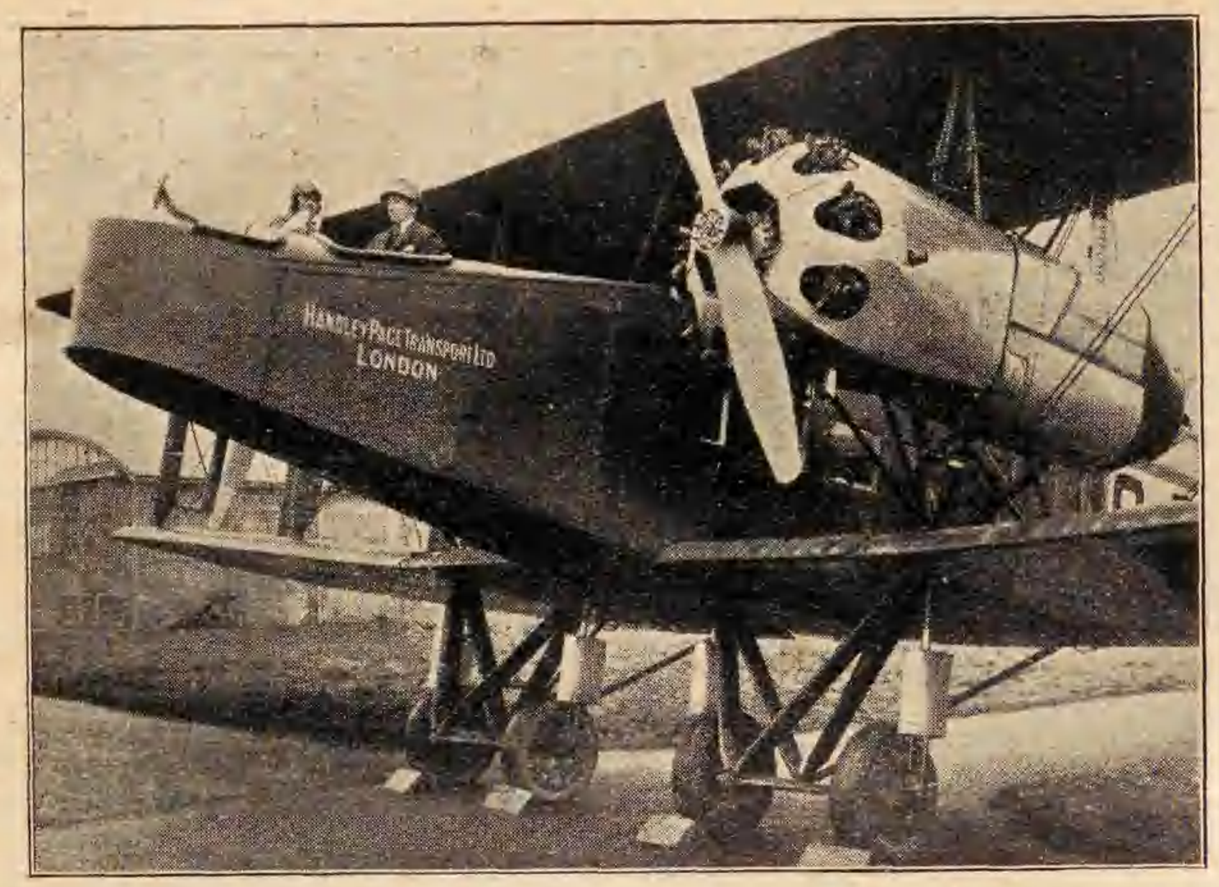
Technical Note No. 89. *The Choice of the Speed of an Airship.* By Max M. Munk. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 113. *Tests on Air Propellers in Yaw.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 123. *Simplified Theory of the Magneto.* National Advisory Committee for Aeronautics, Navy Buildings, Washington, D.C., U.S.A.

Report No. 139. *Influence of Model Surface and Air Flow Texture on Resistance of Aerodynamic Bodies.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report of the Commercial, Industrial and Economic Situation of Italy in December, 1921. By J. H. Henderson, O.B.E. Department of Overseas Trade. London : H.M. Stationery Office. Price 1*s.* 9*d.* net.



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(Continued from p. xiv.)

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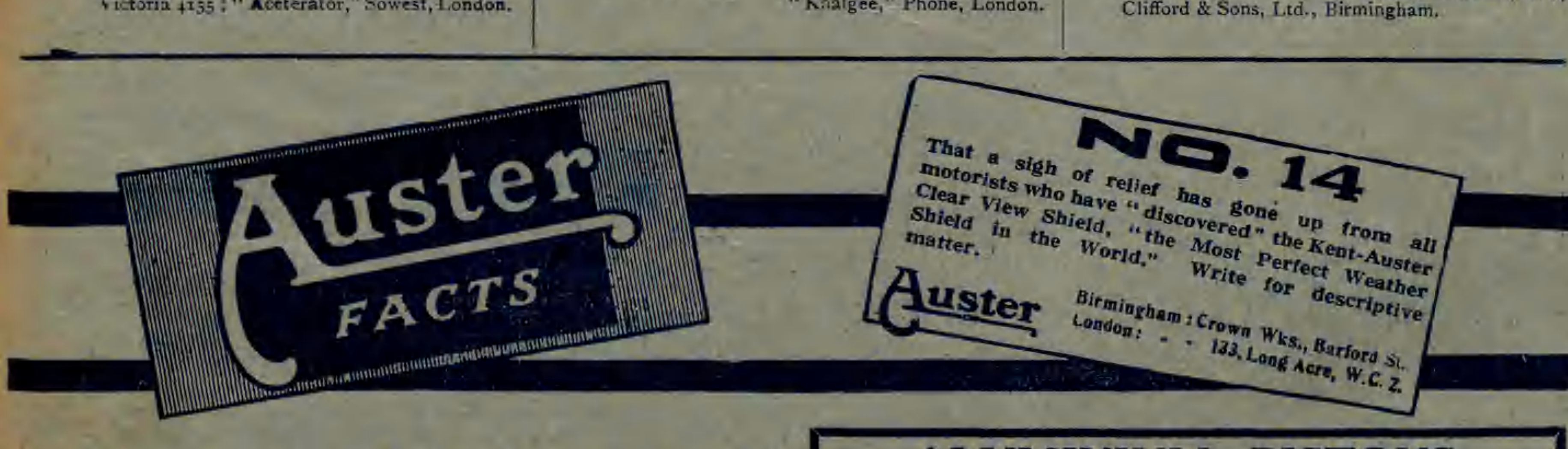

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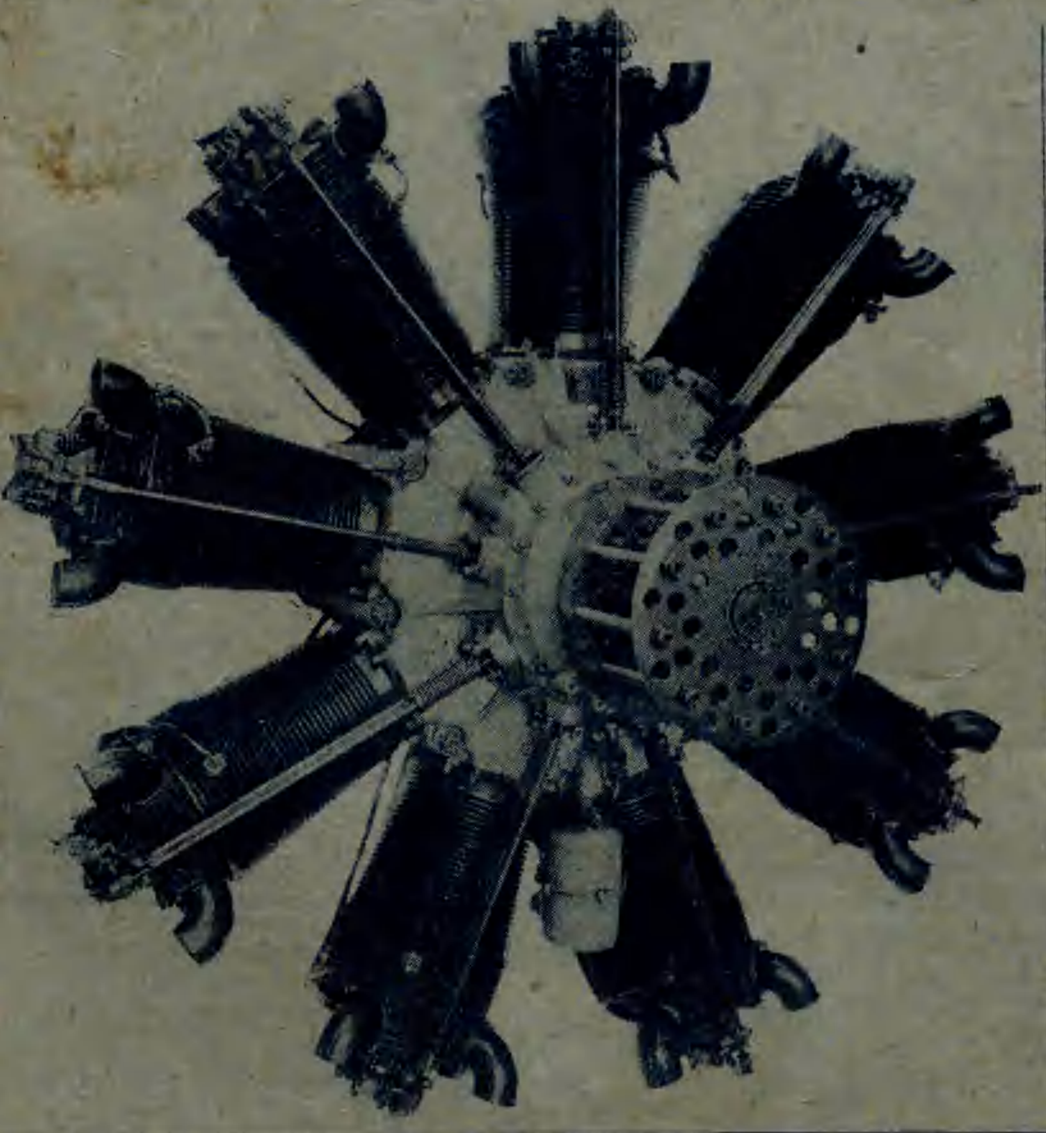

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
April 6	Lecture, "Aerodynamical Efficiency," by M. Louis Breguet, before R.Ae.S.
April 7	Lecture, "Some Outstanding Problems in Aeronautics," by Professor L. Bairstow, before Students' Section, R.Ae.S.
April 17	R.Ae.C. Race Meeting, at Waddon
April 17–19	Seaplane Contest, Marseilles
June 1	Entries close for Schneider Cup Race
June 5	R.Ae.C. Easter Race Meeting, at Waddon
June 23–25	International Competition for Touring Aeroplanes, Brussels
July 6–20	French Gliding Competition
Aug. 6	Gordon-Bennett Balloon Race, Geneva
Aug. 7	R.Ae.C. Race Meeting, at Waddon
Aug. (last fortnight)	Schneider Cup Seaplane Race, at Naples
Sept.	Tyrrhenian Cup, Italy
Sept.	Italian Grand Prix
Sept. or Oct.	R.Ae.C. Race Meeting, at Waddon
Sept. 22 ...	Coupe Deutsche (300 kil.)
1923.	
Dec. 1	Entries Close for French Aero Engine Competition
1924.	
Mar. 1	French Aero Engine Competition.

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT

FOLLOWING as it did so closely upon the announcement of the handing over to the Disposals Board of all airships and airship material, the news of the very serious attempt to form a company for the carrying out of an airship mail and passenger service to India and Australia probably came as a surprise to most people. It was generally thought that, what with South Africa and then India turning down the airship proposition, the whole question was deferred till better times. The new scheme, having the backing of such very solid and influential firms as Vickers and the Shell motor spirit group, is a welcome sign of faith in the future of the airship.

The New Airship Scheme

With reference to the scheme, which is briefly indicated elsewhere in this issue, this calls for a total capital of £4,000,000, which is not by any means an unduly large amount wherewith to start a service to the other side of the world. It will be noticed that no capital outlay is asked for from the Government, but merely a contingent liability, in the form of a guarantee of interest, of £91,000 per annum until such time as the undertaking is able to pay the interest itself. This period is estimated by experts at four to five years. It is proposed that India and Australia should undertake a similar guarantee of interest, but only to the extent of £40,000 each, or amounts which are thought to correspond with the benefits to be derived from the services by the three countries.

In view of the fact that, as Maj. Scott stated at the recent Air Conference, we shall be forced to take up airships again in a few years' time whether we like it or not, a fact which has not been disputed, it would seem that the Government cannot well turn down this proposal, which would have the effect of creating a commercial airship service which could not fail to be of the greatest importance as a reserve in *personnel* and *matériel* against an emergency. Even in the event of the Governments having to hand over the entire guarantees of £171,000 per annum, the price would be a small enough one to pay for the benefits, from an Imperial point of view, of such services.

It should not be forgotten that the starting of such an airship service would have an accumulative effect on commercial aviation in general, because once the airship service was started, branch or feeder lines operated with aeroplanes or seaplanes would be established almost at once. In this way a network of aerial routes would come into being, which would be of the most far-reaching importance as an item in Imperial defence. If we are to have "all-red" air routes to different parts of the Empire, it is difficult to see how one can leave out the airship, which is the long-distance aircraft *par excellence*. On the other hand, once the greatest distances between parts of the Empire are linked up by airships, the development of heavier-than-aircraft services within the Dominions and Colonies will follow as a matter of course.

At the moment of writing the Air Council has not announced its views in this matter, but we really cannot see on what grounds it could refuse its co-operation. The handing over of existing airships and material would certainly not mean a great loss to the nation, as the ships and equipment would not be likely to fetch very much as scrap. On the other hand, although existing ships would be useless for the service, they would form a very good fleet for training and similar purposes. A further point for the Government to consider is that the saving in dole money by reason of the building of new airships might easily exceed the amount of the interest they are asked to guarantee.

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The Ships to be Used With regard to the airships which it is proposed to build for the projected services, these appear to us somewhat ambitious. It is now generally admitted that before we can with certainty and safety build ships larger than 2,500,000 cubic ft. further research is necessary. It is a big jump from 2,500,000 cubic ft. to 3,800,000 cubic ft., and if the Government agrees to the suggested scheme, it might be advisable to use one or two of the existing airships for purposes of full-scale research, of which, we believe, not a very great amount is required in order to establish certain fundamental principles in design. Failing this, we are afraid that the construction of an airship of close on four million cubic feet will be somewhat of an experiment, and might easily prove a very expensive one. If the airship service is to be a success it is of the utmost importance that public confidence should not be shaken at the beginning by any untoward incident.

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The Projected Route It is expected that the new large airships will be capable of a speed of 70 knots, but as stops have to be made *en route*, and an allowance of six hours at each mooring mast has been made, the average speed has been put at the conservative figure of 40 knots. This would mean that the journey to Bombay would occupy 5½ days, as against the present 17 days. Rangoon, instead of being 22 days from London, would be brought within 7½ days. Hong Kong should be reached in 8½ days—it now takes about 4½ weeks; and Perth, in Australia, should be within 11 or 12 days of London. This represents in the case of Perth a saving of between a fortnight and three weeks, and by the time overland air services by aeroplanes had been established Southern Australia should be brought correspondingly nearer to London. The gain in time over the whole route is such that both for mails and passengers there should be no lack of public support of the scheme, quite apart from any consideration of the advantages from the point of view of Imperial defence.

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Can It be Done? We have already referred to the fact that we do not consider it possible to build airships of close upon four million cubic feet until further research has been made, and have suggested that one or two of the existing airships should be used for research on full scale. There is another item in the scheme which appears to us somewhat doubtful. It has been stated that the new airships can be built at a cost of £125,000 to £150,000. Where? Certainly not in this country. We presume it is not intended to buy the ships from Germany, and the possibility of building a ship of 3,800,000 cubic ft. capacity for £150,000 in this country is, it seems to us, very much open to doubt. Germany during the War had exceptional production facilities—turning out, we believe, a complete rigid airship in something like two months. Even then the cost of a ship was generally admitted to be approximately £250,000, and the ships then built were certainly very much smaller than the type contemplated for the new airship service. However, even if the cost should exceed the suggested figure, improvements are in sight which will materially reduce the running costs. One of the chief among these is the use of hydrogen, in conjunction with petrol, as fuel. It has been estimated that this will increase the paying load by 40 per cent. In the estimates placed before the Dominion Premiers the production of hydrogen was taken as costing 20s. per 1,000 cubic ft., whereas with modern methods it is thought that this can be reduced to about 4s. per 1,000 cubic ft. There are other improvements which may reasonably be counted upon within the next few years, and so probably the estimated figures of costs will prove somewhere near the mark, even if the relative amounts of the different items may have to be given a somewhat different allocation.

Taking everything into consideration, we think the proposed scheme deserves every support, and we hope—even if it demands certain modifications in detail—the Air Council will decide to support the scheme somewhat in the manner suggested.

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The Resignation of General Sykes On another page of this issue of FLIGHT will be found copies of the correspondence which passed between Maj.-Gen. Sir Frederick Sykes and Capt. Guest, referring to the resignation of the former as Controller-General of Civil Aviation on the expiration of his term of office. It had been thought that Sir Frederick would accept the offer of the Secretary of State for Air to remain in office for another year, but this he has now declined to do, and his resignation has been accepted.

It has been alleged in certain quarters that the present state of civil aviation was due to Sir Frederick's handling of the Government's side of it. With that view we have never agreed, and that civil aviation fell on evil days was due to the Treasury limitations imposed upon the department rather than to any fault on the part of the Department itself. They had to administer a policy, but were not to blame for that policy, and in the administration of it we think it will be agreed by every one who has had anything to do with the C.G.C.A. that very great sympathy and courtesy has always been shown. We do not know what plans Sir Frederick Sykes has for the future, but we do desire to express to him our thanks for his conscientious work in the Civil Aviation Department, and wish him all good luck in whatever direction he may decide to apply his great gifts as an organiser.

So far no successor to Sir Frederick Sykes has been appointed, and it is doubtful whether any will be appointed. Rather do we expect that the office will be allowed to lapse—at any rate, in its present form. Capt. Guest, in his remarks introductory to the Air Estimates debate, outlined a scheme of reorganisation of the administrative side of the Air Ministry. Probably now that Sir Frederick has resigned, the department of Civil Aviation will be placed, not under a Controller-General, but under a Director, possibly with the title Director of Civil Aviation. If that prove to be the intention of the Government, we trust that the new D. of C.A. will be given a seat on the Air Council, as otherwise there would appear to be a danger of Civil Aviation becoming too much of a sub-department of the service side of aviation.

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RESIGNATION OF SIR FREDERICK SYKES

The Air Ministry announced on April 1 that Maj.-Gen. Sir Frederick Sykes, G.B.E., K.C.B., C.M.G., has resigned his appointment as Controller-General of Civil Aviation, on the expiration of the term for which he was originally appointed.

The following correspondence has passed between the Secretary of State for Air and Sir Frederick Sykes :—

Air Ministry, *March* 29, 1922

Dear Guest,

I thank you for your invitation to continue in my position as Controller-General of Civil Aviation for another year. This invitation was conveyed to me in a letter received late on Monday night (the 20th inst.) and it was necessary for me to give a decision before your statement in the House of Commons on Tuesday (the 21st). I had, therefore, very little time for consideration, and, as I intimated to you on Tuesday the 21st, I was prepared, because of my keen interest in the air, to accept it. On reconsideration, however, I have now come definitely to the conclusion that, owing to the very small scale to which you have found it necessary to reduce the Department of Civil Aviation, there is no scope for such a position as mine, and that I would not be justified in continuing even for a year to receive a salary for work which circumstances make it impossible for me to perform. I desire, therefore, that my appointment should terminate on April 1—the date originally fixed, but if you think that I can be of assistance in connection with the re-organisation which you contemplate, I shall gladly place my services at your disposal in a voluntary capacity.

Yours sincerely,
(Signed) F. H. Sykes

Capt. The Right Hon. F. E. Guest, D.S.O., M.P.,
Secretary of State for Air.

Air Ministry, Adastral House,
March 31, 1922

Dear Sykes,

I am in receipt of your letter of March 29, in which you tender me your resignation of the post of Controller-General of Civil Aviation, on the expiration of your original three years' term of office on April 1.

I feel that your action, prompted as it is by an appreciation of the position of the national finances, which have forced us to curtail the activities and the expenditure on your, as well as on other Departments, is entirely honourable to yourself.

I greatly regret that our association on the Air Council and in the Air Ministry, should now terminate, but I do not hesitate to accept your decision.

I know how deep your interest in your work has been, and what it must mean to you to leave it, but you have the satisfaction of knowing that the ground work of the Air Ministry's plans in regard to Civil Aviation has been well laid. I am confident that both the Air Ministry and the public will remember your services with gratitude.

In my own name and on behalf of my colleagues, I wish to thank you, and to express the hope that your departure from the Air Ministry will not impair your interest in the Air Force and in Civil Aviation, in the auguration of both of which you have played so large and so distinguished a part.

It is good of you to offer your voluntary services in connection with the re-organisation which I outlined in the House of Commons last week, and I shall certainly be very glad to avail myself of your offer, as opportunity arises.

Yours sincerely,
(Signed) Frederick Guest

Maj.-Gen. Sir F. H. Sykes, G.B.E., K.C.B., C.M.G.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN MARCH 19 AND APRIL 1, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods				
						h. m.		
Croydon-Paris	54	134	16	39	52	2 33	D.H. 18 G-EAWW (1h. 57m.)	B. (5), Br. (1), D.H. 4 (2), D.H. 18 (3), G. (5), H.P. (1), V. (1).
Paris-Croydon	54	155	9	39	46	3 24	D.H. 4a G-EAWH (2h. 9m.)	B. (6), Br. (1), D.H. 4 (2), D.H. 18 (2), G. (5), H.P. (2), V. (1).
Totals for 2 weeks ...	108	289	25	78	98			

Note : One flight (1 pass.) between Croydon–Amsterdam made on 13th.

* Not including "private" flights. † Including certain journeys when stops were made *en route.*

‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport. P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc. :—Co. des Grandes Expresses Aériennes; Daimler Hire Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

LONDON TERMINAL AERODROME

Monday evening, April 3.

PARTICULARLY changeable weather has marked the past week. There have been snowstorms, gales, and ideal flying days so hopelessly mixed as to prevent anything like regularity of service. On Thursday snowstorms were experienced all the way from Northern France to Croydon, and pilots had great difficulty in getting through. One of the Messageries' Breguets had a particularly rough time. The pilot of this machine, which was *en route* from Paris to Croydon, saw a large snowstorm right in his track when approaching Boulogne, and in order to avoid this he struck out over the sea at Paris-Plage. The snow was so heavy, however, that he completely lost his way, and it was only by good fortune that he eventually found himself over the coast near Lympne, after flying above the water for nearly an hour—during which time he was forced down occasionally to within 30 ft. of the sea by low clouds. He landed at Lympne for weather reports, and then flew on to Croydon, having to pass through a snowstorm on his way.

Mr. Olley, flying a Handley Page 0–400, had to land at Lympne and Biggin Hill before finally reaching Croydon.

The pilot of the Instone machine got through without a stop, but was greatly troubled by the "smoke barrage." This "barrage" is encountered whenever the prevailing wind is from the north or north-west, and consists of smoke and other atmospheric impurities which are carried over Surrey and Kent from London. On this particular occasion it had drifted as far as 4 miles out into the Channel, and persisted all the way to Croydon. It produces an effect of thick haze, and, although troublesome, seldom actually prevents flying.

Today, again, there was stormy weather with heavy snow in England, and copious rain in France, and the entire service was suspended. It was extremely unfortunate that this should happen today as two new services, both advertised widely, were to have begun. The Messageries Aériennes had arranged for a newspaper "special" to leave Croydon at 7 a.m., and a similar machine with French newspapers was to have left Le Bourget; while the new services instituted by Daimler Airways were also to have been inaugurated.

Advent of the New "Air Expresses"

ON Friday the first of the D.H.34's, which have been eagerly awaited, arrived on the aerodrome from Stag Lane. Mr. Hinchcliffe was piloting the machine, while Mr. Herne was in the seat next the pilot. The aeroplane aroused much interest, and during the day the various pilots of Daimler Airways were getting experience on the machine, and doing the requisite number of landings in order to get the "34" put on their licences.

On Sunday Mr. Hinchcliffe flew the machine to Paris with a load of newspapers. The load was, apparently, too much for the machine, and after an extraordinarily long run it only just managed to clear the hedge, and was actually so low that it disappeared from sight in the valley south of the aerodrome. The flight to Paris occupied 3 hours 18 minutes, and the petrol ran dry on Le Bourget aerodrome; so it would appear that Mr. Hinchcliffe either had trouble with the machine or went a long way out of his course.

When attempting to leave Le Bourget for the return journey, again with a heavy load, the machine stuck in the mud and was unable to get away.

This sort of thing rather amuses the "old hands," as they have all been through it years ago; but it would perhaps be better if new companies could benefit by some of this experience, and start where others have left off, instead of beginning all over again, and making the same mistakes that were made in early days. It will be remembered that the same sort of thing happened with the D.H.18's. For a long time their full load was at the most seven passengers, but when pilots and mechanics had gained experience on the machines the full load of eight passengers and quantities of baggage could be carried with ease.

The Instone Air Line have also had delivery of their first D.H.34, and this made its maiden trip to Paris and back on Sunday with a number of newspaper representatives. There was quite a race, in fact, between the Instone and the Daimler people to get away first. Mr. Barnard piloted the Instone "34," and had the same sort of trouble in taking off, but, having had previous experience of this kind of thing, he "taxied" back and the machine was lightened by two passengers. The second attempt was successful, and he made the trip to Paris in 2 hours 40 minutes. He also made the return journey in fairly good time, but had to land at Lympne for minor adjustments to the engine.

In addition to the "34," the Instone Line sent a "4a" and the "Vimy" to Paris on Sunday, while a D.H.18 returned from Paris, a total of five journeys for the day.

Amsterdam and Back at 4½d. a Mile

MR. LEVERTON informs me that when the K.L.M. re-open their Amsterdam service on the 18th, the fares will be reduced from £8 8*s*. single to £6 6*s*., and from £15 15*s*. return to £10 10*s*. The return fare is, I believe, the lowest on any of the "airways," working out at a fraction over 4½*d*. a mile.

The Messageries Aériennes, with the opening of their new office in the Haymarket, have a new London manager, Mr. P. E. Grosfils, and he tells me that his Company are now the general agents in London for many of the airways operating in France, including the line from Paris to Constantinople. His Company are finding their present offices on the aerodrome too cramped, and are to build another just at the entrance to the 'drome.

At the moment there is great rivalry between the different firms for pride of place in both offices and signs; but the Handley Page Company have certainly, up to the present, said the last word with a gigantic sign running along the apex of their new office roof, and visible from all parts of the aerodrome and also from Plough Lane.

Mr. Shaw flew an "18" to Paris on Friday for the Instone Air Line, and encountered bad weather on the way. Near Poix aerodrome, while flying below the level of the tree-tops, he narrowly missed a "Spad" that had forced-landed in a ploughed field on the other side of the road to the aerodrome. Some idea of the weather conditions may be gathered from the fact that the pilot of the "Spad" had been unable to rise high enough to clear the trees, and get into the aerodrome, because of the lowness of the clouds. On Mr. Shaw's return journey the weather was so bad in the Beauvais district that he flew off from Le Bourget due north and then, edging towards Abbeville, flew into clear weather.

The enclosure-side of the aerodrome is a mass of mounds of earth and trenches, where the petrol companies are busily putting in tanks and pipe-lines. When the present schemes are finished, there will be bulk storage for 16,000 gallons of petrol. The Daimler Airway have their own 3,000-gallon tank and pump, so that they will avoid having to wait if they find all the pumps in use. I understand that the mixing of the petrol and benzole for the Napier engines is to be done in this tank, instead of in the tanks of the "34's."

The D.H.18 G-EAWO, which was loaned to the Instone Air Line by the Air Ministry, was handed over to the Daimler Airways yesterday, and riggers from De Havilland's were working late last night fitting new wings to the machine, which has now flown over 600 hours. The old wings are to go back to Stag Lane to be done up.

Mimic Tornado on the 'Drome

ON Friday afternoon there was an amusing and unusual event on the aerodrome. The Royal Aero Club's "Avros" played a leading part, being required to provide a gale of wind for the filming of a scene in a South American tornado by the Welsh-Pearson Company. Fire hydrants, with special sprinkler attachments, were run out to provide the torrential rain, and the hero of the film story struggled in the tempest thus produced. Incidentally, the grassy surface of the aerodrome gave a realistic representation of a South American pampas.

Capt. Muir, of the Surrey Flying Services, tells me that the charges for the hire of that company's "Avros" and D.H.9 for taxi work are to be on the basis of 2*s*. a mile. As the "9" will take three passengers, this works out at only 8*d*. per mile per passenger, which is beginning to compare favourably with the rates for ordinary taxis.

The Trust House have now replaced the old settees and easy-chairs with more substantial furniture, upholstered in leather, and the lounge has been the one cosy place on the aerodrome during the inclement weather and biting winds of the past week.

Mr. Pudney, who has bought the Renault-Avro previously owned by Mr. Herne, flew off yesterday ostensibly on a test flight, but apparently finding the machine "O.K." and the weather perfect, made off to an unknown destination.

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'Planes Assist Seal Catching

A GRAND catch of 50,000 seals is recorded from Montreal as the first week's haul of the Newfoundland Sealing Fleet, which was guided by aeroplanes to the location of the herds.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

ANNUAL GENERAL MEETING

THE Annual General Meeting was held at the Club on Wednesday, March 29, 1922. Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., (Chairman of the Club) presided, supported by Rear-Admiral Sir Godfrey M. Paine, K.C.B., M.V.O., Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., Lieut.-Col. Mervyn O'Gorman, C.B., Col. F. Lindsay Lloyd, C.M.G., C.B.E., Mr. F. Handley Page, Mr. Ernest C. Bucknall.

The result of the Ballot for the nine vacancies on the Committee was declared as follows :—

Group-Capt. F. W. Bowhill, C.M.G., D.S.O., R.A.F.
Maj.-Gen. Sir W. S. Brancker, K.C.B., A.F.C.
Ernest C. Bucknall.
G. B. Cockburn.
Col. F. Lindsay Lloyd, C.M.G., C.B.E.
Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P.
Lieut.-Col. Mervyn O'Gorman, C.B.
Air-Commodore C. R. Samson, C.M.G., D.S.O., A.F.C., R.A.F.
Sir A. Mortimer Singer, K.B.E.

Election of President, Vice-President and Council.—The following were unanimously elected :—

President.—Brig.-Gen. the Duke of Atholl, K.T., M.V.O., D.S.O.

Vice-President.—Viscount Northcliffe.

Council

S.A.I. Prince Roland Bonaparte.
The Earl of Hardwicke.
The Earl of Lonsdale.
Admiral of the Fleet, The Earl Beatty, G.C.B., O.M., G.C.V.O., D.S.O.
The Rt. Hon. Lord Hugh Cecil, M.P.
The Lord Howard de Walden.
The Lord Kinnaird, K.T., F.R.G.S., D.L., J.P.
The Lord Montagu of Beaulieu, C.S.I.
Admiral of the Fleet, the Rt. Hon. Sir Edward Seymour, G.C.B., O.M., G.C.V.O.
Admiral The Hon. Sir Edmund Fremantle, G.C.B., C.M.G.
Count Henry de la Vaulx.
Sir David Salomons, Bart.
The Rt. Rev. Bishop Welldon.
Martin Dale.
Andre Michelin.
Sir Basil Zaharoff, G.B.E., G.C.B.
Air-Marshal Sir Hugh M. Trenchard, Bart., K.C.B., D.S.O.

The Chairman, in his statement at the Meeting, said: The Club is the Society for encouragement of the sport of Aviation in this country, and last year the programme of races was carried through successfully. The cost of organising races and provision of prizes fell rather heavily upon the Club; there was, however, every indication that the general public was prepared to support these races, and it is hoped that this year the expenses would be more than covered.

The Aerial Derby last year produced a very exciting race, and brought to light the Bamel machine, designed by Mr. H. P. Folland and constructed by the Gloucestershire Aircraft Co. The speed of the Bamel machine was 163·34 m.p.h. This machine eventually represented Great Britain in the Deutsch Cup in France, but, owing to a mishap to the fabric, was unable to complete the course. At a later date, the Bamel machine flew at Martlesham Heath, and put up the British speed record over a kilometre course to 196·6 m.p.h.

A new departure last year was the introduction by the Club of an air race between the representatives of Oxford and Cambridge Universities, and the result was a very close finish, ending in a victory for Cambridge. The Club took over the financial responsibilities of supplying the machines. Every effort is now being made to hold a similar race this year.

Another new departure last year was the holding by the Club of the first race meeting at Croydon. In spite of the inclement weather the meeting was a distinct success, and has encouraged the Club to hold further meetings there this year on the same lines. The first meeting will take place on Easter Monday, April 17.

Gordon Bennett Balloon Race was started from Brussels in September last, and the Club's representatives, Mr. Allen and Squadron-Leader Baldwin, occupied the second and fourth places in a field of fourteen competitors. The winner alighted in Ireland, and the two Club representatives in Wales.

Last year the Club acquired four aeroplanes for the use of Members. These are housed at Waddon Aerodrome, Croydon, and are let out to the Members at a very reasonable figure. The Flying Service's Fund is still carrying on its charitable work. During the year 200 applications for assistance were dealt with, and grants and allowances to the amount of £3,109 were made. The Duke of York continued to take a great interest in the Fund, and the other Members of the Committee have also given much time to the administration.

The Annual Conference of the F.A.I. was held last year in Madrid, and was opened by the King and Queen of Spain. Col. O'Gorman, who attended all F.A.I. Conferences on behalf of the Club, had rendered very valuable assistance.

The Racing Committee had worked very hard in carrying out last year's racing programme. They have also prepared this year's programme, which is on a more extensive scale than in previous years.

The Committee of the Club which meet monthly are primarily engaged in the aeronautical work of the Club. Apart from the Club Committee Meetings, individual Members of this Committee render valuable assistance in representing the Royal Aero Club on several Joint Committees outside the Club, such as the Air Ministry, International Conferences, Society of British Aircraft Constructors, the Air League, etc.

He acknowledged with thanks the gift of two pictures of the late Mr. H. G. Hawker and Commander Mackenzie Grieve, painted by Mr. Ambrose McEvoy, and presented to the Club by the Directors of Rolls-Royce, Ltd.

In conclusion it was announced that the Committee had decided to suspend the Entrance Fee temporarily for 100 new members, which it was hoped to elect during the next six months.

COMMITTEE MEETING

A Meeting of the Committee was held on Wednesday, March 29, 1922, when there were present :—Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair, Mr. Ernest C. Bucknall, Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., Lieut.-Col. Mervyn O'Gorman, C.B., Mr. F. Handley Page, Rear-Admiral Sir Godfrey M. Paine, K.C.B., M.V.O., and the Secretary.

Election of Members.—The following new Members were elected :—

Edward Murray Bates.
Lieut.-Col. Maurice Ormonde Darby.
Lieut.-Col. Ivan Buchanan Davson.
Flight-Cadet Ellis Reid.

ROYAL AIR FORCE AND AIR RACING

The Air Council has informed the Royal Aero Club that they have authorised Air Officers Commanding to give permission to Officers and Airmen to take part in Air Race Meetings organised by the Royal Aero Club at Waddon Aerodrome on April 17, June 5, and August 7, subject to the provisions of the King's Regulations.

Offices : THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

France to have a 1922 Aero Salon

IT has now been definitely decided by the Chambre Syndicale des Industries Aéronautiques that they will hold an Aero Exhibition in Paris this year. It will be, as before, at the Grand Palais, and although the actual date is not yet settled, it will probably be in December for a fortnight, although there are many who would prefer September to be the selected month.

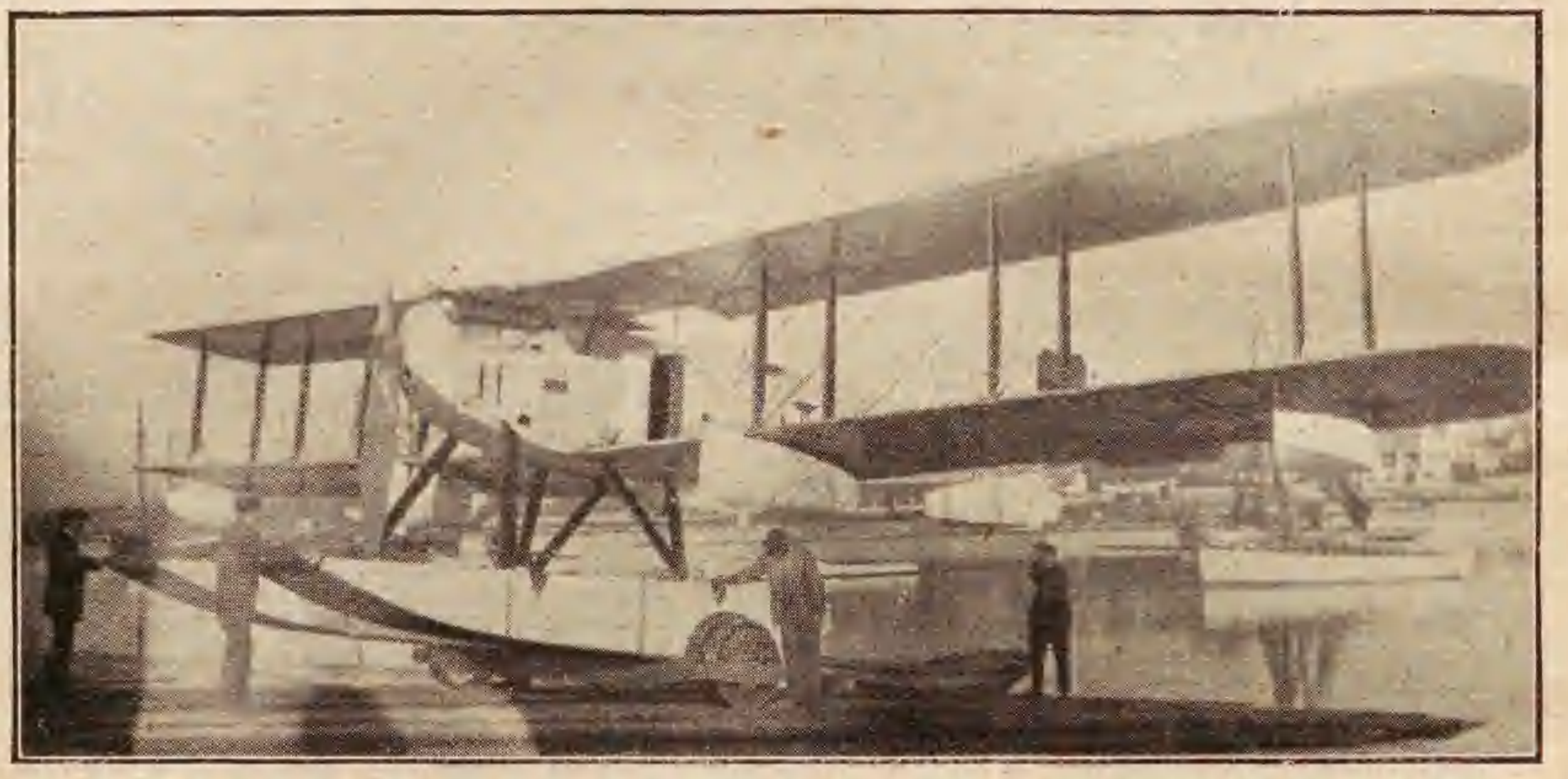
THE LISBON TO RIO TRANSATLANTIC ATTEMPT

Fairey Seaplane Used

Two Portuguese officers, Sacadura Cabral and Gago Coutinho, left the Tagus on the morning of March 30, on their first stage of the flight to Rio, the Canary Islands. The distance from Lisbon is 715 miles, and the machine arrived at Las Palmas at 3 p.m. For various reasons the resumption of the flight on the next stage, to the Cape Verde Islands, was postponed until Sunday, April 2, when the machine took off from Las Palmas at 10 a.m. The distance to St. Vincent is approximately 840 miles, so that the machine should have arrived at about 8 or 10 p.m. on the same day. Up to the time of going to press no news of its arrival has been received, and some anxiety is felt for the safety of the gallant officers.

The machine used in the attempt is a Fairey seaplane, Rolls-Royce "Eagle" engine, and was described and illustrated in our issue of January 19, 1922. In the main it is similar to the famous Fairey type C III D, but larger wings have been fitted in order to enable the machine to carry the fuel necessary for long-distance journeys.

In the accompanying photograph the machine is shown with two large fuel tanks slung under the bottom plane. These have, we understand, been removed, and the bulk of the petrol has been placed in tanks in the floats instead. In this manner a good deal of head resistance has been saved, and the performance correspondingly increased.



THE FAIREY LONG-DISTANCE SEAPLANE USED IN THE TRANSATLANTIC ATTEMPT: Under the lower plane may be seen large petrol tanks. These have now been removed, and tanks fitted in the floats instead. Otherwise the machine remains as shown in the photograph.

Those who know the standard Fairey seaplanes, and their sea and airworthiness, will not be unduly alarmed at the lack of news from the missing aviators, as the machine would be able to ride out a moderate sea in case of a forced descent. At the same time, trouble may have developed which could not be put right by the crew, and in that case it is to be hoped that they will be seen by a passing vessel, of which there should be a good number on the route followed.

AN AVIATION WEEK AT NICE

By D. W. THORBURN

UNDER the auspices of the Areo Club of the Côte d'Azur, and with the active assistance of the various local authorities, an Aviation Week was held at Nice from March 26 to April 2. The proceeds were divided between the Club, the Syndicate of the Sporting Press, and local charities, and attracted some of the largest crowds I have ever seen at any flying meetings. Practically all the machines taking part were land machines, which were housed at an aerodrome specially prepared on the shore at the far western end of the Promenade des Anglais, but the exhibitions and contests took place over the sea in front of the centre of the Promenade, where some hundreds of yards of the Promenade had been enclosed and stands erected.

The fact that the pilots started at a point about 2 miles distant deprived the affair of the element of personal interest usually so characteristic of Hendon gatherings, and also, it must be admitted, seriously interfered with the organisation of the meeting. An elaborate programme had been prepared, but it bore little if any resemblance to what actually occurred, and the time-table was disregarded entirely.

The first day's flying opened with a defile of all the pilots and machines. The leading French aviators took part, among them being Fonck, Fronval, Sadi Lecointe, Madon, Bernard, Bossotrot, Maicon, and Nungesser, while Italy was represented by Brachpapa and Ferrarin, and Belgium by Willy Coppens, well known in London as the Belgian Air Attaché. There was therefore no lack of talent.

A contest for the best figures of eight followed, but interest was seriously distracted by the continual flying of other pilots at the same time. The slow flying race was won by Flachaire on a Spad, his speed being given as 3 kiloms. in 4 mins. 28⅕ secs. A race between Lecointe and Brachpapa over a course of three circuits, resulted in a win for the Italian on his Fiat. The programme, by the way, made no reference to the motors which played so important a part in the proceedings.

Nine machines took part in a competition for the dropping of messages into a marked area, the winner being Becquet, on a Spad. Other demonstrations included a special display of aerial acrobatics by Fronval and Nungesser.

The second meeting was held on Thursday, when an enormous crowd thronged the long enclosures. According to the official programme the proceedings should have opened with the arrival of a dirigible and an aerial attack on it by a squadron of aeroplanes, but no airship turned up, and the first event was the escape and disappearance of an observation balloon, which was being prepared for destruction later on in the afternoon.

The second item announced was the arrival of a squadron of flying boats from St. Raphael and a combat with two destroyers. One of the flying boats was to have been apparently damaged in the flight and then taken prisoner by a submarine. Repairs were to have been effected, and the machine should have delighted the crowd by making its escape after sinking the submarine. This was timed for 2.15, but no squadron ever turned up, and it was much later in the day when one solitary flying boat appeared, was tied up to a destroyer, and never managed to get started again up to the time the crowd left. A submarine was cruising around all the afternoon, and aroused more real interest than anything else by occasionally submerging and re-appearing.

Several parachute descents were to take place at various times during the afternoon, but with the exception of one from a kite balloon, which occurred so far over the sea as to be almost indistinguishable, nothing came off until about 6.30 in the evening. In the case of the one mentioned, the parachute took some time to open, but I accept with all due reserve the report in a local paper that the daring aeronaut fell for the space of 22 secs. before the parachute opened, covering 100 metres at a terrific speed!

A good deal of looping and spinning went on at frequent intervals, and there were long intervals in which nothing aviatic took place. One missed sadly the brilliant organisation of our own Air Force Pageant, and the strict adherence to time-table which makes all the difference.

The remaining days of the Aviation Week were devoted to numerous official receptions, luncheons, dinners and dances, with excursions for aviators and their friends to resorts in the neighbouring district. Among others who joined in these proceedings was Paulhan, long retired from active flying, and now engaged in the peaceful pursuit of floriculture in the region near Cannes. Several lectures were also given during the week on aeronautic subjects. The weather on Thursday and Friday broke down, and the sunshine for which the Riviera is noted was conspicuous by its absence, to the great detriment of the joy riding which had been arranged and the open-air charity bazaar at the aerodrome.

EMPIRE AIR SERVICES

The New Airship Scheme

Very considerable interest has been aroused by the announcement of the scheme for the formation of a company to establish an airship mail and passenger service to India and Australia. At the moment of writing, the decision of the Air Council in the matter has not been made public, consequently it is not known whether this scheme, which calls for no capital investment by the Government, but only a contingent liability in the form of a State guarantee of interest of £91,000 per annum, will mature. The proposal has the backing of Vickers, Ltd., and of the Shell group, and the details of the scheme were explained at a private meeting at Caxton Hall, on March 30, by Commander C. Dennis Burney. Mr. A. H. Ashbolt, Agent-General for Tasmania, who has long been one of the stoutest advocates of Imperial airship services, presided, and Major G. H. Scott explained certain technical considerations. If the scheme meets with Government approval, it will presumably mean that existing airships will not be handed over to the Disposals Board.

Briefly, the scheme submitted by Commander Burney to the Air Ministry is as follows: The company's capital of £4,000,000 would be made up of £1,800,000 in ordinary shares, and £2,200,000 in debentures, subject to the Government arranging, by means of a subsidy, a guarantee of dividend and interest for a period of years. On ordinary shares a 6 per cent. dividend (free of income-tax) would be guaranteed for 10 years, and the debentures would carry 4½ per cent. interest (free of income-tax) until redemption. It is proposed that £1,200,000 ordinary shares and £2,200,000 debentures should be issued forthwith, leaving £600,000 ordinary shares unissued.

Of this share capital, Messrs. Vickers, Ltd., have undertaken to subscribe for 100,000 shares at par and the Shell group for 100,000 ordinary shares or debentures at par. Both companies will give full technical assistance. It is stipulated that the Government shall transfer to the company free of cost all airships, airship material, and airship bases—such as Pulham, Cardington, and Howden, and will supply wireless telegraphy and meteorological services.

The total contingent subsidy per annum in the form of a guarantee of dividend on the ordinary shares and interest on the debentures (on the capital now proposed to be issued) would be:—On £1,200,000 ordinary shares, £72,000 for 10 years; on £2,200,000 debentures, £99,000 until redemption, divided as follows:—British, £91,000 per annum; Australia, £40,000; and India, £40,000. These dividend and interest payments would cease as soon as the profits from the company were sufficient to pay them. It is suggested that no dividend or interest should be payable until the middle of 1923, and accordingly the coming Budgets will be unaffected.

The programme of development would be divided into two stages—(*a*) a bi-weekly service to India; (*b*) an alternate day service to India, with a weekly extension to Australia. Capital would thus be conserved until the necessary experience has been obtained, to render the service efficient on the first stage, before expanding to the second stage. Commander Dennis Burney asks that until time has been given for consideration of this offer no airship or airship material should be broken up or otherwise disposed.

It is estimated that, unless the public take to airship travel very rapidly, there will be a loss on running expenses for the first two years. During this period nothing will be earned to write off depreciation charges, but, on the other hand, experience will give rise to large improvements in the design of airships, and consequently the airships originally constructed by the company will become obsolete with more than normal rapidity. The cost of this will be about £750,000, and it is suggested that when the profits have reached such a figure as to relieve the Government from their guarantee of dividend upon the ordinary shares, and the company can show to the satisfaction of the Treasury that it has established the business on a commercial basis, the Government will refund to the company the £750,000.

Estimates of expenditure and revenue were also submitted. They provide for the building of five new airships (the present fleet will be used for training and for short journeys only). The new ships will be much on the lines of the "LZ125" so far as size is concerned, with a capacity of 3,800,000 cubic ft. On a bi-weekly service to India it is believed that there would be a return of £372,000 per annum, after paying all costs and depreciation charges. Details were also given of a proposed extension to Australia. The sum available for ordinary shares is estimated at £240,000 per annum.

For the first year of full service it has been assumed that receipts will only equal one-third of the running costs, or £130,000 as against a total earning capacity of £1,482,200, and for the second year total receipts of £260,000. It has been further assumed in the computation of dividends that when the service is in full working order yearly earning of £1,037,000, against the total of £1,482,200, will be obtained.

The airships to be used would have a maximum speed of 70 knots, and it is thought that an average speed of 55 knots could be maintained. It is proposed to establish bases with mooring masts *en route*, and allowing six hours at each, the following time-table is estimated:—

Bombay ..	5½ days	(now 17 days).
Rangoon ..	7½ ,,	(now 21 to 22 days).
Hong-Kong ..	8½ ,,	(now 4 to 5 weeks).
Australia ..	11½ ,,	(now 4 to 5 weeks).

* * *

Air Parcels Post Contract

Appointment as exclusive contractors for carrying the Air Parcel Post to Paris has been made by the Postmaster-General in favour of the Instone Air Line, who have installed a machine devoted exclusively to goods. The contract has been secured in open tender.

London Papers on Paris Breakfast Table

With this week most of the London papers will be carried by air and will be available in Paris between 9 and 10 a.m., under arrangements made by Messrs. Hachette. Excellent!

Royal Air Force Club

The Annual General Meeting of the Royal Air Force Club will be held at 5.45 p.m. on Monday, April 24.

Air Mail to Denmark

We understand that arrangements have been made for inaugurating, this month, an air mail service between Rotterdam and Copenhagen. The company which is to undertake the new service is stated to be Danish, although it is intended to use British machines and pilots. The plan is to have machines leaving Rotterdam in the morning, after the arrival of the night boat from London, and it is expected that they will be able to reach Copenhagen shortly after noon, so that the mails should be distributed early in the afternoon in Copenhagen. In the opposite direction machines will leave Copenhagen at 3 p.m., and will reach Rotterdam in time to connect with the night boat to London. Thus, instead of taking 72 hours, the mails between London and Copenhagen should do the journey in about 24 hours.

THE DESIGN OF A COMMERCIAL AEROPLANE

By CAPTAIN G. DE HAVILLAND.

There was a very good attendance to hear the highly interesting and instructive paper, under the above title, read by Capt. de Havilland before the Royal Aeronautical Society, on March 30. Col. O'Gorman was in the chair, and without superflous introduction asked Capt. de Havilland to read his paper. The popularity of the lecturer was demonstrated by the applause which greeted him as he arose to commence the reading of his paper. Although not a very long one, lack of space does not allow of doing more than giving below a summary of the most important points of the paper.

The object of aerial transport, Capt. de Havilland said, was the carrying of passengers and goods by air, from one point to another, in the shortest possible time consistent with safety, comfort and economy. As the type of machine used for this purpose was largely influenced by the type of engine available, it followed that, in the absence of a very high-powered engine, a large machine would necessarily be a multi-engined one. The problem then resolved itself into deciding whether to build a single-engined or a multi-engined machine.

Single-Engine or Twin-Engine ?

Regarding the latter, the lecturer pointed out that the twin-engine machine cost more to build than two single-engined machines using the same engines; that it required larger sheds, and that when out of commission for repairs, it represented a greater loss. Unless the twin-engined machine, he said, was much over-engined—and therefore uneconomical—it could not fly on one engine with full load. The primary object of a twin-engined machine should be its ability to fly on one engine, and the line of development would, therefore, seem to be less weight per h.p., a better arrangement of engine positions, and improvements in the control gear. Such a machine, he thought, could probably not be run economically at the present time, although he thought the multi-engined machine would continue to be developed together with the single-engined type.

The Question of Loading

Having thus indicated the considerations which led one to think that the single-engined machine was the more immediately suitable, Capt. de Havilland narrowed down the problem to a choice between a large slow machine, and a small fast one. The latter, he emphasised, would be of low first cost and economical to run and maintain, and would, provided the high landing speed could be dealt with, and the "get-off" was satisfactory, be a desirable machine in every way. The greatest objection to a high wing loading, and consequently high landing speed, was the long run after touching, but this could easily be reduced, he said, by providing for a large ground angle so that on landing the planes would act as an efficient air brake. Wheel brakes had not proved very satisfactory. As regards landing shocks, these could be dealt with by a good shock-absorbing undercarriage. The lecturer mentioned as an example that at Martlesham a machine which had a ground angle of 17 degrees, and a wing loading of 11.3 lbs./sq. ft. (R.A.F. 15-wing section) gave a pull-up of 163 yds. in a five-mile wind. This machine had flown about 1,200 hrs. and there had never been a mishap which could have been avoided had the landing speed been lower.

As regards the question of "get-off," Capt. de Havilland stated that as a result of numerous tests, and experience of actual service conditions, the limiting "get-off" for fully-loaded machines was that a height of 50 ft. should be reached in 450 yds. from a standing start in a calm. These conditions could be fulfilled by a machine having a light loading and comparatively high weight, but this type had other disadvantages, such as larger shed space, more petrol and oil per mile flow, and greater percentage loss of ground speed in a head wind. Against these must be put the greater carrying capacity of the lightly-loaded machine if designed for the same "get-off."

Capt. de Havilland then pointed out that all the various factors, when balanced out against each other for 1,000 hours' flying, indicated that the passenger mileage is a maximum for a machine having a stalling speed of about 55 m.p.h., while the "all-in" cost per seat per London-Paris trip reaches a minimum for stalling speeds between 58 and 62 m.p.h. The best compromise at the present time would, therefore, seem to be a comparatively small single-engined machine of fairly high wing loading. Such a machine, with an engine of 450 h.p., would carry about 2,000 lbs. of freight at a cruising speed of over 100 m.p.h., with a range of 350 miles. He thought it was an open question whether this machine should be a monoplane or a multiplane, and that only full scale tests could decide the merits of each type. Regarding the monoplane, Capt. de Havilland stated that theoretical estimates indicated that there was only a moderate advantage, aerodynamically, in this type. "It seemed, however," he continued, "that if the aerodynamic qualities were exactly the same as a corresponding biplane, the monoplane construction would be worth while, owing to the smaller surface required and general fewness of parts making for a robust construction. In the preliminary lay-out it was found by integrating the forces on the various sections of the wing that a lift coefficient of about .7 would be obtainable. Later on, wind channel tests showed a distinctly better figure on the tapered wing used, and tests on the complete model demonstrated that the presence of the *fuselage* increased the lift so considerably as to bring the lift coefficient up to .86.

"An estimate of the weight of wing structure showed that it was safe to expect the weight of the monoplane wing to be at any rate no more than the equivalent R.A.F. 15 biplane wing structure with an increase of speed range of about 10 m.p.h. The actual aeroplane has borne out these figures, as the weight of the wing structure is 1,050 lbs., and is equivalent to an R.A.F. 15 biplane structure of 740 sq. ft. loaded to 10¼ lbs.

"It has not as yet been possible to get official performance figures, but from the tests carried out at the works, it is evident that there is a general agreement with the wind channel results. The loading with full load will be 17 lbs./sq. ft., most flights have been carried out at 15 lbs./sq. ft., and with this loading the machine lands at about 54 m.p.h. A speed trial at 10,000 ft. with this loading gave 116 m.p.h. Accurate tests are needed to confirm these figures, but it seems evident that the results expected from this wing construction are realised as near as possible, and that this big jump in lift coefficient and consequent reduction of area can be translated from model to full scale without serious error.

"This aeroplane has shown some interesting and difficult features. It was anticipated that the propeller problem would be a difficult one with existing gear ratios. This has been verified in practice, and the need for lower propeller speeds is manifest. Small variations of the disposition of obstructions in the slipstream have a remarkable effect on the performance. The controls also have presented unusual features. The lateral control is very good, but rudder and elevator control are soft, while rudder control when taxi-ing is entirely absent.

"The stability of this type tends to be more marked than the ordinary machines. Among the reasons for this are, doubtless, the facts that it has a larger range of angles of incidence and a smaller downwash than might be expected at slow speeds. Both these factors would tend towards fore and aft stability. Another practical point to be reckoned with is that in a commercial machine the space taken up by the spars in the cabin is rather large, and also the fact that spare wings are not so easily transported as is the case with a biplane. There is no doubt that every considerable increase of lift coefficient will produce difficulties which take some time to surmount. It is now obvious that the cantilever monoplane has very great promise, and it remains to work out the incidental difficulties in order to transform the promise into practical performance."

On the subject of construction, Capt. de Havilland repeated his opinion, expressed at the Air Conference, that for aeroplanes intended to be used in normal climates there was at present little to be gained by metal construction. He called attention to the higher cost of metal, and also to the question of durability, which, he thought, was less for metal when using very thin metal and numerous rivets. For cheapness of construction, and for good wearing qualities, he recommended three-ply wood for the *fuselage*. Metal struts in *fuselage* and wing construction did not generally, he stated, offer any advantages when considering simple and economical construction. The same might be said about wing spars, at any rate so long as it was not possible to standardise and thus make use of special metal sections.

On the question of structural strength, the lecturer expressed himself in favour of a duplication of stressed parts, which could often be carried out without adding a great deal of weight, rather than work on a very high factor of safety for vital members. As an instance, he mentioned the incidence bracing of a biplane, which is usually designed to take the full load of either front or rear truss.

Turning his attention to the subject of controls, the lecturer advocated the extensive use of ball bearings, not only because they made the controls easier to work, but also because they obviated backlash. He thought that the "sogginess" of a machine, which was often said to be the result of age, and to spoil the performance of a machine, was due to lag in the controls rather than to any actual decrease in performance. In cases where cables must be run around a bend or corner, Capt. de Havilland stated, it had been found satisfactory in practice to run a length of cycle chain over a smooth pulley with a suitable guard. Fitting the control cables outside the *fuselage* facilitated inspection and replacement. While on the subject of lateral control, the lecturer described the special type first tested on the "D.H.29" monoplane, and now incoroporated in the "D.H.34" biplane, the latest type to be constructed for the London-Paris service. This form of control has already been dealt with in FLIGHT, and consists in giving the *ailerons* a differential movement, so that the *aileron* which is moving up moves through a greater angle than does the opposite one, which is, of course, moving down. The result is that the *aileron* in the "up" position forms a balance for that which is in the "down" position. By altering the degree of differential motion, the amount of balance can be adjusted to, practically anything required. Capt. de Havilland stated that Mr. A. E. Hagg, of the "D.H." technical department, was largely responsible for this invention.

A commercial aeroplane, the lecturer thought, should have a good degree of stability, so that it could be flown "hands off" under all reasonable conditions. The pilot should then be able to keep right way up when flying in fogs. Suitable turn indicators should enable the pilot to keep his direction, but in conjunction with these he thought it might be an advantage to have a temporary hand-operated rudder control for use in fog conditions.

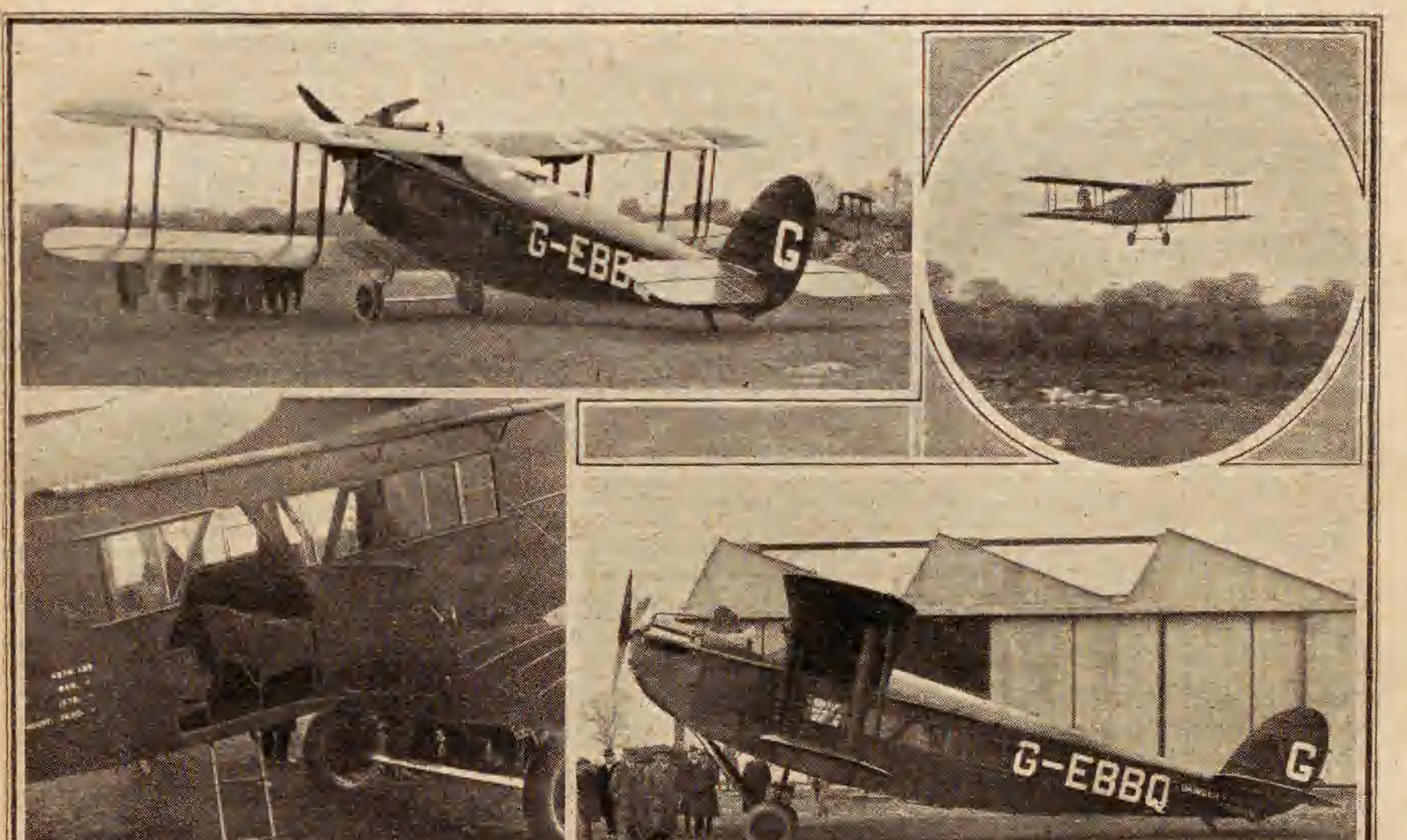
Engine Installation

Capt. de Havilland stated that the detachable engine mounting did not appear to have proved necessary under service conditions, but when machines were run harder, and also during actual construction, it was an advantage. As regards the problem of starting an aero engine, the lecturer thought that a hand barring gear should be satisfactory, provided the ignition and doping systems were improved for starting conditions. Petrol systems of the direct gravity type were the simplest and lightest, but it was not always possible to obtain the necessary "head" with present carburettors. He thought that probably the safest place for petrol tanks was under the top plane, just outside the slipstream. Rubber joints were a source of trouble, but soft steel piping seemed to be reliable, as did also "Petroflex" tubing, which had the advantage of a flexible tubing, and was at the same time durable.

Passenger Accommodation

On the subject of passenger accommodation, Capt. de Havilland expressed himself in favour of the wicker type of seat, arranged along the sides of the cabin, so that all the seats were window seats. With regard to decoration, the weight of this should be carefully watched, as it was quite easy, he stated, to throw away 100 lbs. in paint and varnish, and that this meant a loss of from £5 to £20 per day in load. Ample window lighting was essential, and at least two windows on each side should be made to open. Emergency exits were best arranged near the rearmost portion of the cabin, as this part would be above water in the case of a forced descent. It should not be difficult to silence the engine sufficiently, and the lecturer thought that long exhaust pipes, carried to a point behind the cabin, were the most satisfactory. Heating and ventilation should present no serious difficulties. The luggage compartment was conveniently arranged immediately behind the cabin, with a door in the side of the *fuselage*.

Capt. de Havilland thought that the modern commercial aeroplane would be found to have a much greater durability than generally supposed, putting the life of a machine at three years at least, and probably much longer. This would mean a distance of well over half a million miles. The present mileage flown between engine overhauls, was



FURTHER VIEWS OF THE "D.H.34": Last week we published a description and some illustrations of the new "D.H.34" machine, as built for the Daimler Airway and Instone Air Line. These may now be supplemented by the above photographs, taken on the occasion of the lunch and subsequent visit to the Stag Lane aerodrome. The two larger views show the machine in three-quarter rear and side view, while below is seen the cabin, door, folding ladder, etc. Inset, shows the machine coming in to land.

given by the lecturer as between 15,000 and 20,000 miles, which compared with any type of motor transport.

The chief items of expense as regards maintenance were given as renewal of control cables, replacement of rubber shock absorbers, replacement of wearing parts of petrol pumps, tail skids, and landing-wheel tyres. The lecturer thought that, with the exception of the last named, these troubles had been eliminated, and the use of solid tyres was now, he said, receiving attention. Capt. de Havilland concluded his very interesting paper by stating that "if we leave out of consideration any aerodynamic or structural improvements that will probably appear in the near future, the result of steady development on normal lines gives every reason for an optimistic outlook. With the appearance of larger and lighter engines the cost of passenger or ton mileage will further decrease, and owing to greater reliability the dangers of forced landings will be practically non-existent."

The Discussion

Major F. M. Green said that he would now take the opportunity of replying to Capt. de Havilland, as this opportunity was not afforded at the Air Conference recently. He did not agree on the question of metal construction. It was now possible to build machines of metal which weighed less than wood machines, while probably the cost would not be any higher, might even soon be somewhat lower. He agreed with the lecturer in the matter of twin-engined machines, but thought that three-engined machines would have an advantage, as in case of one engine stopping only about one-third of the power would be lost. He referred to what he termed the "multi-unit" type of engine, on which he was, he said, now working. It consisted in mounting three engines on a common crank case, and gave some promise of good results.

Mr. W. O. Manning did not agree with the lecturer on the question of landing speeds. He thought that experience had shown that low landing speeds formed a sort of insurance against excessive damage, and quoted as proof the old Blériot 28–30 h.p. machines, which landed very slowly, and in which, in spite of many crashes, pilots hardly ever were seriously injured. As soon as the higher-speed 50 h.p. machines came along, which had wings with a smaller camber, crashes began to result in injury, sometimes fatal, to the pilots.

Squadron-Leader Roderic Hill put in a good word for the twin-engined machine, saying that it would enable a pilot to make a flat glide to a landing ground, even if the machine were not capable of flying on one engine. He could not, he said, view with equanimity landing speeds of 62 m.p.h., and thought that, as Mr. Manning had said, low landing speed was an insurance against too much danger. With regard to petrol systems, he pleaded for greater simplicity, saying that it was time we got away from the necessity of a pilot sitting in the cockpit of a machine for three hours, trying to get acquainted with all the different cocks.

Mr. F. Handley Page said he was told that insurance premiums would be considerably lower if landing speeds were kept below 50 m.p.h. He caused much amusement by admitting that to him it seemed that there was only one way to keep down the landing speed (referring, of course, to the H.P. slotted wing), but as this was a scientific society, and not a self-advertising one, he would say no more about that. He agreed with the lecturer that at present wood construction was most suitable. Later on, when we came to build very large machines, metal might be used for preference, much in the same manner, and for similar reasons, that large liners were now built of steel, but small craft, such as motor boats, were nearly always built of wood. Wood machines appeared to stand up well, and he quoted as an example the Fokkers used in Turkey during the War. He understood that the way in which the Fokkers stood up was due to a special secret process of treating the wood, but did not know how much there was in this claim. As regards petrol systems, Mr. Handley Page again amused the audience by saying that what we really wanted was placing the tank very high above the machine, so as to get gravity feed, and then lead the petrol to the engine through 5-inch pipes. There would then be no danger of them choking up. Unfortunately one had to have some form of sky hook to support the tanks, which complicated matters.

Colonel Mayo said that Capt. de Havilland was the pioneer of high landing speed machines, pointing out the big jump in performance which was attained with the introduction of the heavily-loaded "D.H.4." For military machines, that was good, as one was prepared to face the high landing speed for the sake of the better performance. For commercial machines, however, he did not think that the high landing speed was to be accepted. He was surprised at the lecturer's statement about the high landing speed machine having had no accident which could have been avoided had the landing speed been lower. He would like to know how many journeys had to be cancelled owing to the unsuitability of the high speed machines for flying in fogs. As an example of the way in which the slow-landing machine could carry on, he mentioned the Farman "Goliath." This machine, he said, was without doubt fitted with the worst engine in the world, but in spite of this it had an excellent record. He mentioned several instances of this type of machine having made forced landings without serious damage. With regard to petrol systems, Col. Mayo stated that in France gravity feed was almost universal.

Colonel Bristow offered a few criticisms of the inability of the pilot to see on more than one side on some machines, and said that this was very distressing in taking off from an aerodrome with obstacles. The placing of the compass where the pilot could see it easily was another point, and controls should be adjustable so as to be adaptable to different pilots. He thought that the present reliability of our air services and immunity from accidents were due to the extraordinary skill and experience of the pilots employed, and that as it was becoming increasingly difficult to get good commercial pilots, we should not lose sight of the fact that it would be an advantage if machines could be so designed as to place a less severe tax on the skill of the pilot. He also referred to highly-loaded machines, and stated that recently one French heavily loaded machine had a forced landing and crashed. The Goliath also had to land, but did not crash.

Colonel O'Gorman before asking the lecturer to reply, said that the discussion had brought out a pronounced difference of opinion as regards high loading *versus* low loading. He thought that high loading was quite all right if the engine was reliable. With regard to the Goliath, he was not speaking from knowledge of the facts, but he very much doubted whether the Goliath got a lower rate of insurance than did the high-load French machines.

Capt. de Havilland stated that he thought that eventually metal construction would be adopted, but not at present, when, he was certain, a metal machine would take three times as long to build. Wood was easy to repair. Incidentally, he had heard of no reason why we should be building metal machines, except for the tropics. He was very glad to hear that Major Green was studying the "multi-unit" type of engine. He said there had been several forced landings with heavily loaded machines, but with a large ground angle they pulled up as quickly as the lightly loaded. In a bad fog, he thought, any machine was dangerous, and he did not think it made any difference whether one was coming into an aerodrone at 50 m.p.h. or at 62 m.p.h. Referring to the Goliath, Capt. de Havilland thought it was a pity that the one which forced-landed in Kent did *not* make a perfectly safe landing. As regards gravity petrol feed, he stated that it had been found that the effect of acceleration in taking off was to double the "head" necessary. Thus, if a certain carburettor was stated to function with a "head" of 2 ft., this was increased to 4 ft. by acceleration.

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Improving the Air Port Services

The Postmaster-General announces that from April 4 a new dispatch of Air Mail letters was inaugurated by the Post Office between London and Paris. The aeroplane is due to leave Croydon aerodrome at 9.30 a.m. daily. This dispatch is additional to the present service from Croydon at 12.30 p.m., for which letters are accepted at the General Post Office up to 11.10 a.m. daily.

By the use of the new service, letters posted in London too late for the ordinary night mail dispatch to Paris, but in time for the last night collection, will normally be delivered in Paris on the following afternoon, and if they are addressed to places near Paris delivery may be expected in the evening instead of on the second morning following. Letters will be accepted for the 9.30 a.m. aeroplane dispatch at the counter of the General Post Office up to 7.15 a.m.

Letters from the provinces, posted too late for the ordinary mails due for dispatch by the night boat, benefit by the new aeroplane service if they are posted in time for inclusion in mails due to reach the London train terminus by or before 6 a.m.

As regards places at a considerable distance from London, that is, practically all localities except the south and south-east of England, the use of the air service enables the public to postpone the time of posting for France and beyond, by the greater part of the business day.

LONDON-PARIS BRITISH AIR SERVICE

Last week two gatherings for luncheon took place on Tuesday (at the Hotel Cecil) and on Wednesday (at the Criterion)—the first to celebrate the successful completion of the first year's operations of the subsidised British Air Services, the hosts upon this occasion being the Directors of Handley Page Transport, Ltd., and Instone Air Line, Ltd., and the second function to "christen" the new Daimler Air Service, which started on Monday last.

The "H.P."-Instone Meeting

Lord Gorell, Under Secretary of State for Air, occupied the Chair at the Hotel Cecil, and, in proposing "Success to the British Aeronautical Industry," said that the two lines within the last twelve months had done much good by instilling into the public the sense of flying.

Not very long ago, a passenger from London to Paris handed the pilot sixpence on landing at Le Bourget. He welcomed that spirit, because it showed that that passenger, at any rate, had had such a comfortable journey that he thought he was in a taxi. Then there was the case of a lady, who chartered a machine to fly to Harrogate, and on descending there said: "Wait, please." These instances could be multiplied, and they showed that the sense of ordinariness in the air was beginning to dawn on the British public, and when it dawned civil aviation would go right ahead. Messrs. Handley Page Transport, Ltd., and the Instone Air Line, Ltd., who had both been running regular daily cross-Channel services during the past year, had had a good deal to do with inculcating that spirit into the British mind.

In regard to the cross-Channel service, Lord Gorell mentioned that their two hosts would be joined in the next few days by a third firm—the Daimler Company, and he was glad to welcome them.

The two lines from March 19 of last year until the present time had made 526 trips in British machines from London to Paris, and had carried 2,989 passengers, while in the same period 775 trips with French machines had taken 2,043 passengers. In the other direction, from Paris to London, British machines made 524 flights and carried 2,709 passengers, and French machines 787, carrying 2,380 passengers. The totals were: British machines, 1,050, with 5,694 passengers, and French machines, 1,562 with 4,423 passengers.

He had always held that for the ultimate and general development of civil aviation they must look even more to goods than to passengers, but he was afraid that the position in this respect had not been so successful. He had only the figures for the seven months between August, 1921, and February of this year; in that period, the two French firms carried fifty-three tons of goods and the two British firms only sixteen tons. He hoped that in the coming year every effort would be made to change the proportions.

Continuing, Lord Gorell said that in the last week aviation had won a great victory. The Air Ministry had had to battle for its very existence, and had finally come out triumphant. A good sign, he thought, was the more rational interest taken by members of the House in aviation. They had realised what air power meant, and that gave promise that when more was asked for by the Air Ministry there would be a strong section of Parliament which would support them.

Mr. Handley Page, in responding, said he first wished to offer recognition of the great work which Mr. Cogni, their General Manager, had done for the cause of aviation, by his indefatigable zeal in promoting its interests. It was with some satisfaction he could state that his company had flown 70,000 miles with a cost for breakages of only £50. That reflected the security and safety with which the passengers had travelled. Though 10,000 passengers had been carried between London and Paris, they ought to have been carrying more than that number between this country and our Colonies. What he wished to urge upon the authorities was that the lines abroad, the little places we had got to reach eventually, should be thrown open to British enterprise and developed under commercial auspices, rather than as part of a military unit, although he in no way meant to disparage the magnificent work done by the military side. For this purpose, an educational campaign was necessary, and the best education was to have an interior air line in this country. If they could make the air lines prosperous, they would bring in the train of the aircraft industry increased trade between the different parts of the Empire.

Sir Samuel Instone, in proposing "The Air Ministry," said they had arrived at a milestone in aviation. They had just concluded the first period of the subsidy. He congratulated the Air Ministry upon their new lease of life in face of the great campaign to annihilate them. Sir Samuel paid a high compliment to the Chief of their Staff, Capt. Barnard, and said he was pleased to say they had recently added Sir A. Whitten-Brown to their staff, which conveyed an assurance that things would go forward. The Air Ministry's wonderful weather reports had been of the greatest importance to the successful flying, free from accidents and trouble. He welcomed the series of articles of General Groves in *The Times*. He had been able to say what many in high places would have liked to have said, and it had done an immense amount of good. Civil aviation, he thought, would afford an outlet for the young of the coming generation, and therefore it ought to be supported.

Major-General Sir F. Sykes claimed that Civil aviation was the basis of the Air Force. Out of the Channel services they must build up air-routes in various directions abroad, Imperially, and at home.

Mr. Baldwin Raper, M.P., responded for the House of Commons.

Amongst those present were: Sir James Stevenson, Brig.-General P. R. C. Groves, Brig.-General R. K. Bagnall-Wild, Sir H. White-Smith, Lieut.-Col. W. D. Beatty, Colonel Blandy, Sir A. Whitten-Brown, Lieut.-Col. J. Barrett-Lennard, Mr. Theodore Instone, Capt. Alfred Instone, Mr. T. A. Lewis, M.P., Mr. James Paterson, Mr. F. G. L. Bertram, Mr. Arthur Logan, Major S. Greer, Colonel A. Ogilvie, Lieut.-Col. W. A. Bristow, Mr. E. Gamage, Mr. G. E. Howse, Dr. G. C. Simpson, Mr. J. S. Ross, Mr. L. Simon, and Mr. E. Cogni.

The Daimler Airway Inauguration

At the Criterion, Mr. E. Manville, M.P., presided, the chief guest being Capt. Guest, Secretary of State for Air.

Mr. Manville at the outset referred back to the Air Transport Company's work, with which they had been associated, and the experience then gained against the snags which should help them to create a commercially successful service. First-class organisation stood behind commercial success in civil aviation, and if that idea were carried to its ultimate end it might not be necessary to call upon the Government for the subsidy that was given to approved companies who were unable to make ends meet. Capt. Guest, he said, was somewhat sceptical whether civil aviation could be made self-paying, but he hoped to be able to prove to him that it was possible. The Postmaster-General, who was present, was more than favourably inclined to sending mails by air, and moreover he was well satisfied with the results so far.

Capt. Guest acknowledging the toast, said the Air Ministry welcomed the arrival of the third candidate in the field of competition for air mail and air passenger services. There was a significant factor in connection with the entry into the field of the Daimler Hire Service. It was the first very definite sign of a great motor company turning its attention to aeronautics, and he hoped it would be the fore-runner of the movement in that direction. This was also the first company to have indicated an expectation of carrying on successful air travel without the aid of the subsidy. He had laid himself open to charges of being optimistic about the commercial success of civil aviation, but he thought he had been a little unfairly judged, because such expressions as he had made use of must be taken with their corollary. Although in England, through want of space, the weather conditions, the excessive comfort and speed of other forms of transport, civil aviation had apparently not become popular, yet as a corollary it was none the less necessary that the British Isles should be the pioneers of a wider form of civil aviation than these islands offered to us. We were merely the heart of a great Empire which had great stretches of country, which were unbridgeable except by air, and he had always supported the cross-Channel services and the subsidies attendant thereto, because it was there, under the most difficult conditions, that we could establish and develop our ability in civil aviation, and transport it—organisation and all—to other parts of the Empire in order to reach the desirable acme of success which was the Imperial air communications. There were openings already at hand. A greater conception was to have a route straight through Europe to Constantinople, to Baghdad, to Busra, and to India at Karachi. It was early yet to do more than outline such a possibility, but most of the links in that chain were already covered and undertaken by someone, and it seemed that the time would not be far distant before we got started on that great route.

He wished to repudiate the charge that was sometimes expressed to the effect that civil aviation was "snowed under" in the Air Ministry by Service considerations. This would certainly not be so while he was at the Air Ministry, but he thought people ought to appreciate the relative responsibilities of the two sides of the work. The fact that they had had to devote the last three years to the formation of a service, had no doubt somewhat over-occupied their time, but without that service they would be as dissatisfied as they could be as citizens of this great country, and therefore when they heard or read unsupported attacks upon the Ministry in that connection, they should take the broadest possible view of the necessity for the whole service being built up in this country, and being put into a position of sufficient security to keep pace with developments in any other land. He did not suppose anyone believed in the subsidy as a permanent doctrine, but during the stages of infancy it was essential that the State should come to the rescue and assist in the best way it could. He looked forward to the time when civil aviation would not need this artificial support, but so long as the period of suspense remained there would be no stronger advocate than himself of the system of subsidies in this connection.

Mr. F. G. Kellaway, the Postmaster-General, said he admired the audacity of the entry into aviation of the Daimler Hire Co. If the air services could give him good terms for carrying his goods those goods would be at their disposal. The three considerations necessary to the successful carrying of mails were speed, cheapness, and reliability, and the most important of all was reliability. The outlook now was brighter than it had been at any time since 1919. He did not know how far the technical men had got towards solving the problem of night flying, but that was one of the difficulties that stood in the way of a very considerable use of the air services for carrying mails between England and Paris. The London business man could post a letter tonight, and have it delivered in Paris next morning, and until the air services could fly at night they would not beat that. He hoped that during this year the mails would be carried to Brussels by air, and that the service would be extended through Brussels to Germany. For the conveyance of air mails to Amsterdam, they were again relying on the services of the Royal Dutch Air Co. He was now in communication with the French Post Office regarding mails from Paris to Prague, Vienna, and Budapest, but the outstanding examples of what could be done in carrying mails by air was the Cairo-Baghdad service. The ordinary mails going from this country to Baghdad took twenty-seven days, but the Air Ministry was carrying them in ten to nine days, and they hoped this year to reduce it to eight. The extent to which that service was used was remarkable, for he was informed that something like 45 per cent. of the letters sent between this country and Baghdad were sent by air. If the Air Ministry, or any of the civil aviation companies could guarantee cheap, swift, and reliable communication, he, as Postmaster-General, and the Post Office as a whole, would be only too glad to use the whole of their organisation to place in their hands for transport the largest quantity of letters and parcels which they could possible carry. He saw no practical difficulty in the way of having an air service which would enable letters posted in London today to be delivered in Australia within a week's time. If that could be done, think not only of its commercial advantages, but of the extent to which it would make all the peoples of this Empire one great family. It would be a case of audacity overcoming insuperable difficulties.

Col. Frank Searle, the Managing Director of Daimler Hire, Ltd., said they had built up their business upon service to the public—value for money—and they intended to follow upon the same principle with the Airway. He thought the Paris-London service could be now run with the subsidy, but he hoped in a year to give figures that would prove the service could be run without a subsidy. Once they could prove they could work at a profit, they would be prepared to go anywhere with a full service. He maintained that the expense for business people in travelling by air to Paris and back in the day was less than by the pre-historic methods by train and boat, absorbing two days, at least, with all its extra expenses. He wanted the agencies to look after the airway more individually and encouragingly than they had done. Col. Searle then paid a high tribute to Messrs. Napiers, the engine manufacturers, who were giving an immense amount of help to the companies who were operating, and also to Capt. de Havilland, who designed the machines. He was most sympathetic and receptive of suggestions of a practical (not engineering) nature, and had as far as possible, embodied them in his machines.

Amongst those present were: The Duke of Sutherland, Lord Gorell (Under Secretary for Air), Major-General Sir F. Sykes (Controller-General of Civil Aviation), Sir J. Norton Griffiths, M.P., Sir H. White-Smith, General Sir H. C. Z. Holden, Colonel Grant Morden, M.P., Colonel O. C. Armstrong (President, Federation of British Industries), Brig.-General Sir W. T. F. Horwood, Sir Halliwelle Rogers, Brig.-General P. R. C. Groves, Sir A. J. Hobson, Mr. P. J. Hannan, M.P., Major-General Sir W. S. Brancker, Brig.-General R. K. Bagnall-Wild, Mr. F. Handley Page, Captain de Havilland, Lieut.-Col. W. D. Raikes, Sir Samuel Instone, Lieut.-Col. Mervyn O'Gorman, Lieut.-Col. Heckstall Smith, Lieut.-Col. W. D. Beatty, and Commander F. B. Armstrong.

* * * *

THE LONDON AERO-MODELS ASSOCIATION

The Propeller Competition held on March 25 proved popular, there being fifteen entrants.

The judges were kept busy testing up to 10.30, and had to continue on the following Tuesday, to complete their task.

The first prize was won by Mr. W. E. Evans, second by Mr. L. Lansdown, third by Mr. F. de P. Green. Mr. F. J. Camm will give full data of the competition in due course.

Re Competition No. 2, for R.O.G. duration. Models limited to 4 ozs. minimum. No other restrictions. To be held on Wormwood Scrubbs, Sunday, April 16, at 11 a.m. (The word " minimum " was omitted in error in the announcement of March 23).

On Thursday, the 6th inst., Mr. W. E. Evans will give a short lecture on " How to Design a Model Aeroplane Propeller."

The Secretary has been requested to draw members' attention to General Rule No. 3.

Meetings are held every Thursday at 20, Great Windmill Street, Piccadilly, W. 1, at 7.30 p.m., when full particulars of membership can be obtained.—Hon. Sec., A. E. Jones.

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(*Continued from* p. xii.)

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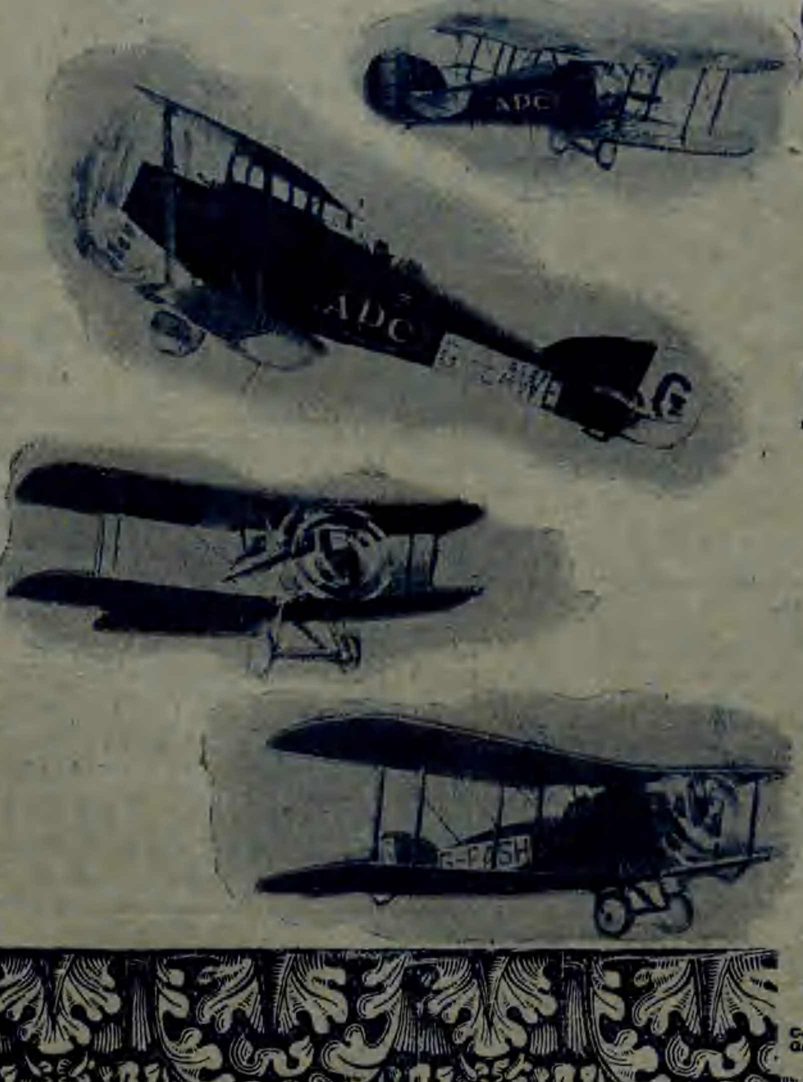

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
April 17	**R.Ae.C. Race Meeting, at Waddon**
April 17–19	**Seaplane Contest, Marseilles**
June 1	**Entries close for Schneider Cup Race**
June 5	**R.Ae.C. Easter Race Meeting, at Waddon**
June 23–25	**International Competition for Touring Aeroplanes, Brussels**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22 ...	**Coupe Deutsche (300 kil.)**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT

Battleships and Bombs

THE controversy which has occupied so much space in the daily press lately relating to the effect on ships of bombs dropped in their immediate vicinity appears to us to have strayed considerably from the points at issue. Lord Lee of Fareham has explained the views of the Admiralty and of the Navy on the matter, and Lord Graham, who was responsible for the aeroplane carrier H.M.S. *Argus*, and General Groves, whose excellent articles in *The Times* were the immediate cause of the controversy, have in turn stated the case for aircraft. Lord Lee contends that even large bombs, if so dropped as not to be in actual contact with the side of a ship, have an effect equivalent only to a much smaller quantity of explosives which is in actual contact with the ship. We are not at all convinced that Lord Lee is right in this contention. However, even if it is granted that he is right, and that *actual contact* is necessary for the full effect of explosives dropped from aircraft, we think that he has failed to take into account the dropping of torpedoes from aircraft. He will there get all the actual contact he wants, with the further advantage on the side of aircraft that if one or two or ten are destroyed the loss in men and material will be insignificant, while out of an attacking air squadron some are certain to get through and find their mark.

But, as we have already mentioned, and as Gen. Groves points out in a letter to *The Times*, the amount of damage which aircraft can do to battleships is a mere detail of the much greater problems at issue. These are that in the next war the Navy by itself cannot protect us against air attacks, no matter how efficient it is or how many battleships it possesses. Aircraft, and aircraft only, can do that. This is the main issue which we should keep in mind, and at the present moment this country has to all intents and purposes no such defence against aerial invasion. No one has proved that there is any other way of establishing and maintaining such a defence than the "striking force" advocated by Gen. Groves.

Rear-Admiral S. S. Hall, in a letter to the Press, makes some stringent remarks about our Naval Staff and its doctrines, and he emphasises that the reason why he considers the building of two battleships a waste of money is that close blockade is dead, and there is no one we can distantly blockade. It is not, he points out, a question of one aeroplane being only able to sink an old battleship in shallow water, but of future air attack when clouds of 'planes will attack at dusk, dawn, or by moonlight the ships before they go to sea.

A trenchant contribution to the controversy is that of Mr. T. G. Tulloch in *The Times*, who calls attention to the seemingly obvious fact, which is nevertheless often lost sight of, that a three-dimensional weapon, such as aircraft and, to a somewhat more limited extent the submarine, must defeat two-dimensional weapons, such as surface-vessels. This writer concludes with the following very telling paragraph: "Having regard to aerial warfare, Great Britain is no longer an 'island'; therefore why try and defend it as if it were?" Precisely. That is the whole crux of the matter. As to how many bombs it would take to sink a battleship, and how many machines would be shot down in the attempt, these are merely incidental problems which do not greatly affect the argument one way or the other. The defence against aircraft attack on cities, factories, shipyards, camps, etc., is the problem with which we are faced, and certainly for that purpose the Navy is useless. That the air arm can also by itself protect us against naval attack we are not so convinced, although we fully realise the help which the air can, and should to a vastly greater extent than has hitherto been the case, give to the Navy in this respect. We are rather afraid that some of those who have contributed to the controversy have been carried away by their enthusiasm and belief in the air, and led to claim for the air arm feats which it has not yet been proved capable of performing. We fully believe that some day, and probably not so far distant as might be imagined, the air will be able to do all these things, but that time is scarcely yet, and possibly a certain amount of harm has been done to the cause of the air by these somewhat extravagant claims.

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Air Council and the Airship Scheme

The airship scheme proposed by Commander Burney, details of which were published in FLIGHT last week, has now, it is announced, been considered by the Air Council, but it is stated that in their original form the Air Council regarded the financial conditions as imposing too severe a liability on the Government. Commander Burney has since submitted certain modifications which are now being considered by the Air Council. These include an offer to repay the whole of the money advanced as subsidy at the rate of £25,000 a year as soon as the company is in a position to relieve the Government of liability under the interest guarantee. This certainly appears to be a very fair offer, and as it is understood that the Air Council's refusal to accept the original scheme was based upon financial considerations, and not on any doubts as to the feasibility of the scheme, there is, perhaps, a possibility of the revised offer being accepted. The potential value of the scheme to Imperial defence is such that we sincerely hope that the Air Council may regard it favourably.

The Air Disaster

The mid-air collision which occurred in France last week is a most regrettable accident, the more so in view of the recent inauguration of one of the services involved, viz., the Daimler Airway, to which reference is made below. It is, however, an accident which is not very likely to occur again, even if the somewhat elaborate schemes that have been suggested are not adopted. The probability of two machines meeting nose-on in this fashion is very remote. At the same time we cannot afford not to take every precaution which tends to make flying safe, and the recent accident points to the desirability of making provision for the prevention of a recurrence. It has been suggested that machines travelling in one direction should fly at one altitude, and those going the opposite way at a different height. Also that each should keep a mile or two to the right of the general route. Both plans are open to objections on the part of the pilots, who usually like to follow a certain route, especially in thick weather. It might, however, be found possible to combine the two; that is to say, the machines going in one direction flying slightly to the right of the route and at a certain altitude, while those going the opposite way fly also to the right and at a different altitude. This arrangement would, however, necessitate an almost complete duplication of emergency landing grounds, while pilots might object to being restricted to certain altitudes, owing to the difficulties which would be encountered in the matter of flying by landmarks. It is true that wireless direction finding is now proving very useful to pilots flying out of sight of the ground, but the fact remains that most pilots are averse to flying above clouds, out of the sight of the ground. That may be mostly prejudice, but until confidence in the wireless has been firmly established, it is a very easily understood prejudice.

We think that, as a matter of fact, no such alteration in the arrangements is necessary, at any rate for some time. It should be comparatively easy to provide machines with short-range transmitting and receiving sets, all tuned alike, by means of which, in thick weather, a pilot could be apprised of the approach of another machine while still some miles apart. In most cases this would probably be found sufficient to ensure that the pilots of approaching machines would see one another while there was still plenty of time to alter course and avoid collision.

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The New Air Services

Commencing last week, the air services to Paris have been augmented by the new service established by the Daimler Airway, and by accelerated services by the older companies. In addition to the usual air mail leaving Croydon at 12.30, there is now a morning service leaving at 9.30. By the new service letters posted in London too late for the ordinary night mail dispatch to Paris, but in time for the last night collections, will normally be delivered in Paris on the following afternoon.

In addition to the increased activity on the London–Paris route, it is rumoured that a London–Manchester service is a probable starter soon, and it is stated that other lines radiating from Manchester are in contemplation—for instance, one linking Manchester with Dublin. Altogether, therefore, it looks as if civil aviation is to have a busy season, and signs are not lacking that we are now over the worst difficulties and that henceforth commercial aviation will develop fairly rapidly towards that importance which it is destined ultimately to hold.

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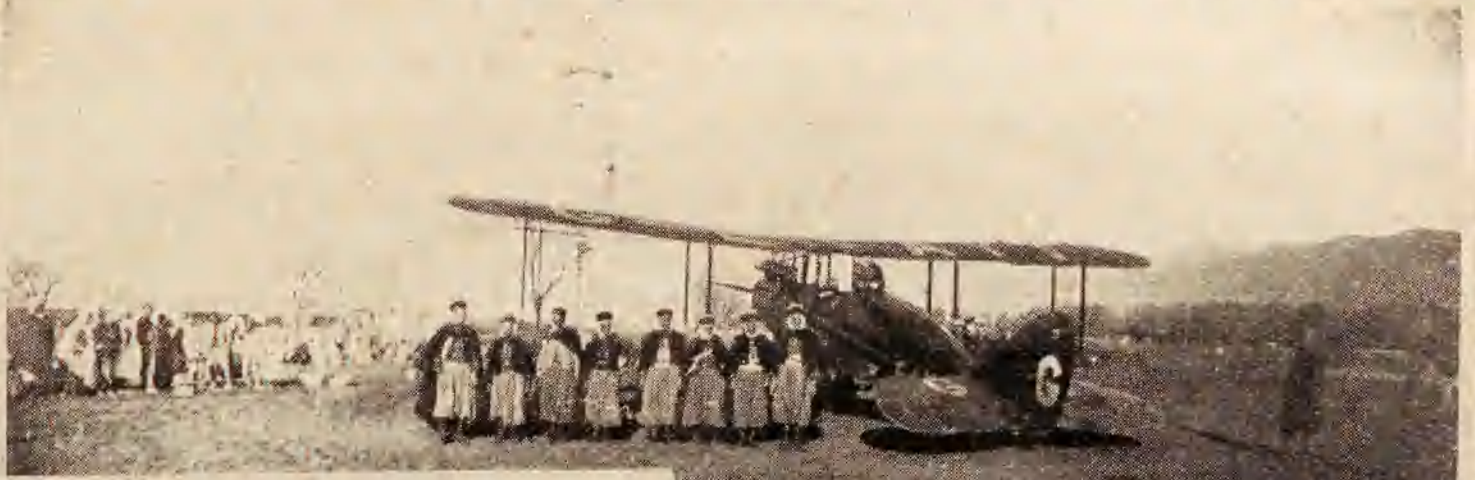

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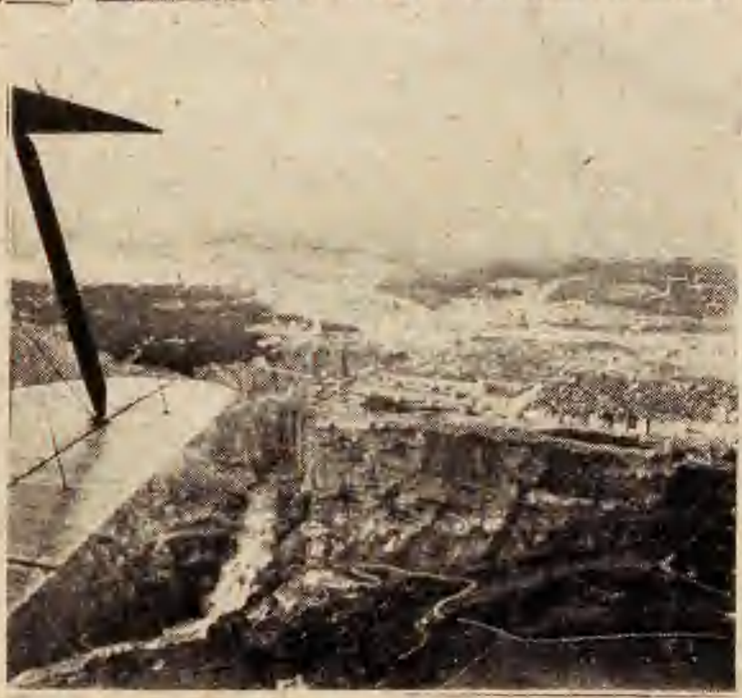

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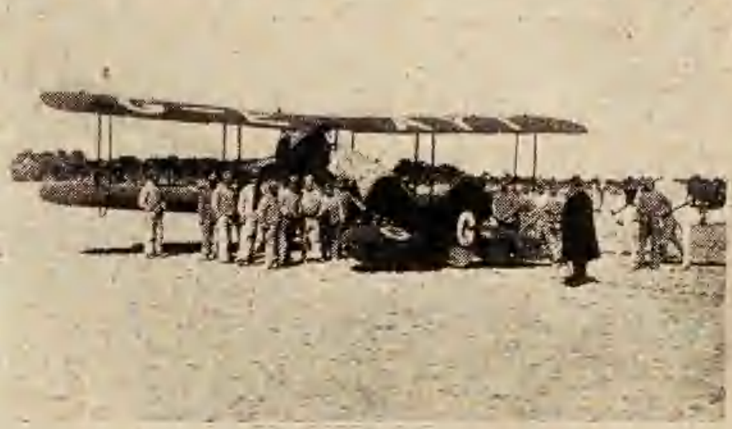

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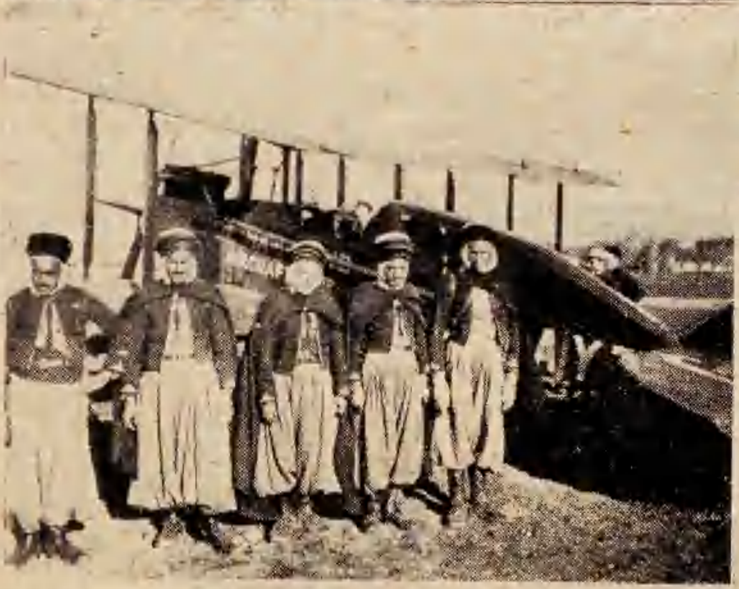

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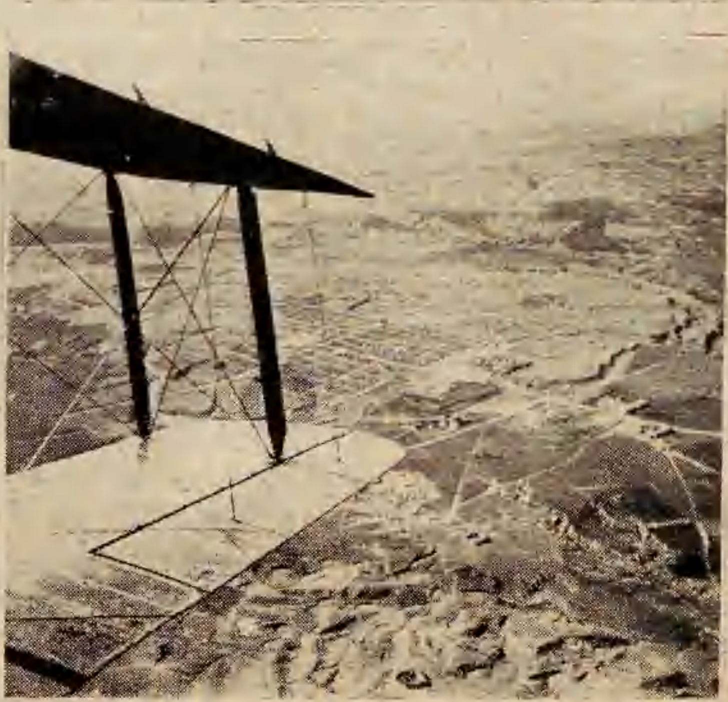

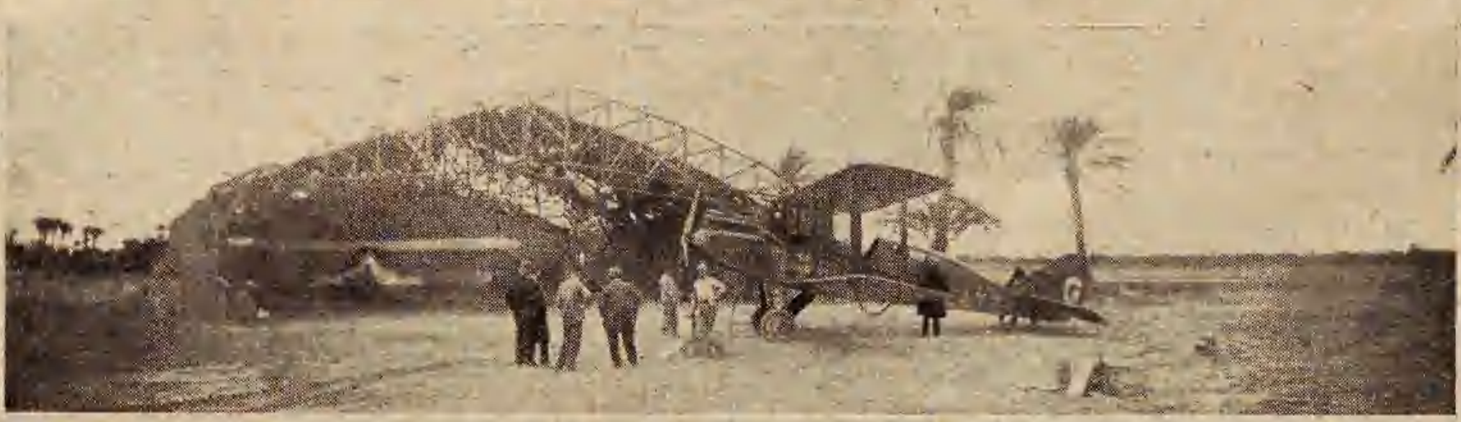

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" BLAZING THE TRAIL " : Some photographs secured by Mr. Cobham's passenger on the 6,000 miles tour. 1. The D.H.9c at Batna. 2. Aerial view of Constantine in Algeria. 3. The machine on the natural aerodrome at Touggourt. 4. Mounting guard over the machine at Batna. 5. Sahara from above. Just beyond the wing tip may be seen Touggourt. 6. A bit of local atmosphere. The machine and a hangar (of sorts) at Biskra (" Garden of Allah ").

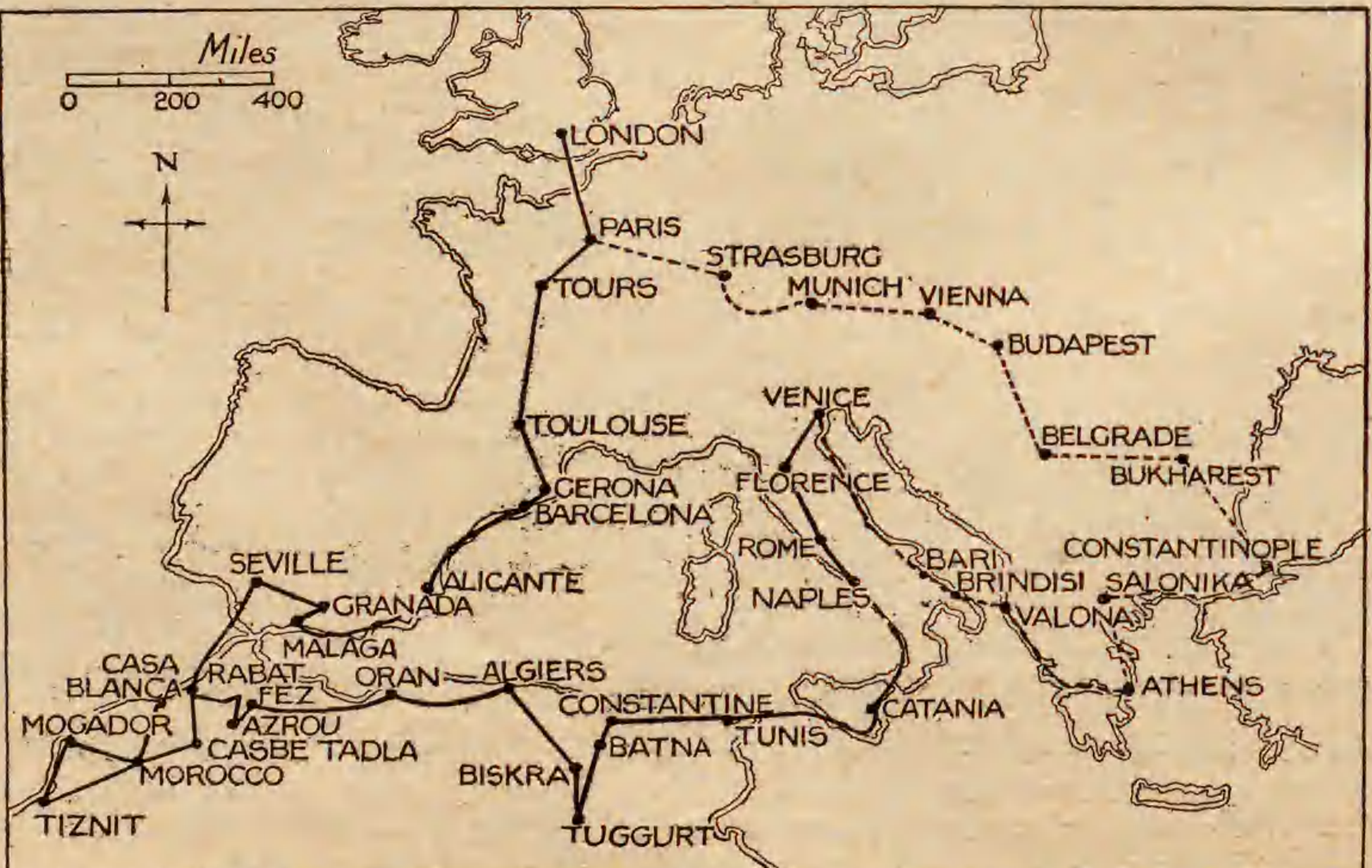
"BLAZING THE TRAIL"

Mr. Cobham's 6,000 Miles

As an example of what an Englishman can do when he makes up his mind, it would be hard to beat Mr. Alan Cobham's performance of flying, with a passenger, from London to Paris, Toulouse, Barcelona, Alicante, Malaga, Gibraltar, Rabat, Casa Blanca, Morocco, Fez, Orano, Algiers, Touggourt, Batna, Constantine, Tunis, Catania, Messina, Napes, Rome, Florence and Venice. The machine used was a D.H.9c, with Siddeley "Puma" engine, and we understand that throughout the journey neither machine nor engine gave the slightest trouble. Truly a marvellous performance, when it is remembered that the tour was made without any ground organisation whatever, and that Mr. Cobham had to be his own engineer, looking after machine and engine each day after the end of a flight. We regret that space does not allow of publishing the details of this marvellous flight, but it does not require any very vivid imagination to picture what changing conditions were, must have been, met with. The tour was made in a leisurely fashion, it is true, but even so certain stretches of the journey presented great difficulties. These were, however, all overcome, until fate overtook Mr. Cobham at Venice. He was actually within sight of the aerodrome, when a fog suddenly blotted out all land-marks. He wisely decided to come down in the sea, which he managed to do successfully, and he and his passenger were ultimately

Captain Martel, of the French Artillery at Fez, and Mr. Cobham.

La Rache Aerodrome, Spanish Morocco : The Air Service between Seville and La Rache is run with D.H.9c machines. Our photograph shows the arrival of the first machine after the inauguration of the service.



Sketch-Map of the route followed by Mr. Cobham on his tour.

rescued unhurt, although the machine and engine suffered considerably from the effects of the salt water.

Incidents from Mr. Cobham's tour have been recorded from time to time, but we have now obtained some photographs, taken by the passenger, which will, we think, be found of interest as showing unfamiliar country and surroundings. Some of these photographs will be found on p. 211.

The accompanying sketch-map will give a better indication of the route followed and the countries visited than could any descriptive matter, and will give a very good idea of the magnitude of the trip. From Venice onwards, the dotted line route indicates the remaining portion of the tour, which was cut short by the accident at Venice. It will be seen that considerably more than half of the tour was successfully completed, and had Mr. Cobham chosen to obtain another machine whereon to proceed, there is little doubt but that he would have accomplished the trip successfully. Even as it is, however, the tour is an achievement of which the pilot may well be proud, and when it is remembered that no organisation beyond that already existing was provided, the trip deserves to rank high among the flights of modern years. There was no question of covering enormous distances without landing, nor of completing a given distance in a minimum of time, but, what is, perhaps, even more useful, the tour demonstrated the reliability of modern air travel, and, incidentally, afforded an opportunity of doing very excellent propaganda work abroad.

Mr. Cobham's next adventure will, we think, attract even more attention, but about that nothing may be said at present.

"WHAT CAN WE DO WITH OUR SONS?"

Sir Samuel Instone makes the following valuable and practical contribution to the discussion which has been raging so furiously recently in *The Times*:

"I think a great deal can be done for 'our sons' in civil aviation. It offers an opening for young men, and should be supported. In the late war all the officers in the mercantile marine became officers in the Royal Navy, and their work in defeating the submarines and in other operations at sea was of inestimable value. In the next war, there is every reason to suppose, aircraft will be a predominant factor, and the importance of having an adequate reserve of officer pilots cannot be over-estimated. I think, therefore, in the interests of national security, the Government should grant a subsidy to the civil aviation companies to be used solely for the training of pilots, so that, in time of war, there shall be an adequate reserve of officer pilots to draw upon, in the same manner as they have drawn upon the officers of the mercantile marine.

Civil aviation, as it develops, will, on the other hand, offer a fresh lease of life to pilots in the Royal Air Force when they have ceased to be of value to the fighting service. Flying in the fighting service is a young man's job. Even in peace time, training for air warfare, with 'stunt' flying and the other risks that must be taken, puts a great strain upon the nerve, and the useful career of the fighting pilot comes to an end at a comparatively early age. In an 'omnibus' service of a commercial aviation company, where 'safety first' is the principal consideration, his career can be prolonged for another ten years, and the pay is good.

But we do not rely entirely upon taking over pilots from the Royal Air Force. We want to train our own pilot officers and mechanics, and for that purpose we have established a scheme of apprenticeship for boys leaving school. We have begun with two apprentices, and we are prepared to take others. They will wear a distinctive uniform, as officers in the mercantile marine do. The articles of indenture are, I believe, the first that have been drawn up for a civil aviation company, and from that point of view the original document will one day become historic. They provide for a premium of £500, which need not necessarily be paid in one sum; and the parents are responsible for clothing and board and lodging. The period of apprenticeship is three years, and the apprentice receives as pocket money, 10*s.* a week in the first year, 15*s.* a week in the second year, and 25*s.* a week in the third year. The company undertake to give instruction in the profession of aviation at their Waddon aerodrome, Croydon, or elsewhere, which shall include a course in the engineering shops and flying instruction which will enable the apprentice at the termination of his apprenticeship to apply to the Air Ministry for a pilot's certificate. If, however, the apprentice is found to be unfit, on account of his state of health, or for other reasons, for final training as a pilot, then, during the last year of his apprenticeship, the company will instruct him solely with a view to his becoming qualified and efficient to act as a ground station engineer. If after the determination of his indenture, the apprentice secures from the Air Ministry a pilot's certificate, the company will employ him, or use their best endeavours to procure him an engagement with some other recognised company.

There will, I believe, be a wide scope for these boys. The Instone Air Line is establishing stations across the Empire, and as soon as protection is afforded, and machines are approved, station managers, technical experts and spare pilots will be required.

NOTICES TO AIRMEN

Belgium: Ostend Aerial Lighthouse

1. An aerial lighthouse has been erected in the W. corner of the Ostend aerodrome, and is in operation in foggy weather, or after sunset, when the arrival of aircraft at the aerodrome is expected.

The light exhibited is a group occulting white light, showing five flashes every nineteen seconds, thus:—Light, 5 secs.; eclipse, 1 sec.; light, 2 secs.; eclipse, 1 sec.; light, 3 secs.; eclipse, 1 sec.; light, 2 secs.; eclipse, 1 sec.; light, 2 secs.; eclipse, 1 sec.

Note.—This light is additional to and should not be confused with the marine light at Ostend Harbour, notified in Notice to Airmen No. 106 of 1921.

(No. 32 of 1922.)

France: Aerial Lighthouses, Aerodromes, etc.

Aerial Lighthouses.—As from April 1, 1922, the hours of operation of the aerial lighthouses in France will be as shown below:—(i) The lighthouses at *Valenciennes, Strasbourg, Lyons, Dijon, Nimes and Bordeaux*, which are situated on routes over which night flights rarely take place, will only be lit by request. To test their working, they will also be lit for half an hour per week; (ii) The lighthouses of *Le Bourget, Beauvais, Poix, Berck-sur-Mer and St. Inglevert* will be lit regularly half an hour after sunset until two hours after sunset. They may also be lit at other times than those indicated, by request.

(No. 34 of 1922.)

Aerodromes for Civil Use

A consolidated list has now been issued. (No. 35 of 1922.)

Honours

H.M. the King has granted unrestricted permission for the wearing of the following decoration, which was conferred by H.M. the King of the Belgians for valuable service in connection with the War:—

Order of the Crown (Off.)

Maj. (acting Lieut.-Col.) A. V. Holt, D.S.O.

Imperial Airship Scheme under Consideration

The Air Ministry announces that the Imperial Airship Scheme submitted by Commander Burney has been under the consideration of the Air Council. In its original form, as communicated to the Press, the Air Council regarded the financial conditions as imposing altogether too heavy a liability on the Government. Commander Burney has since made certain modifications in that scheme, and the revised proposals are being further considered by the Air Council. The existing airships and the airship bases at Cardington and Pulham are still in the possession of the Air Ministry, and have not been actually handed over to the Disposal Commission.

London-Brussels Route to be Opened

The Air Ministry announces that the Instone Air Line has now been "approved" as the company to operate a subsidised air service between London and Brussels. This is welcome news, as the London-Brussels line may well prove a very important one in the future, linking up as it does this country with Northern and Central Europe. We should now like to see a seaplane service running to North Germany and the Scandinavian countries.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

SECOND CROYDON AVIATION RACE MEETING

(Under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aéronautique Internationale)

At London Terminal Aerodrome, Croydon, Easter Monday, April 17, 1922, commencing at 3 p.m.

Club Handicap.—The Committee has decided to open this event to all types instead of confining it to machines of Avro type only.

Course.—The circuit for each event is approximately eight miles, the turning points being Waddon Aerodrome, a White Cross on the ground near Purley Downs Golf Club, and Beddington Cement Works.

Handicapping.—The handicaps will be fixed on the day of the Meeting by the Official Handicappers of the Royal Aero Club, viz. :—

R. J. G. Crouch.
J. D. Coales.
J. H. Ledeboer.

Members of the Royal Aero Club will be admitted free on presentation of their Membership cards.

The prices of admission are as follows :—5*s.* (plus tax 9*d.*), 2*s.* 6*d.* (plus tax 6*d.*) and 1*s.* (plus tax 3*d.*).

The charge for motor-cars is 2*s.* 6*d.* (instead of 5*s.*, as previously announced), and motor-cycles 1*s.*

Programme

Club Handicap.—For all types of machines. Two laps of the circuit. Distance, approximately 16 miles.

Entrant.	Machine, Engine and Pilot.
Fl.-Lt. W. H. Longton, D.F.C., A.F.C.	Martinsyde F.4, 300 h.p. Hispano Suiza (W. H. Longton).
Maj. J. R. Grant (Aircraft Disposal Depot)	D.H.9A, 400 h.p. Liberty (R. H. Stocken).
Maj. J. R. Grant (Aircraft Disposal Depot)	Parnell Panther, 200 h.p. B.R.2 (A. F. Muir).
Fl.-Cadet N. Vintcent ..	B.E.2B, 90 h.p. R.A.F. (N. Vintcent).
De Havilland Aircraft Co., Ltd.	D.H.9B, 230 h.p. Siddeley Puma (C. D. Barnard).
Dr. E. D. Whitehead Reid	D.H.6, 90 h.p. R.A.F. (E. D. W. Reid).
Henry Petre	Avro, 110 h.p. Le Rhone (H. Petre).
C. Dudley Palmer ..	Avro, 110 h.p. Le Rhone (C. Dudley Palmer).
Fl.-Officer A. F. Ingram..	Avro, 110 h.p. Le Rhone (A. F. Ingram).
Bristol Aeroplane Co., Ltd.	Bristol Monoplane, 100 h.p. "Bristol" Lucifer (C. F. Uwins).
Fl.-Lt. H. O. Long ..	Martinsyde F.4, 300 h.p. Hispano Suiza (H. O. Long).
Fl.-Officer R. S. Carroll ..	S.E.5A, 200 h.p. Wolseley Viper (R. S. Carroll).

2nd Waddon Handicap.—For machines with a speed of not less than 100 m.p.h. Four laps of the circuit. Distance, approximately 32 miles.

Entrant.	Machine, Engine and Pilot.
Fl.-Lt. W. H. Longton, D.F.C., A.F.C.	Martinsyde F.4, 300 h.p. Hispano Suiza (W. H. Longton).
Maj. J. R. Grant (Aircraft Disposal Depot)	D.H.9A, 400 h.p. Liberty (R. H. Stocken).
Maj. J. R. Grant (Aircraft Disposal Depot)	Parnell Panther, 200 h.p. B.R.2 (A. F. Muir).
De Havilland Aircraft Co., Ltd.	D.H.9B, 230 h.p. Siddeley Puma (C. D. Barnard).
Bristol Aeroplane Co., Ltd.	Bristol Monoplane, 100 h.p. "Bristol" Lucifer (C. F. Uwins).
Fl.-Lt. H. O. Long ..	Martinsyde F.4, 300 h.p. Hispano Suiza (H. O. Long).
Fl.-Officer R. S. Carroll ..	S.E.5A, 200 h.p. Wolseley Viper (R. S. Carroll).

2nd Croydon Handicap.—For machines with a speed of less than 100 m.p.h. Three laps of the circuit. Distance approximately 24 miles.

Entrant.	Machine, Engine and Pilot.
Vice-Admiral Mark Kerr, C.B., M.V.O.	B.E.2E, 90 h.p. R.A.F. (Mark Kerr).
Dr. E. D. Whitehead Reid	D.H.6, 90 h.p. R.A.F. (E. D. W. Reid).
Fl.-Cadet N. Vintcent ..	Avro, 110 h.p. Le Rhone (N. Vintcent).
Henry Petre	Avro, 110 h.p. Le Rhone (H. Petre).
C. Dudley Palmer ..	Avro, 110 h.p. Le Rhone (C. Dudley Palmer).

1st Spring Handicap.—For machines occupying the first three places in the Waddon and Croydon Handicaps.

Four laps of the circuit. Distance, approximately 32 miles.

Parachute Descents.—Double Parachute Descent by W. Newell in a "Guardian Angel" Parachute.

Parachute Drop of a dummy man with "H" type "Guardian Angel" parachute, showing the use of a resistance parachute in a nose dive.

Exhibition of mail-dropping types of "Guardian Angel" Parachutes.

Balloon Sniping Competition.—Competitors :—Lieut.-Col. C. E. Risk, D.S.O., Capt. A. F. Muir, Flight-Cadet N. Vintcent and F. P. Raynham.

Three small balloons will be released at short intervals. The machine will carry a passenger whose object is to shoot down the balloons. An ordinary shot gun will be used, and the competitor who destroys the three balloons in the shortest time will be the winner.

How to reach Waddon Aerodrome, Croydon.—By train from London Bridge to Waddon.

By train from Victoria, Charing Cross and London Bridge to East Croydon and thence by tram or 'bus to the aerodrome.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

PERSONALS

Married

On January 31, at St. Thomas' Cathedral, Bombay, Flying Officer G. J. STROUD, M.B.E., R.A.F., was married to JANET MAY, only daughter of Mr. and Mrs. EDWIN BARTON WOODGATE, of High Halden, Kent.

To be Married

The engagement is announced between EVELYN JACK NEEDHAM, late Capt. 3rd Northamptonshire Regt. and R.F.C., elder son of the late Lieut.-Col. the Hon. H. Colville Needham and the Hon. Mrs. Needham, The Gate House, Windsor, and MARY CAMPBELL, only child of the late Rev. BENJAMIN CAMPBELL LITTLEWOOD and Mrs. LITTLEWOOD, Hillside, Bracknell, Berks.

The engagement is announced of Flying-Officer BERNARD LESLIE BLOFELD, R.A.F., third surviving son of Mr. and Mrs. H. Blofeld of the "Woodlands," Sydenham Hill, and DOROTHY EVELYN FIRMIN, widow of J. E. Firmin, Lieut. 5th Batt., Wiltshire Regt., and eldest daughter of Mr. and Mrs. A. G. CHIFFERIEL, of Inverleith, Denbigh Gardens, Richmond Hill.

Killed

DENYS NEWSON DICKSON, R.A.F., who died on March 23 as the result of a flying accident, was the younger son of Algernon and Edith Dickson, of Tower House, Woolton Hill, Newbury. He was aged 22 years.

Item

The will of Lieut. ANDREW BEAUCHAMP PROCTOR, V.C., D.S.O., M.C., D.F.C., of the Central Flying School, Upavon, Wilts, who died on June 21 last, the result of an accident while flying, has been proved at £945.

LONDON TERMINAL AERODROME

Monday Evening,
April 10, 1922.

New British "Expresses" Scheduled

Handley Page Transport began their new service to Paris on Tuesday. A machine is now timed to leave Croydon each morning at 10 a.m. and return from Paris at 3 p.m. The Instone Air Line have also put on a 10 a.m. service, and have altered the time of their midday service to 3 p.m. The Instone Air Line start operations on the London-Brussels service route on May 1, when they intend to run one machine in each direction daily, and I understand that the fare will be the same as last year—that is to say, £5 5s.

On Thursday tests with a new life-saving parachute were held above the aerodrome. The idea was to provide a parachute which would actually lift a pilot out of his seat in a aeroplane without his having to jump and fall some distance before the parachute opened. To attain this object a small parachute is first of all flung out, and this, opening in the rush of wind, drags the full-sized parachute from its housing. This in its turn opens, and lifts the pilot out of his seat.

Captain Muir, flying one of the Royal Aero Club "Avros," took up this apparatus, which was tried initially with a dummy. In order to prevent any fouling of the controls, should the apparatus fail to work, the dummy was placed on the wing rather than in the back seat of the machine. Two ascents were made, but, although it was shown that the idea would work, details of the release-gear require alteration before the dummy is replaced by a human being.

The Early-Morning Newspaper Service

The Messageries Aériennes have been putting up an extremely good show with their aerial newspaper service, which is now scheduled for early each morning. Considering the state of the weather, the regularity obtained by this service has been reminiscent of the days of Aircraft Transport and Travel, and I understand that the various newspaper firms who are sending consignments have been very pleased indeed with results up to date. Mr. Grosfils, by the way, expects to have his Haymarket office open this week, and flew over to Paris on Tuesday in order to complete arrangements for certain schemes which the Messageries have in hand.

One of these projects is, I understand, to be an arrangement whereby a party of three or five people can, by paying the ordinary air-fare and giving a day or so's notice, have a special machine to leave at any time convenient to themselves. It is expected that there should be quite a demand for this facility, especially as there have already been several inquiries from ladies who wish to fly over to Paris and do a day's shopping, returning to London the same evening.

On Wednesday night tests were carried out on the lighting of the British section of the London-Paris airway. Temporary lights had been installed at the lighthouses at Tatsfield and Cranbrook, and the full lighting was in operation at the aerodromes of Croydon and Lympne. A Handley Page 0-400, belonging to the R.A.F., flew over from Biggin Hill, and, after making a landing at Croydon down the beam of a searchlight, ascended again and flew along the airway at Lympne. The "cone" light at Lympne was picked up long before the lighthouse at Cranbrook was lost sight of. The people on board remarked, in fact, that it was easier with these lights to follow the route at night than by day. After crossing the Channel the machine returned to Croydon, circled round the aerodrome, and then returned to Biggin Hill.

I understand, incidentally, that the wireless on this particular Service Handley Page was so much below the civil aviation standard that the wireless operator at Croydon was unable to get into satisfactory communication with the machine.

Night-Flight with a "Goliath" from Paris

The Grands Express "Goliath," equipped for night flying is, weather premitting, to make an attempt at a night flight from Paris to London tomorrow (Tuesday) night. M. Labouchere will pilot the machine.

This "air express" is the only foreign machine employed on the "airways" which is fitted with wireless, but its installation has, so far, been unsatisfactory. There seems to be some mysterious reason why foreign companies are unable to obtain the same apparatus the British companies use, and which is most satisfactory.

While on the subject of wireless, it is interesting to hear that a private message, sent from a passenger in an "air express" over the Channel to his office in the City, was actually received in that office only one minute after it had been dispatched from the "air express" by wireless.

On Tuesday Mr. Alan J. Cobham arrived from Stag Lane to take the Instone D.H. 34 back for finishing touches and minor adjustments.

Mr. Cobham tells me that the De Havilland Aircraft Company have now a fleet of six D.H. 9 c's, which are available for "taxi" work, and that they are also prepared to accept pupils for training as pilots. Already they have had a number of ex-Service pilots to take "refresher" courses, which consist of an hour's "dual" on a D.H. 6, followed by "dual" and "solo" on a D.H. 9.

The Cup which Messrs. Napier presented for competition for inter-section football was received on the aerodrome on Saturday, and is now on view in the Post Office. The Instone team won this trophy last year.

Mr. Saul, who has been navigation officer on the aerodrome for some time, has left to join a new service which Daimler Hire, Ltd., are commencing. They intend to run a fleet of motor-yachts in a similar manner to their fleet of cars—their motto, apparently, being, "Land, sea, or air, Daimler Hire will get you there."

The Schoolboys and their Air Trip

The 24 Harrogate schoolboys who were to have travelled by air to Paris on Saturday were prevented from flying by bad weather, and had to go by train and boat. They were so disappointed that, after a hasty consultation, it was arranged that on their way back from their Continental tour on April 25, they should fly from Paris to London.

On Tuesday, when the new 10 a.m. services of Handley Page and Instone were started, two D.H. 18s, one operated by each firm, left the aerodrome within two minutes of one another, and, aided by a following wind, sped at a great pace to Paris.

They were reported over Lympne only 35 minutes after leaving Croydon, and less than 10 minutes later a wireless message from one of them reported passing Boulogne. The last machine to start actually gained on its rival, arriving at Le Bourget only one minute behind it, having accomplished the journey in 1 hour 59 minutes.

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LONDON-PARIS MACHINES COLLIDE

On Friday of last week an extremely regrettable and most unusual accident marred the running of the London Continental Air Service, which has hitherto been remarkably free from serious disasters. It is an accident, also, all the more unfortunate in that it involved the recently inaugurated Daimler Hire Service. A Goliath belonging to Grands Express—F-GEAD—piloted by M. Mire and carrying a mechanic and three passengers had left Le Bourget at 12.6 p.m. for Croydon. The weather was very misty and visibility bad, and when flying over Thieuloy, near Grandvilliers, at a height of only a few hundred feet, a D.H. 18, from Croydon—G-EAWO—of the Daimler Service, piloted by R. E. Duke and carrying a boy steward and mails, suddenly loomed out of the mist. Before either pilot could turn, the machines collided, and then crashed to earth in flames. The D.H. 18, it is stated, had its wing and tail broken off by the impact and fell immediately, whilst the Goliath swooped to earth a little further off. Assistance was at once rushed to the wrecked machines, but with the exception of the boy steward —Hesterman—who was terribly injured, all were found to be dead. The boy was taken immediately to the village, but died from his injuries some time later.

R. E. Duke was a well-known pilot of the Continental services, and had a distinguished war record in the R.A.F. He was formerly, before joining the Daimler service, with the Aircraft Transport and Travel Co. and the Royal Dutch Aviation Co. M. Mire, the French pilot, was also well known as a Continental Air Service pilot, and had been flying for Grands Express for over a year.

The following message of condolence has been sent by the Secretary of State for Air to M. Laurent Eynac, French Under-Secretary of State for Air, and to the Chairman of Daimler Hire, Ltd. :—

"In my own name and that of the Air Council I offer you my deep sympathy on the fatal air collision which occurred yesterday, the only accident of this kind in the history of air transport between Great Britain and France.

(Signed) Frederick Guest,
Secretary of State for Air."

THE ROUND-THE-WORLD ATTEMPT

Sir Ross Smith's Proposed Route

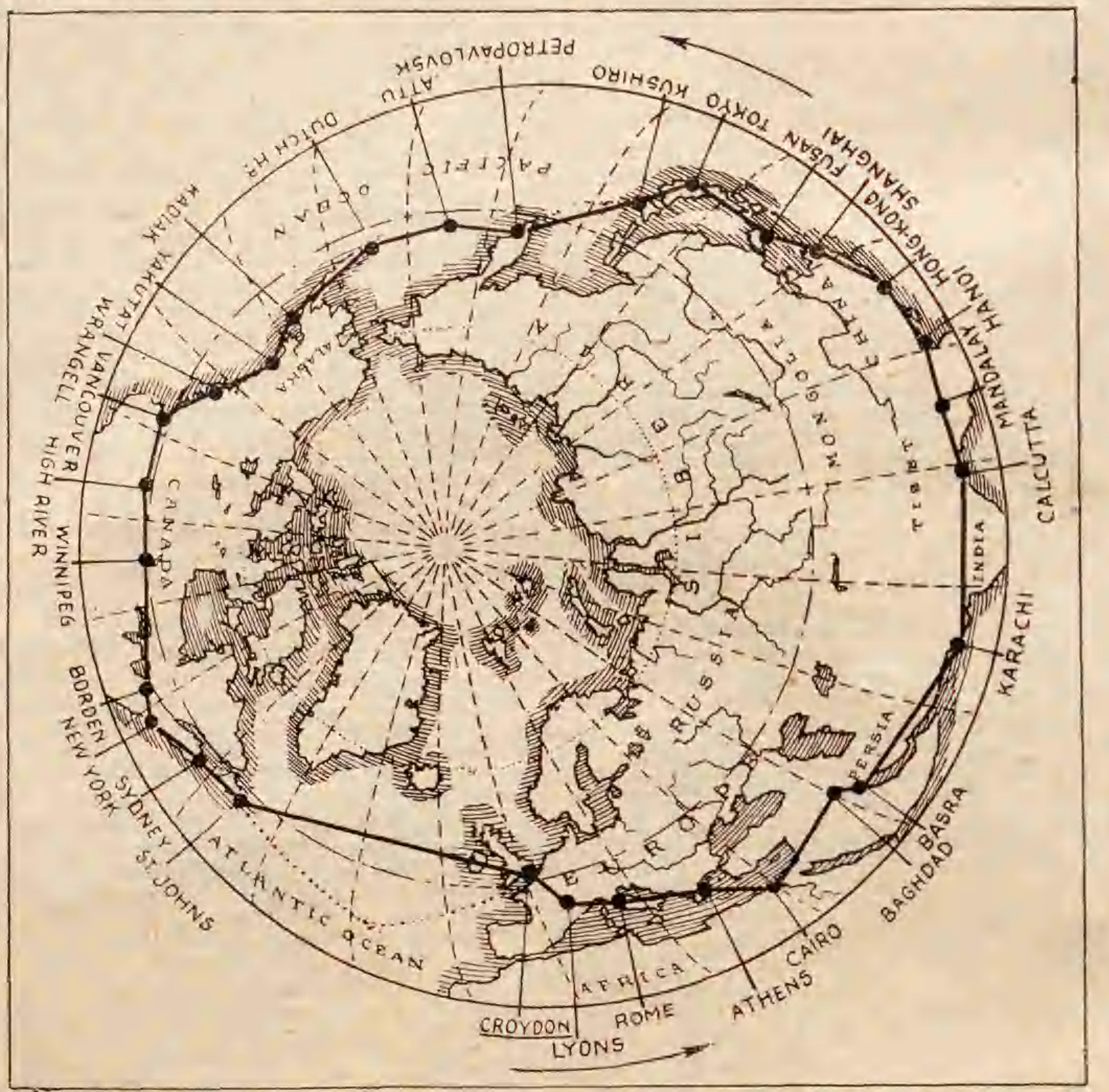
IT is now some time since the first announcement was made of the intention of Sir Ross and Sir Keith Smith to attempt the flight around the world. In the interval plans have matured, and the machine, a Vickers "Viking" Amphibian, Napier "Lion" engine, has been finished and tested. Needless to say, there are numerous preparations to be made before such a flight can be attempted, and it has been necessary to postpone the start until some time this month. All being well, it is hoped that a start may be made from Croydon on Tuesday, April 25, but a good deal will, of course, depend upon weather conditions and other factors affecting the flight.

It is not the intention of Sir Ross to attempt to beat Phineas Fogg, Jules Verne's hero of "Round the World in Eighty Days," although with a fair amount of luck this should be possible. It is hoped, however, to make the tour, which will be approximately 22,000 miles in length, in about three months, and in order to ensure fitness both of machine, engine and crew, it is intended to limit flying to approximately six hours per day, with every fourth day or so, according to circumstances, set aside for rest. In the case of the crew this rest will probably take the form of strenuous work on machine and engine, but it has often been stated that a change of occupation is as good as a rest, so that going on that assumption everything should work out satisfactorily. In any case, both Sir Ross and Sir Keith, and Lieut. Bennett, who accompanied them on the flight to Australia, have proved themselves capable of standing the strain, and there is every reason to hope that they will be able to do so again on this occasion.

As on the previous great flight, Sir Ross Smith will pilot the machine, while Sir Keith will act as navigator and wireless operator. Lieut. Bennett will, as before, look after the machine and engine, and one is thus assured that both will receive the very best attention. We understand that in order the better to fit himself for his responsible duties Sir Keith Smith has been undergoing a course at Biggin Hill, and that he is now well qualified to navigate the machine on its epoch making flight.

Among the instruments carried on the flight will be a very fine photographic equipment, and both cinematograph and "still" pictures will be taken *en route*. Thus it is hoped that a pictorial record of very considerable value will be obtained to supplement the account of the tour.

As regards the machine, this, as already stated, will be one of the Vickers "Vikings," with 450 h.p. Napier "Lion" engine. A very similar machine was illustrated and described in detail in our issue of October 6, 1921. There is thus little need to go into details here, and it suffices to indicate briefly the main points in the design. The machine is of the flying boat type, built as regards the hull of a light framework of rock elm covered with "Consuta" ply-wood. The wings are of the biplane type, with the Napier "Lion" mounted high in the gap between them, driving a pusher airscrew. The tail is also of the biplane type, which is a feature peculiar to most Vickers machines of Mr. Pierson's design. The "amphibian" gear consists of two wheels so mounted that they can be raised clear of the water by travelling up quadrants mounted on the sides of the hull. The petrol is carried in tanks in the boat, and is forced to a gravity tank in the top plane. For the trans-Atlantic portion of the flight an extra supply of petrol will be carried, and it is hoped to cross in about 18 hours if weather conditions are favourable. If not,



SKETCH MAP OF SIR ROSS SMITH'S PROPOSED ROUTE: This map has been drawn from a globe, and gives a very good idea of the manner in which it is proposed to circle around the earth. By turning the map around, the names of the various ports of call are very conveniently read. No attempt has been made to show the actual path followed by the machine, the different points being linked up by lines which are straight in the map, but which, if followed, would, of course, result in curved paths.

probably the southern route *via* the Azores will be taken which, although longer, does not involve quite so long non-stop flights.

The route which it is proposed to follow is shown in the accompanying map. Starting from Croydon, the machine will cross the Channel and proceed down through France, probably stopping at Lyons for the night. The next stage will be to Italy, probably Rome, whence the machine will cross to Greece. Cairo is to be the next port of call, and leaving here a course will be taken across the desert to Baghdad. Basra and Karachi come next, and flying across the upper part of India, Calcutta will be the next port of call. Leaving Calcutta the machine will cross Burma to Mandalay, and hence it will proceed to Hanoi in French Indo China. Hong Kong, Shanghai and Fusan (the latter in Korea) will be reached next, and the adventurous travellers will then cross to Japan. From here a course will be laid for Petropavlovsk in Kamchatka.

The next stage will include fairly long distances across the sea, the machine following the curve of the Aleutian Islands rather than attempting to shorten the sea route by going farther north into the Bering Strait. It is expected to make stops at Attu and Dutch Harbour in these islands, and Alaska will be reached *via* Kadiak Island. The mainland will be made at Yakutat, on the coast of Alaska, and the travellers will thence commence their journey across Canada *via* Fort Wrangell, Vancouver, High River, Winnipeg, and the great lakes to Borden and New York. After a stay at New York it is the intention to start on the longest single stage of the journey, *i.e.*, across the Atlantic. If weather conditions permit the direct route, *via* Sydney and St. Johns, Newfoundland, will be attempted. If not, it is possible that the southern route, *via* the Azores and Portugal, may be chosen. In any case this portion of the route will present difficulties in the way of a long non-stop flight, although in other respects it may be less difficult by far than some of the other stretches that have to be negotiated.

The task is a difficult one, and a great variety of geographical and climatic conditions will be met with. Thus the flight will be a very severe test both of men, machine and engine. However, there is reason to suppose that, given a reasonable amount of luck, the flight will be completed. It is difficult, but certainly not fantastic, and it cannot but do a great deal of good as a piece of propaganda. That Sir Ross Smith has chosen the right type of craft for the attempt is quite evident. In fact, we should be inclined to say that no machine but an amphibian would have much chance of getting through. Certain of the ports of call require a landing to be made, and would thus rule out the pure seaplane. Others, and perhaps the majority, call for alighting on water, and rule out the land machine. By combining the two, although this means carrying a certain amount of extra weight, there is a good possibility of being able to alight safely anywhere *en route*, and thus the chances of success are considerably enhanced. We are certain all our readers will join us in wishing the aviators *bon voyage*.

THE ROYAL AIR FORCE STAFF COLLEGE

THE Royal Air Force Staff College, Andover, Hants, which is commanded by Air-Commodore H. R. M. Brooke-Popham, was officially opened on April 4. The Chief of the Air Staff, Air-Marshal Sir H. M. Trenchard, had intended to perform the ceremony, but he was unable to attend, owing to other urgent official duties, and his place was taken by Air Vice-Marshal Sir J. M. Salmond, A.O.C., Inland Area, R.A.F., who read the inaugural address on behalf of Sir Hugh Trenchard.

There were present at the opening, in addition to the Commandant, staff and pupils of the first course, the following senior officers of the Royal Air Force: Air Vice-Marshal A. V. Vyvyan, A.O.C., Coastal Area, R.A.F.; Air Vice-Marshal P. W. Game, Director of Training and Organisation, Air Ministry; Air Commodore F. R. Scarlett, A.O.C., R.A.F., Halton; Air Commodore J. M. Sterle, Director of Operations and Intelligence, Air Ministry; Group Captain T. C. R. Higgings, Commanding No. 7 Group, Inland Area, R.A.F.; Mr. W. F. Nicholson, Secretary to the Air Ministry; and Mr. W. A. Bland, Deputy-Secretary, were also present.

In the opening remarks of his address, Sir Hugh Trenchard expressed his pleasure that they had reached the day of the opening of the Staff College—"the cradle of our brain." It was a great day for the Royal Air Force, especially, looking back at the formation of the Central Flying School with its Naval and Military wings, and then looking at the present work of the Air Service as a whole.

"Our relations," he proceeded, "with the older Services, have now been defined, as you have seen, by the Government in the House of Commons, for all to read. The integrity of the Air Service is assured, and though our relations with the Navy are still under discussion, I want all officers and men to realise how much the two older Services want to help us, and we must put aside from our minds, any idea that we are omnipotent and that we, and we alone, are the people that cannot be argued with. For practical purposes of the defence of the Empire, the three Services are really one Service, and all of you must realise that, whatever happens, whatever discussions arise, it is all three that will defend this Empire. In some cases, one will play a major part, sometimes another. In some, all will play an equal part.

He next touched upon the importance of all instructors and officers observing the strictest secrecy as to the confidential matters of policy it will be their business to discuss, and it was, for every one of them, to remember that the honour of the College was in their keeping. "Never," he said "abuse this confidence, and never allow confidential or secret matters to escape from the circle of your comrades."

"Remember," he continued, "that the one great thing to which you should, at all times, apply your thoughts and brains, is the expansion of the power of material and personnel without increasing either. . . . What you have to weigh, and weigh carefully, is the balance between cost and efficiency. If efficiency is equal in each case, which is the more economical?"

"I very often hear of officers saying "My squadron is more efficient than so-and-so's squadron," but seldom did I, in the old days, hear of an officer saying "My squadron is as efficient as so-and-so's squadron, but I run mine at half the cost in petrol and tyres and machines." It is from that point of view that I want every officer to approach the question, to procure a maximum of efficiency at a minimum of cost, and to take a pride in the result as they do in economy in their homes." . . . "I do not want you to think that efficiency is not still an important factor, but I do want you to have it constantly in mind, that economy is as great a factor."

The war-like conditions take a long while to die, but by degrees, both officers and men throughout the Air Force, must be taught to encourage economy in their own interests, and each unit must realise that, by being more economical than any other unit, they are benefiting the Air Force as a whole."

Touching upon the development of the Air, not in substitution for other forms of defence, but to meet new forms of attack, which, for the British Empire, is really the vital question, Sir Hugh Trenchard said he hoped it would be possible for Air Commodore Brooke-Popham to get Naval and Military officers to come and give their views on this subject, so that it may be studied as a whole and not in water-tight compartments.

On the question of the Air, as an auxiliary to the Army and Navy, he said that he knew that the two older Services only wanted to help the Air Force, and that they looked, with a single eye, to the defence of the Empire as a whole.

"In the same way, we know they would help us to solve our problems, so we, on our side, must do our utmost to help them in solving theirs."

Coming to the question of our Reserves, Sir Hugh said, "It is impossible in peace time, to maintain a force big enough for any eventualities, nor should it be necessary. Therefore, we have three types of Reserve, the first being the people who, in the ordinary way, pass out of the Air Force into the Regular Reserve. Secondly, a form of Auxiliary Air Force, acting as the Territorial Force does towards the Army; and I foresee that this will be a most important force for the defence of these islands in time to come, and by its means, I hope that, the knowledge of the advantages of aviation will spread to our civil population. Thirdly, we have civil aviation. We must look to the civil aviation that is developing, or may be developed, in the future for a Reserve. If a large number of machines and pilots can do useful commercial work in their civil capacity, they will be of inestimable value as a Reserve for war."

Having dealt with some of the wider aspects, Sir Hugh Trenchard turned to matters of a less general character, in which he gave, to instructors and pupils alike, some very sound and helpful advice, concluding his admirable address by saying "the setting up of the Staff College is a signpost, and on the signpost are the words to EFFICIENCY, ECONOMY and FORESIGHT."

AERODYNAMICAL EFFICIENCY AND THE REDUCTION OF AIR TRANSPORT COSTS*

By **M. LOUIS BREGUET.**

THE possibility for aeroplanes used in air transport services to be made to pay has, so far, been very often questioned, considering the present cost price per ton-mile flown.

I intend to demonstrate that one can, from now, predict an important reduction in air freight rates, not only through greater safety of flight, mainly resulting from a longer life of aeroplanes and engines, but also through the betterment of several coefficients which characterise the aerodynamical qualities of aeroplanes.

The study of these coefficients can be made either by laboratory tests on models or by full-scale tests in flight, which, if judiciously interpreted, should yield information sufficiently accurate for practical purposes. I am of opinion that these full-scale tests have not been given yet all the attention and extension they deserve. I read a paper on that subject at the last international Air Navigation Congress which was held in Paris last November.

May I remind you that the principles of aerodynamics lie in the following formulæ :—

$$R_x = (K_x + \sigma/S)SV^2 \quad \ldots \quad (1)$$

wherein :—

R_x is the total drag of the whole aeroplane along the direction of motion.

K_x is a coefficient relating to R_x and dependent upon the value of the angle of incidence in flight.

σ is the projected area, normally to the direction of motion, representing the passive resistances of the aeroplane.

S is the projected area of the wings on a plane parallel to the direction of motion.

V is the speed of the aeroplane along the trajectory.

$$R_y = K_y SV^2 \quad \ldots \quad (2)$$

wherein :—

R_y is the lift of the aeroplane, normal to the direction of motion.

K_y is a coefficient relating to R_y and dependent upon the value of the angle of incidence in flight.

Dividing equation No. (1) by equation No. (2), which gives the ratio of drag to lift, we have :—

$$R_x/R_y = (K_x + \sigma/S)/K_y = \tan\phi \quad \ldots \quad (3)$$

That expression $\tan\phi$ is usually called the "fineness" of the aeroplane, and every aeroplane is characterised by a certain minimum value of $\tan\phi$ which can be represented by $\tan\phi_m$. The smaller $\tan\phi_m$ is the better will be the aerodynamical qualities of the aeroplane.

We will now consider the formula giving the longest distance which a given aeroplane can fly in a "no wind" atmosphere (which formula I established during the war).

$$L = (622\ \rho/m \tan\phi_m) \log P/(P - p) \quad \ldots \quad (4)$$

wherein :—

L is the said longest distance in kilometres.

ρ is the efficiency of the propeller.

m is the "fuel and oil" consumption of the engine per horse-power and per hour in kilogs.

P is the total weight in kilogs. of the aeroplane and cargoes at the start.

p is the weight in kilogs. of the "fuel and oil" consumed by the engine during the flight and which was included in P.

One at once realises the very great importance of the fineness $\tan\phi_m$ which is the only term depending upon the aerodynamical qualities of the aeroplane.

For certain given values of L, ρ, m and P, a reduction of $\tan\phi_m$ causes a reduction in the "fuel and oil" consumption, and consequently increases the weight of paying freight which could be carried.

The conclusion is that one must bring to the minimum the value of $\tan\phi_m$. It can be obtained by choosing the best possible profile for the wings, the best designs for the body, empennage, etc. Moreover, the undercarriage should be made to disappear inside the body or the wings when the aeroplane is in flight, etc.

The power spent in horizontal flight is given by the formula :—

$$W = R_x V = (K_x + \sigma/S)\,SV^3 \quad \ldots \quad (5)$$

where

W is the power in kilogs.

R_x is the drag in kilogs. as calculated by formula (1).

S is the wing area in sq. m.

V is the speed in metres per sec.

On another side, the value of the lift, as given by formula (2), is equal to the total weight P of the aeroplane in horizontal flight. We thus have :—

$$P = R_y = K_y SV^2 \quad \ldots \quad (6)$$

Eliminating the speed V between the two equations (5) and (6) we come to the formula giving the power W :—

$$W = P\sqrt{(P/S)}\,(K_x + \sigma/S)/(K_y)^{3/2} \quad \ldots \quad (7)$$

We thus see that the necessary power is in direct proportion to the value of the term

$$(K_x + \sigma/S)/(K_y)^{3/2}$$

I have represented the term by the Greek letter ξ and call it the *coefficient of power*.

For a given aeroplane, the value of ξ will reach a minimum for a certain angle of incidence in flight, and to that particular value of ξ will correspond the minimum of power required, and that is why I propose to call that special value ξ_m the *coefficient of minimum power*.

That coefficient of minimum power can be used to calculate the minimum power necessary to maintain in horizontal flight, a given aeroplane, and the height of ceiling chosen will fix the margin of power to be provided. One can, therefore, see that, should it be possible to reduce in the proportion of two to one, for instance, the value of ξ_m, then an engine of half the power would be sufficient to reach the same ceiling, and here, again, we come to the conclusion that the aerodynamical qualities of the aeroplane must be improved as much as possible.

I am now going to show you how one can design in the near future, starting from existing aeroplanes, new ones which should bring down the rate of aerial freight to the value of those now charged in France for first-class railway passengers.

An aeroplane of high standard quality now has :—

A fineness equal to	0.12
Its coefficient of minimum power is equal to ..	0.55
Its propeller efficiency is	0.73
Fuel and oil consumption of its engine at an altitude of 2,000 m. is 290 gr. per horse-power and per hour.	

We will, moreover, admit the total weight of that aeroplane to be such as to allow it to climb to 4,500 m. within 1½ hours, and we will consider an aerial line of 800 km. non-stop flights.

If such an aeroplane has a wing surface of 100 sq. m., for instance, and a power plant of 600 h.p., its dead weight will be equal to 2,200 kilogs., and it will be able to carry a total load of 2,100 kilogs. Its total weight will thus be equal to 4,300 kilogs.

Its flying speed at full power, at an altitude of 2,000 m., will reach 175 km. an hour, and its commercial speed at the same altitude can be reckoned as to be equal to 150 or 155 km. an hour.

The weight of fuel and oil necessary in a still atmosphere, for a given flight, is deduced from the formula (4), which in the present case, gives the weight as being 568 kilogs.

But practical flying has proved that one must expect to have to fly against a 50 km.-an-hour wind, and, therefore, it is necessary to have at least a 50 per cent. safety margin in fuel and oil. In other words, we shall have to carry in the case under consideration a total weight of fuel and oil equal to 568 × 1.5 = 850 kilogs., whilst the average consumption will only be of about 1.1 times the calculated quantity of 568 kilogs., that is to say, 625 kilogs.†

The crew (pilot and second pilot-mechanic) together represent a weight of about 180 kilogs., and another 70 kilogs. are necessary for various instruments and T.S.F. apparata.

The total weight of fuel and oil, crew and instruments, thus reaches 1,100 kilogs., leaving a clear margin of 1,000 kilogs. for passengers and paying cargo.

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* Paper read before The Royal Aeronautical Society, April 6, 1922.

† The coefficient 1.1 is the average of data registered on several hundred flights.

The present running costs of an aerial line of 800 km. long, with the above aeroplanes, are as follows :—

	Francs.
Petrol (820 litres at 1.82 francs for 800 km. flown) per km.	1.87
Oil (50 litres at 3 francs for 800 km. flown)	0.19
Crew (pilot at 0.20 francs per km., second pilot-mechanic at 0.15 francs)[*]	0.35
Sinking fund for aeroplane and engine	6.50
Upkeep of aeroplane and engine, and aeroport expenses, etc.	4.50
General expenses of the company	4.00
Francs	17.41

Should an aeroplane always fly with full cargo load, and without incident or interruption, the cost price per ton and per kilometre would thus be about 17.40 francs. But one has to reckon with trips made with smaller paying loads, or incidentally interrupted, and, therefore, it is wise to calculate the cost price per ton on flights with half cargo loads as an average, which brings the present cost price per ton and per kilometre to 35 francs. That is the price at which are now working the best aerial lines.

Should such prices be considered as irreducible, they would be practically prohibitive, and little chance would be left to commercial aviation, since one would have to charge from 1,100 to 1,200 francs per passenger from Paris to London or *vice versa*, without any profit to the company.

How can these figures be reduced in the near future? We will consider :—

1. Advantages to be drawn solely from the betterment of aerodynamical qualities of the aeroplanes and of the thermal efficiency of engines.

2. Advantages resulting from such improvements in the engines and in mechanical parts of aeroplanes as would bring reductions in the provision for sinking funds, upkeep of machines and general expenses.

1.—Advantages to be drawn solely from the betterment of aerodynamical qualities of the aeroplanes and of the thermal efficiency of engines.

Taking, for the sake of demonstration, the same size of aeroplane as already considered, that is to say :—

Wing area : 100 sq. m.
Total weight : 4,300 kilogs. at the start.
Ceiling : 4,500 m.

And if we suppose that we can bring down :—

Its fineness to	0.065	instead of	0.12
Its coefficient of minimum power to	0.28	,,	0.55
Its propeller efficiency to	0.775	,,	0.73
The fuel and oil consumption of its engines per horse-power and per hour to	215	,,	290 gr.

then such an aeroplane will not require more than 288 h.p. to reach the same ceiling of 4,500 m.

It is evident that the reduction in power is only due to the betterment of the fineness and of the efficiency of the propeller.

One can thus spare 312 h.p., which means a saving of 468 kilogs. of dead weight (at the rate of 1½ kilogs. per h.p. for the engine and its appliances).

The quantity of fuel and oil to be carried can be deduced from the formula (4), as has already been done for the first type of aeroplane considered. This gives

$$p = 230 \text{ kilogs.}$$

The weight it is wise to carry up will be taken equal to

$$230 \times 1.5 = 345 \text{ kilogs.}$$

and the average actual consumption will be about

$$230 \times 1.1 = 255 \text{ kilogs.}$$

The weight saved on fuel and oil with the second type of aeroplane will thus be practically

$$850 - 345 = 505 \text{ kilogs.}$$

and the excess of useful load is thus increased to a total of

$$468 + 505 = 973 \text{ kilogs.}$$

The commercial efficiency of that type of aeroplane will thus be practically double that of the first type, since it will be able to carry 1,973 kilogs. of passengers or paying freight, instead of 1,000 kilogs.[†]

At the same time, that aeroplane will cost 25 per cent. less than the first, since its power plant will only be half the size of the first, and the value of the power plant now represents about half the price of an aeroplane.

The running cost of the new type of machine will then be as follows :—

	Francs.
Petrol (335 litres at 1.82 francs for 800 km.) per km.	0.765
Oil (20 litres at 3 francs for 800 km.)	0.075
Crew	0.35
Sinking fund (75 per cent. of 6.50 francs, since the cost price of the aeroplane has been found reduced in that proportion)	4.90
Upkeep of aeroplane and engine and aeroport expenses	4.50
General expenses of the company	4.00
Francs	14.59

As the paying load has been raised to 1,973 kilogs., the cost price per ton and per kilometre, becomes equal to 7.40 francs, or—if calculated on a half cargo load basis—14.80 francs, instead of the present cost price of 35 francs. London to Paris passenger fares can then be brought down to some 450 or 500 francs, without profit for the company. Although very high, these last figures are more encouraging and nearly workable.

2.—Advantages resulting from such improvements in the engines and in mechanical parts of aeroplanes as could bring reduction in the provisions for sinking funds, upkeeping and general expenses.

When one can rely on an average life of 1,000 hours for aeroplanes and engines, instead of the present 200 or 250, much better prices will be obtained. Supposing that such an aeroplane be bought for the same price as the last one mentioned, but calculating on 1,000 hours life, the sinking fund only calls for 1.10 francs, whilst the upkeep can be reasonably considered as half as expensive, since the aeroplanes and engines will be of much better quality and strength. General expenses will also be considerably reduced through the much larger turnover that the companies will then be able to secure.

In such conditions, the running costs would be as follows—

Petrol per kilometre, francs	0.765
Oil	0.075
Crew	0.35
Sinking fund	1.10
Upkeeping	2.25
General expenses	1.00
Francs	5.54

That is to say, 5.55 francs for 1,973 kilogs. carried, or 2.82 francs per ton and per kilometre, or 5.65 francs if calculated on the usual half cargo load basis. Then the Paris to London fare will become about 190 francs, or say £4.

When that time comes, then the aerial transport companies will be flourishing paying concerns, and no more subsidies will be required from the State, because the time spared in travelling by air from Paris to London, for instance, will certainly be worth a fare of, say, £6.

It is worth noting, in the last cost price we have given, that fuel and oil, although intrinsically very expensive, amount only to 15 per cent. of the total cost price, whilst the crew draws 6.4 per cent.

On the other side, sinking fund, upkeep and general expenses, which, on the present cost of 35 francs, represent 86 per cent. of the total cost price, have grown to 92 per cent. with the second example, and come down to 78 per cent. in the last considered circumstances.

May I, therefore, state—in opposition to the sayings and writings of certain experts who do not know much about aerial transports—that it is not the cost of fuel or crew which makes aeroplanes expensive machines, but only their present short life, with resulting consequences. But we must expect and hope to see large and strong aeroplanes of the future become as safe as motor cars, steamships and railways, and when that time comes, then we will be able to apply to sinking funds the same coefficient as is now used for steamships, that is to say, an average life of twenty-five years!

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[*] Several companies now have to spend an average of 0.50 francs per kilometre for the crew, but that is because their lines are rather short ones (say, 375 km. on Paris-London), and also that the crew only flies one single trip a day, and not every day. With the present minimum of salary one has to guarantee them, as also with the number of pilots one has to keep according to subsidies-regulations, these pilots are far from rendering efficient work (from "distances flown" point of view). The figures I have taken of 0.35 francs apply to lines of some 800 km., a few of which are now in contemplation.

[†] As a matter of fact, one should deduct from that weight some 180 to 200 kilogs., for the accommodation of the surplus of passengers and freight. But on another side, one can reasonably expect that the daily progress made in the manufacture of aeroplanes and the use of stronger material will allow saving on dead weight of practically the same amount.

From the example I have taken for the purpose of demonstration, of an aeroplane of 100 sq. m. wing area and 4,300 kilogs. total weight, you must not infer that I expect the improvements of aerodynamical qualities (with the consequences I drew from it) to be realised by such small machines. I believe one can build very good aeroplanes of 4 to 5 tons total weight; but I think it would be much nearer to reality to talk of 500 sq. m. wing surface, 20 to 40 tons total weight and 1,500 to 4,000 h.p. Such large machines will, most probably, have very thick wings. By thick, I mean about 6 ft., and within these wings will be provided cabins, saloons and every comfort for passengers. It is worth noting that if a large increase of the size of an aeroplane does not improve materially its commercial efficiency, it has, nevertheless, the great advantage of allowing much more room for passengers and freight, and that can be easily understood when one remembers that whilst the weight, the power, the capacity in cargo and the cost price of an aeroplane vary as the square of its lineal dimensions, the volume to be reserved for passengers will vary as the cube of the same dimensions. In other words, if the weight, surface and power have been increased 100 times, then the cubic capacity will be 1,000 times larger.

It is not exaggerated to talk of the days when the price of aerial transport will come down to 2 francs per ton and per kilometre, since an average life of two or three years—or say 2,000 hours of flight—for aeroplanes and engines would suffice to bring that result, even with petrol and oil at their present very high prices. It is practically certain that aeroplanes of the future will not burn petrol but rather heavy oils or other cheap fuels, the cost price of which should be about one-fifth that of petrol.

Now, first-class passenger fares in France are calculated on the basis of 21.15 francs per 100 km. Supposing that a passenger with his hand luggage weighs an average of 90 kilogs., we find that the ton-kilometre (passenger) runs to 2.35 francs. That shows that the future prices of aerial transports will be of the same order as the present first-class passenger fares in France.

More striking still is the comparison with the fares on steamship lines, since a first class passenger nowadays pays about 6 francs per ton-kilometre, whilst state cabins are charged at the rate of 10 francs.

In conclusion, aerial transports are expensive for the present, because they are not yet out of the experimental stage, and that the sinking funds, the upkeep and general expenses are very heavy; but one can reasonably say, that within 10 years, these costs should be reduced in the proportion of seven to one, and within 20 years in the proportion of fifteen to one.

We must therefore work hard and steadily, with full confidence in the future of aviation.

A WAR RECORD OF GERMANY'S AIRSHIPS

In a summary of statistics of the Zeppelins and other airships employed by the German Navy during the war, published in the *Marine Rundschau*, the facts concerning these aircraft are available for the first time. Included, *The Times* Berlin correspondent states, is a complete list of naval airships, with the names of their commanders and watch officers, the date of their being put into service, the number of cruises and attacks made, their airport stations, and a brief account of their ultimate fate.

From first to last the German Navy had at its disposal 78 airships. Six were either air training-ships or were used for special purposes, so that 72 took part in actual scouting and operations. The figures show that the average for each vessel was 16 cruises and three attacks. The maximum number in commission at any one time was 19. The highest number in commission in a single year was 39 in 1917, but the greatest number of cruises and attacks was made in 1916. In that year the 31 airships in commission at various times made 296 cruises and 107 attacks. But it was also the year of the greatest losses. Eight were destroyed by enemy action, four by storm, and four by explosion. In the following year nine were lost by enemy action, and five by storm. The total loss for the whole period of the war was 52, made up as follows—Destroyed by enemy action, 26; destroyed by storm, 14; destroyed by explosion, 12. Besides these, however, 17 others went out of service for various reasons.

Full particulars are given about the various stations. The double shed at Fuhlsbüttel was burnt down on September 16, 1916. That at Tondern was burnt out three times and rebuilt. Of the four double sheds at Ahlhorn, three were blown up and totally destroyed in the great explosion which took place on January 5, 1918.

Of the 52 airships lost, the crews of 19 were killed, the crews of six taken prisoners, and the crews of three were interned. In the case of the other 24 there was no loss of *personnel*. Nine airships were left in commission when the Armistice was declared, including the two school airships at Nordholz. One was in course of construction.

Of the six Zeppelins put into commission in 1914, L.3 and L.4 were stranded during the storm of February 17, 1915; L.5 was stranded at Dünamünde, in Courland, on August 6, 1915, after being hit by enemy fire; L.7 was shot down in flames by the enemy on May 4, 1916; L.6, the training-ship, exploded in its hangar on September 19, 1916; and L.8 was shot down in action of March 5, 1915, and stranded at Tirlemont. Twelve were put into commission in 1915. L.18, commissioned on November 3, 1915, caught fire in the hangar at Tondern a fortnight later while being inflated. L.9 blew up in the hangar at Fuhlsbüttel on September 19, 1916, and L.10 was struck by lightning above Neuwerk Island on September 3, 1915. Of the rest, L.12, L.15, and L.19 were shot down; L.17 blew up in the explosion at Tondern; L.20 was stranded at Stavanger, in Norway; L.11, L.13 and L.16 were dismantled, and only L.14, the training-ship, survived to be handed over at the Armistice.

Of the 1916 ships, L.21, L.22, L.23 (at sea), L.31, L.32, L.33 (over London), L.34 (over Sunderland), and L.39 (over Compiègne), were shot down. L.24 caught fire while entering the hangar at Tondern, and caused the explosion which destroyed L.17. L.25 to L.29 were Army ships. L.30 and L.37 went out of commission in 1917, and were handed over to the Allies at the end of the war. L.36 and L.38 were stranded.

The 1917 ships suffered bad losses both from explosions and in action. The great explosion at Ahlhorn on January 5, 1918, accounted for L.46, L.47, L.51 and L.58, besides the Schutte-Lanz, SL.20; L.57, which had been intended for the expedition to German East Africa, exploded in mid-air on her trial trip on October 7, 1917, 14 days after completion. The entire crew perished, and the cause of the disaster was never discovered. She was succeeded by L.59, which made the trip, but was recalled when over the Sudan because the Germans had then evacuated German East Africa. This vessel bombed Naples, and was engaged in an expedition to bomb Malta when she came down in flames in the Straits of Otranto for reasons unknown, as she was not then under attack.

The following were destroyed in action:—L.43 (in the North Sea), L.44 (near Lunéville), L.45 (over Sisteron), L.48 (after bombing the Suffolk area, brought down by the R.F.C., with Commodore Schütte on board), L.49 (near Bourbonnes), L.50 (in France, afterwards sailed away without crew), L.53 (by a British airman while scouting), L.54 and L.60 (by a British airman while in the hangar at Tondern), and L.55 (over Tieffenort, in attack). L.40 was stranded at Nordholz aerodrome in foul weather. The others were either dismantled or were handed over at the Armistice.

The Zeppelin war had been a continuous struggle on the part of the Germans to attain altitudes that could not be reached by the defence. In the summer of 1917 they had reached altitudes at which human beings could not live without oxygen (afterwards compressed air was used). The type L.53 to L.55, then in use, had a cubic capacity of 56,000 cubic metres and a maximum altitude of 18,000 to 20,000 ft. But in 1918 they found their attacks badly hampered by British aeroplanes and the "excellently organised artillery" in England, and they were at best able to attack only in cloudy weather.

The L.70 was a new type, with seven motors and an altitude of 21,000 ft., whereby it was hoped to outstrip any defence. It set forth on August 6, 1918, with the Commodore, Captain Peter Straffer, on board, but the uncertain temperature of August night prevented it from attaining its maximum altitude, and it was shot down by British sea forces on August 10, 1918. On the following day the next in seniority, Captain Prölz, was brought down with L.53, and it was decided temporarily to abandon attacks till the new type, with a cubic capacity of 62,000 cubic metres and an altitude of 22,000 ft., was ready. Fortunately the German Navy mutinied and the German front collapsed before this was ready. L.71 was handed over with the other eight to the Allies, and L.72, still unfinished, was ultimately completed and surrendered to France.

Nine Schutte-Lanz, three Parsivals, and one other were commissioned. None of these, it is stated, proved satisfactory.

IN PARLIAMENT

Commercial Aviation Subsidies

Mr. Gilbert, on March 30, asked the Secretary of State for Air whether his Department pay or allow any subsidies to any commercial aviation companies; if so, will he state to how many of such companies they are paid, what the amounts are, and if any and what conditions are imposed as a condition of payment; if any time limit is imposed; and, if so, for how long?

Captain Guest: As the answer is rather long, I will, with my hon. friend's permission, circulate it in the *Official Report.*

The following is the answer:

The answer to the first two parts of the question is as follows:—

Two companies are at present subsidised on the London–Paris route. The amount and conditions of this subsidy are set forth in Command Paper 1521, published in October last. The terms and agreements therein set forth have been extended to 31st March.

From the 1st April three companies will be subsidised on this route under new conditions. Briefly summarised, these conditions are as follows:—

(1) A subsidy of 25 per cent. on gross takings.

(2) Provision of not more than half the operating fleet by the Air Ministry on a hire purchase basis.

(3) An additional grant during the period ending 28th February, 1923, of £3 per passenger and 3*d*. per lb. of goods carried.

(4) A reduction in the subsidy by the amount of any profit over 15 per cent.

(5) In order to qualify for the subsidy, the firm, its personnel and aircraft, must be British, a specified regularity of service must be maintained, and fully detailed accounts must be kept for the information of the Air Ministry.

In regard to the third and fourth parts of this question, the arrangements in respect of the 25 per cent. subsidy and the provision of machines on the hire purchase basis hold good until 31st March, 1924. The provision of any additional grant under paragraph (3) above after 28th February, 1923, will be a matter for consideration prior to that date. I would add that tenders are now under consideration for the operation of the London–Brussels route by one company with the assistance of a subsidy.

Army and Air Force (Annual) Bill

When considered in Committee, on April 5, Major-Gen. Seely said he desired to raise a point which had been raised previously. That was, the great inconvenience of having the Army Act and the Air Force Act combined in one Bill. It would be very much better, for every reason, if they had separate Bills. There was no special relation between the Army and the Air Force, which does not exist as between the Air Force and the Royal Navy. In all sorts of ways, the terms of service of the Air Force were wholly different from the terms of service of the Army, and they were not differences in a small degree but differences in kind. All this had to be explained in various Clauses.

In the case of the Air Force, a point of really high principle was involved. It was not only inconvenient, but a matter of high policy, not to confuse the Army and the Air Force. Each should have its own separate Annual Act. He asked whether an assurance could be given, that in future, two separate Bills would be provided.

Lieut.-Col. J. Ward, who spoke in a completely opposite direction, was followed by Mr. Mosley, who said Lieut.-Col. Ward, having had no connection of any kind with the problems of the air, saw fit to ridicule the suggestion of Maj.-Gen. Seely, who had had a long and intimate connection with the Air Service. Lieut.-Col. Ward did not appear to realise in what the duty of the Air Service consisted, or the kind of discipline that was required. In the Air Serivce, a man was kept for one of two things, either to fly, or to keep machines and engines in proper repair; he had not to polish buttons or to march about a barrack square. The very nature of his employment was fundamentally different in every respect from the employment of the ordinary military man, and the characteristics required differed widely from the kind of character which was desirable in military service. All that was required of the Air Service mechanic was mechanical proficiency? granted the ordinary measure of good conduct that was required in civilian life, and obedience to the exigencies of the Service. Military discipline was quite unsuitable, and in most respects, quite unnecessary, in regard to the problems of the Air Service. He, himself, having had a slight connection with the Air Service, must agree with Maj.-Gen. Seely.

Lieut.-Col. Ward: Would it not be more sensible to suggest that the Air Force should come under the civil authority and not under the Army?

Mr. Mosley: The Air Force was neither civil nor military. It was not subject to the ordinary requirements of military service. It was a service distinct, and altogether apart, from the Army or the Navy, or civilian life. It was a new arm. Why it should be shackled and tied by military traditions which were entirely unsuited to it, passed his understanding.

Captain Guest said this question had occupied the attention of the Air Ministry since he had been there, during the past year, and there had been considerable discussions as to whether the Service would be assisted by having its own Annual Act. There were many reasons why they should like to have their own Act. It would be a further hall-mark of an independent and separate Service. Last year conditions were such that the Bill was not presented to the House. This year, the pressure of business had, to some extent, interfered with a decision being taken on the matter. He should, however, continue to press for a separate Air Force (Annual) Bill. What decision would be reached by the Cabinet it was not for him to say. Taking it all round, he thought that so much of their Service was common to both Services that it was not a matter which one need press, unduly, in the present state of public opinion, but he hoped that nothing had been said that day which would prevent the Air Ministry from raising this question on another occasion.

Maj.-Gen. Seely said he was glad to hear that the Secretary of State for Air had had this under consideration, and that it was proposed to bring in a separate Air Force Bill.

Question, "That the Clause stand part of the Bill," put, and agreed to.

Battleships and Bomb Attacks

Rear-Admiral Sueter, on April 5, asked the Parliamentary Secretary to the Admiralty whether he has any information that a 4,000 lbs. bomb has been dropped, quite successfully, from the air in America.?

Mr. Amery: According to the American Press, a bomb of 4,300 lbs. carrying about 2,000 lbs. T.N.T., has been dropped on land by an army aeroplane. This is the only instance of which the Admiralty have any information.

Lieut.-Col. Moore-Brabazon: Can we have some experiments on this side, with regard to bomb dropping? Can we have the Hood for 10 minutes, against the Air Force?

Capt. Viscount Curzon: Is there a single aeroplane in any Navy in the world, operating from an aircraft carrier, which is capable of carrying bombs of such a size?

Mr. Amery: I believe not.

Rear-Admiral Sueter asked (1) whether the new designs for the post-Jutland battleships, as contemplated to be built in 1923, can resist a 4,000 lbs. bomb, when dropped from the air, within 30 ft. of the ship if fitted with a delay-action fuse for detonating the explosive charge when at about 20 ft. under water;

(2) whether any experiments have been carried out in this country to determine the effect of the water projectile, thrown up by a 2,000-lb., 3,000-lb., or 4,000-lb. bomb, dropped from the air, to strike the water at various distances from a target representing the under-water portion of a post-Jutland battleship provided with an external bulge or other devices for lessening the explosive effect of a locomotive torpedo or bomb dropped from the air?

Mr. Amery: It is not in the public interest to give information with regard to experiments which have been, and are still being, carried out, but the Admiralty consider that satisfactory protection can be provided in the new ships against the attack suggested in these two questions.

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NIGHT FLYING ON LONDON–PARIS ROUTE

The first flight by night over the British portion of the Continental Air Route (Paris, Brussels, Amsterdam, etc.) was carried out on Wednesday night by an Air Ministry machine in order to test the ground organisation which has been established for commercial flying by night between London and the Continental capitals.

The aeroplane, which carried eight people, including a navigator, wireless officer, and the Air Ministry officials responsible for the lighting and wireless arrangements of the route, left Biggin Hill about 8.30 p.m., flew to the London Terminal Aerodrome, Croydon, and landed there. The pilot in charge, who has had great experience, expressed the view that the flood lighting arrangements on the aerodrome by means of dispersed searchlight beams, together with the illuminated landing "Ls," were the best he had seen, and made landing as easy by night as by day.

The aircraft left Croydon Aerodrome about 9.20 p.m., and steered a direct course for Lympne Aerodrome on the coast. Temporary aerial lighthouses were in action at Tatsfield and at Cranbrook, and these were easily picked up. Shortly after passing the Cranbrook light the pilotage light on Lympne Aerodrome became clearly visible. The machine then flew over Lympne Aerodrome and continued over the Channel towards St. Inglevert, the first aerodrome on the French side. The marine lighthouse at Cap Gris Nez, which had been visible as soon as the aircraft was over Biggin Hill, gave an excellent leading mark, and very soon the French aerial lighthouse on St. Inglevert Aerodrome also came in sight. Turning back on its course, the aeroplane then crossed the coast near Folkestone, and headed direct for the pilotage light at Lympne, at which aerodrome an easy and smooth landing was effected. Leaving this station at about 11.30 p.m., a course was retraced to Croydon, the lights of the Terminal Aerodrome being easily picked out from all the mass of lights of Croydon and London generally. After circling Croydon Aerodrome the aircraft was headed for Biggin Hill, where a landing was effected with the help of wing tip flares and ground flares.

The general impressions of those who made the flight were that it is easier to find a course by night than by day and that provided the Continental ground organisation is as good as our own there should be no difficulty whatever in commercial night flying over the London-Paris route.

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The Flight to South America

As recorded in Flight last week, the two Portuguese aviators who are attempting to fly from Portugal to South America in a Fairey seaplane, with Rolls-Royce "Eagle" engine, left Portugal and arrived safely at Las Palmas, Canary Islands, on March 30. They were then reported to have left Las Palmas for St. Vincent in the Cape Verde Islands on Sunday morning, April 2, but no news was to hand when going to press last week. It is now reported that the machine arrived safely at St. Vincent, where the aviators are remaining until a full moon will assist them in the 1,260 miles long stage from St. Vincent to Fernando Noronha, off the coast of Brazil.

Parcels by Air to Paris

A reduced scale of charges is announced by the Postmaster-General for parcels accepted by the Post Office for conveyance by air and delivery in Paris. Under the old scale the charge varied between 1*s*. 6*d*. for a 1 lb. parcel and 9*s*. 9*d*. for the maximum weight of 11 lb. The new schedule is simplified, and the fees are as follows:—

Up to 2 lbs., 1*s*. 9*d*.; up to 5 lbs., 3*s*.; up to 8 lbs., 3*s*. 9*d*.; up to 11 lbs., 4*s*. 3*d*.

R.A.F. MEDITERRANEAN GROUP

THE R.A.F. have, we learn from the Air Commodore Commanding Mediterranean Group, been taking a prominent part in the sports and athletics in the island of Malta, and, considering their small number, when compared to the Navy and Army, they have shown up very creditably during March.

In polo the R.A.F., *versus* Royal Sussex Regt., were rather badly beaten by 5 goals to nil; but as this was only the second match that they had played as a team, no other result could be expected. In addition, one member of the side was very badly mounted.

The R.A.F. team consisted of: No. 1, Squadron Leader Shepherd, 267th Squadron; No. 2, Squadron Leader Gordon, Group Headquarters; No. 3, Air Commodore Samson, Group Headquarters; Back, Flight-Lieut. Maclean, 267th Squadron.

In golf the R.A.F., *versus* the Gordon Highlanders, on March 7, won by four matches.

R.A.F. team: Squadron Leader Shepherd, 267th Squadron; Flight-Lieut. Maclean, 267th Squadron; Flight-Lieut. Keeble, H.M.S. *Argus*; Flying Officer Harris, 267th Squadron.

United Services Championship

In the R.A.F. *versus* the Army, the R.A.F. were beaten by 13 points to 1½ points.

R.A.F. team: Squadron Leader Shepherd, Flight-Lieut. Keeble, Flight-Lieut. Stewart, Squadron Leader Kelly, Squadron Leader Gordon, Flight-Lieut. Maclean, Flying Officer Harris, Flight-Lieut. Sadler.

Polo Gymkhana, March 13 and 15

The R.A.F., both ladies and officers, played a prominent part, especially so the ladies. Mrs. Samson won 1st prize in the Ladies' 2½ Furlong Scurry, handsomely defeating her opponents. She also won 1st prize in the Ladies' Pig-Sticking.

Mrs. Maclean won 2nd prize in the Ladies' Musical Chairs, after having shown up very prominently throughout. Unfortunately, in the Ladies' Scurry she was left at the post, otherwise she stood a very good chance for a place on her form.

The ladies thus won two 1st prizes and one 2nd in the only three events open to ladies.

In the King's Messenger Race the R.A.F. put in two teams. The 1st team got into the final; the 2nd team were beaten on the first round.

In the donkey polo the R.A.F. were hot favourites, and after winning four matches they got into the final, but suffered defeat by 1 goal to nil.

The R.A.F. team consisted of: Flying Officer Smyth, back; Squadron Leader Gordon, No. 3; Squadron Leader Shepherd, No. 2; Air Commodore Samson, No. 1.

The semi-finals and final were played in fancy dress; the R.A.F. team dressed as members of the fair sex. Somebody was heard to remark that one member of the team had the best pair of legs on the island.

Altogether the R.A.F. in Malta are keeping the flag flying.

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No. 11 (Irish) Wing

A DINNER is being arranged for all Officers who served in No. 11 (Irish) Wing, Royal Air Force, at the Hotel Cecil, Strand, W.C. 2, on Saturday, April 22, at 7.30 p.m.

The price of the Dinner, exclusive of wines, will be 10*s*. 6*d*., which will be collected from Officers at the Dinner.

Will Officers who wish to attend, please send their names to: Flight-Lieut. C. J. Mackay, Room 661, Air Ministry, W.C. 2.

Dress.—Dinner jackets (Miniatures will not be worn).

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ROYAL AERONAUTICAL SOCIETY NOTICES

Lectures.—The following preliminary programme of lectures for next Session has been arranged:—

November 2.—Major A. R. Low, Fellow, "A Review of Airscrew and Helicopter Theory, with Aeroplane Analogies."

November 16.—Mr. R. McKinnon Wood, A.M.Inst.C.E., Fellow, "The Co-relation of Model and Full Scale Work."

December 7.—Professor C. F. Jenkin, C.B.E., Fellow, "Fatigue in Materials."

February 15, 1923.—Wing Commander T. R. Cave-Browne-Cave, C.B.E., Fellow, "The Practical Aspects of the Seaplane."

March 1, 1923.—Major F. M. Green, Fellow, "Helicopters."

W. LOCKWOOD MARSH,
Secretary

THE LONDON AERO-MODELS ASSOCIATION

THE lecture given by Mr. W. E. Evans on "How to construct a Model Aeroplane Propeller" was very much appreciated by all present. Afterwards he gave a practical demonstration, making one from the rough block and showing the various stages of construction.

The Paddington and District Aero Club have become affiliated to the L.A.M.A. Two of the old school of Aero Modelists have also become members of the Association, *i.e.* Mr. D. Driver and Mr. A. E. Dodson.

On Thursday, the 13th inst., Mr. J. E. Louch will give a lecture on "How to construct a Record Breaking Model Aeroplane."

The Competitions Secretary, Mr. C. A. Rippon, 52, Fairbridge Road, Holloway, N.19, will be pleased to receive the names of all members who are entering No. 2 Competition for R.O.G. Duration Models limited to 4 ozs. minimum, which is being held on Wormwood Scrubbs at 11 a.m. on Sunday next, the 16th inst. Any member being prevented from notifying can enter same on the ground previous to competition being started. Mr. Rippon will be present for such entries at 10.30.

It is understood that some of the members are contemplating record making after the above competition. It is hoped that non-competitors will put in an appearance as we want to demonstrate to the public the practical side of Model Aeronautics.

Meetings are held at 20, Great Windmill Street, Piccadilly, W. 1, at 7.30 p.m.

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PUBLICATIONS RECEIVED

The Marine Oil-Engine Handbook. 6th Edition. London: Temple Press, Ltd. Price 3*s*. 6*d*. net.

Physical Properties of Dope Solvent Mixtures. By Guy Barr, B.A., D.Sc., and L. L. Bircumshaw. Aeronautical Research Committee Reports and Memoranda, No. 746 (M. 6). January, 1921. London: H.M. Stationery Office. Price 4*d*. net (post free 5*d*.).

The Buff Book Telephone Directory, April, 1922. London: Business Telephone Directories, Ltd., 25, Lawrence Lane, E.C. 2.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

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26,338. M. A. KENNEY. Launching and landing apparatus for aeroplanes. (176,821.)

35,817. F. H. PAGE and HANDLEY PAGE, LTD. Means for balancing and regulating the lift of aircraft. (176,909.)

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xiv.)

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New Pegamoid Ltd., 134, Queen Victoria St., E.C.
City 9704 (2 lines).
"Pegamoid," Phone, London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Arnott & Harrison, Ltd., Hythe Road, Willesden Junction. Willesden 2297.
Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.
Grahame-White Company, Ltd., Hendon, N.W. 9.
Kingsbury 120.
London Office: 12, Regent Street, Pall Mall, S.W. 1. Regent 2084.
Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.
Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

MOTOR CARS AND MOTOR BICYCLES—

Auto-Carriers (1911), Ltd., 181-182, Hercules Rd., Westminster Bridge Road, London, S.E. 1.

NIGHT LANDING LIGHTS—

Allen-Liversidge, Ltd., amalgamated with Imperial Light, Ltd., 106, Victoria Street, S.W. 1.
Victoria 4155; "Aceterator," Sowest, London.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.
Shell-Mex Ltd., Shell Corner, Kingsway, W.C. 2.
Holborn 2303-4; "Shelzine," Westcent, London.

PHOSPHOR BRONZE AND GUNMETAL—

Clifford, Charles, & Son, Ltd., Fazeley Street Mills, Birmingham.
Central 3634 (4 lines); "Clifford," Birmingham.
Keeling, A. D., Ltd., Caroline Street, Birmingham.
Central 440 (3 lines); "Nickel," Birmingham.

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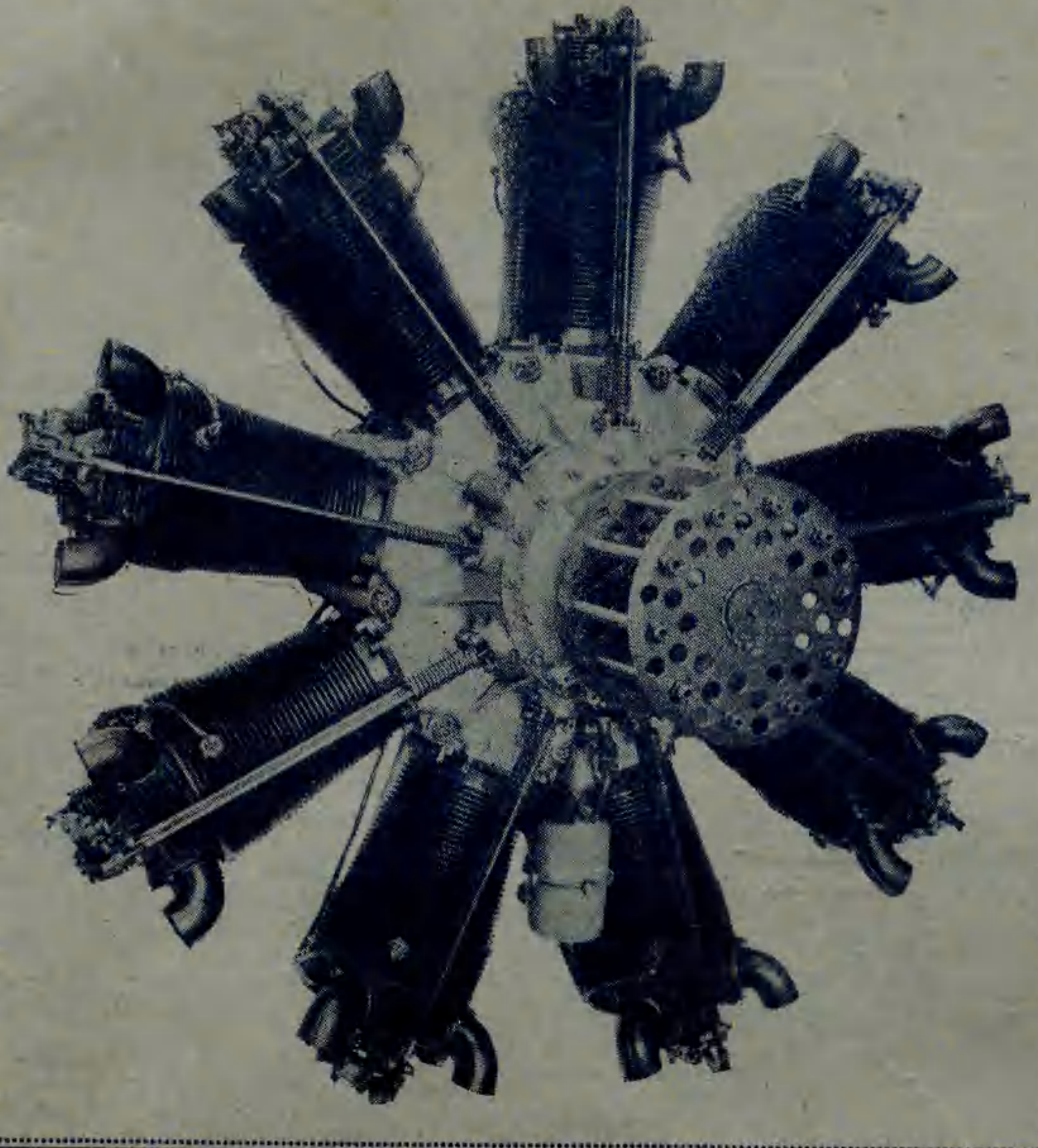

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
June 1	**Entries close for Schneider Cup Race**
June 5	**R.Ae.C. Easter Race Meeting, at Waddon**
June 23–25	**International Competition for Touring Aeroplanes, Brussels**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT

The Weybridge Fatality

ONCE again it becomes our painful duty to record an aviation accident resulting in the death of two flight pioneers. Personally, we feel the fatality all the more keenly because we were privileged to spend several hours of the day before their death with Sir Ross Smith and Lieutenant Bennett. The occasion was a visit to the Vickers Weybridge works to discuss with Sir Ross the great flight and to inspect the machine on which it was to be made. Modest to a degree, both he and Bennett simply avoided discussion of their previous achievements, preferring to speak of their new plans. Particularly was Sir Ross loud in his praise of the manner in which those responsible for the machine had worked and put the best they knew into it, so that he and his two companions might have the finest equipment it was possible for man to devise. He also paid a glowing tribute to the "Shell" group for the perfect way in which the distribution of petrol to the various parts of the globe had been provided for by their organisation. And next day came word that he and Bennett had passed away. The news was simply stunning. It seemed incredible that those two who, but a few hours previously, had been discussing so cheerfully and confidently their great plans were now no more, and that never again should we grasp the hands that had already done so much, and from which still more was anticipated. Sir Ross Smith was nothing if not a pure sportsman, and he is stated to have said, when discussing the possibility of anything going wrong on the flight and failure resulting, that there should be no blaming of anybody, "'Australians don't squeal."

So in his misfortune, could he express his views, we are sure he would have wished for no unnecessary lamenting of his sad fate, great blow that it is to those near and dear to him. He probably died as he would have wished to die, if the end had to come so soon—fighting to the last to master his machine.

As regards the cause of the accident, this is abundantly clear from the accounts of expert eye-witnesses. The machine got into a spin, from which it never fully recovered, at any rate not until it was too late to flatten out and effect a safe landing. As to the reasons for the machine getting into a spin, we can never know for certain. But it appears probable that lack of experience on this particular type of machine may have been a contributory cause. To begin with, we believe we are correct in saying that Sir Ross had not done very much flying on any machine during the last few months. All pilots of experience will agree that being away from regular practice for even a few weeks, results in a familiar machine feeling strange. How much more so when the machine is of an unfamiliar type. No two machines, even of the same model and identical to all appearances, feel exactly alike. Further the flying boat type of machine has little idiosyncrasies all its own. It requires different handling and different control from a land machine of the tractor type. It is therefore in no way casting the slightest slur on the skill of Sir Ross as a pilot to assume as a possible explanation that the machine felt more strange to him than he had expected, and that indecision at a critical moment—an indecision which may have lasted only the shortest of times—may have lost him his chances of recovery.

It appears quite certain from the evidence given at the inquest that no part of the machine broke in the air, and that to a pilot familiar with the type and its construction, the machine was in perfect flying trim and behaving splendidly. One is therefore forced to the conclusion, as the only logical one, that some error of judgment was the cause of the spin which ended so sadly. Beyond that it is not possible to go, and at that we must be content to leave it. It means that two more valuable lives have been sacrificed in order that the linking up and binding together of the Empire by the ways of the air may be found. It behoves us to carry on in the same spirit, that the lives of these two pioneers, and the many that have preceded them, may not have been sacrificed in vain.

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The D. of R. and Farnborough

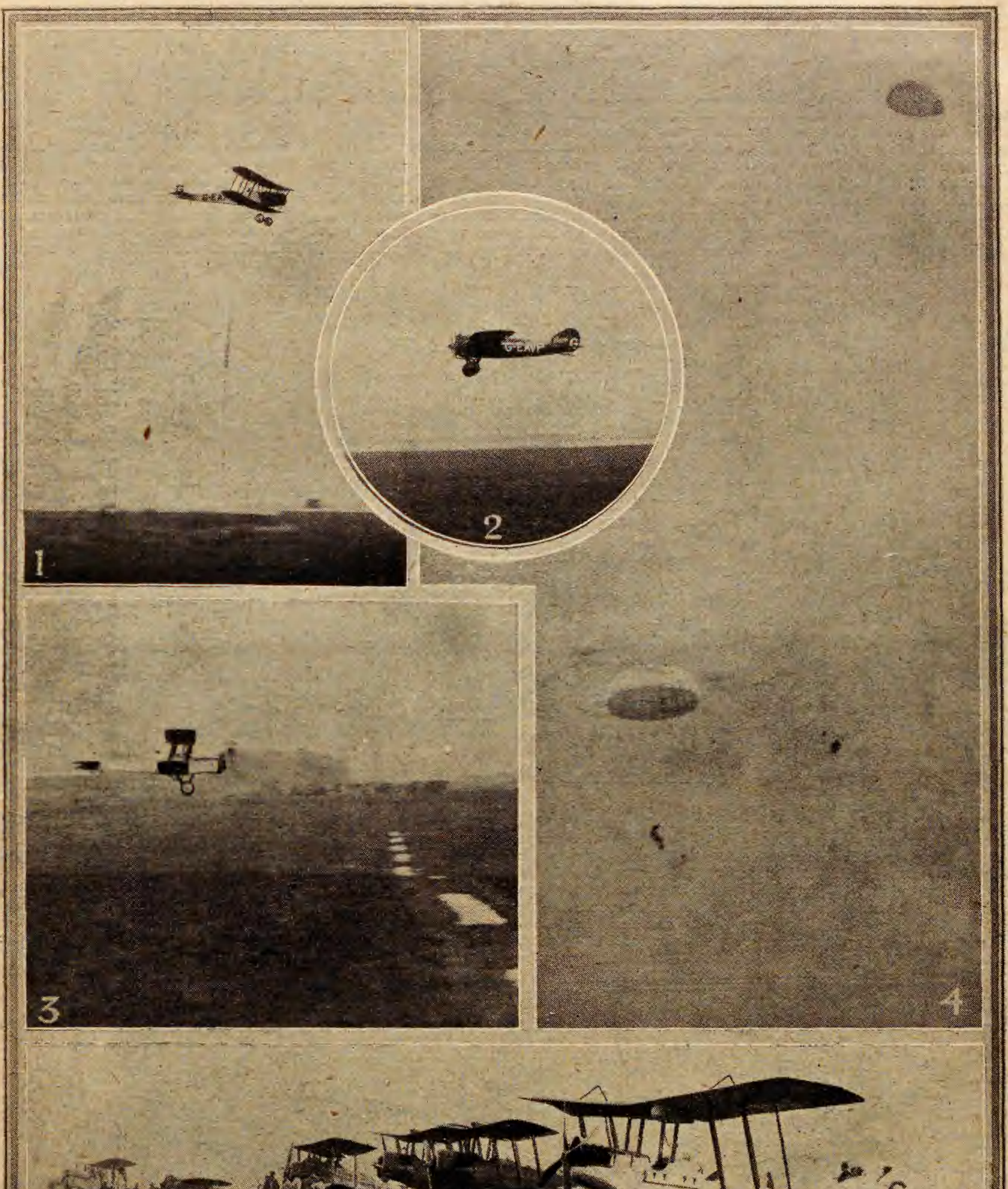
It is by now fairly common knowledge that a great portion of the Directorate of Research is, in the interest of economy, to be transferred to Farnborough. That is all to the good, and, on the face of it, would appear to be a very sound, common-sense decision, and one which will result in economy as well as tending towards a closer co-operation between the D. of R. and the Royal Aircraft Establishment. We sincerely trust, and have no intention of denying, that this, and this only, is at the back of the decision. But it should be borne in mind that "Research" as now understood is a somewhat elastic term. The D. of R. himself stated at the recent Air Conference that a large proportion of his department was engineering. That being so, it appears to us that the removal of the department, or the bulk of it, to Farnborough, may carry with it the danger of a return to the old evil days, when the R.A.F., as it then was, grew to be in direct competition with private designing and construction firms. We do not for a moment suggest that there is any danger of "The Factory" resuming manufacture on any large scale. The results of that policy are still too fresh in mind to allow of that possibility being even contemplated. But it does appear to us that the transfer from Kingsway to Farnborough may give rise to the danger of the Department of Research becoming even less of what its name suggests it should be, and more of an engineering department than those who believe in the value of pure research as distinct from *ad hoc* experiment like to see. We may be wrong—we sincerely trust we are—and there may be no such intention behind the move, but the danger is there, and we have thought it our duty to sound this note of warning. We certainly do not want to see our private designing firms reduced to the level of war-time sub-contractors building machines to other people's designs.

◆ ◆ ◆

The Racing Season Opens at Waddon

The air racing of the season opened on Easter Monday with a series of short contests, the competing machines during the whole time being in sight. This is an admirable scheme, and helps to sustain the interest, which would be apt to lag were the competitors out of sight for long periods. In our report on the races we have advanced certain criticisms of the arrangements, which were certainly not all that they might have been. We are offering these in no carping spirit, but merely because we wish to see air races and air competitions of all sorts becoming one of the most popular features of the London summer season. In the main the Royal Aero Club is doing well with the sporting side of aviation, and it is in the minor incidentals that shortcomings are most noticeable. These can, we feel sure, be remedied with a little goodwill, and if that is done we are certain that the public response will be such as to recompense the organisers for the extra trouble taken.

We have previously questioned the wisdom of the decision to transfer the scene of these competitions from Hendon to the London Terminal Aerodrome. We are still very much in doubt, and still consider Waddon but ill-suited to the holding of race meetings where really fast machines are to be flown. In its present form and state Waddon is a very poor aerodrome for a racing machine, and we would suggest that, until the present offices, sheds, and other buildings have been transferred from Plough Lane across to the buildings occupied by the A.D.C., the holding of pure speed races should not be organised at Waddon. Secondly, arrangements could surely be made, even now, with the railway companies for running more trains to Waddon station, thus saving visitors the journey on the trams from Croydon to the aerodrome. These trams must easily be the worst in London, and if a frequent direct train service were run (and made known) to Waddon station it would be a great gain. Later on, when the main buildings of the air station are at the A.D.C. premises, it will, of course, be possible to run trains direct to the aerodrome itself. But even without that, much might be done to facilitate and render less irksome the journey to and from the London Terminal Aerodrome. We would suggest that the Club take the matter up seriously with the remnants of the Department of Civil Aviation.



AT THE CROYDON MEETING ON EASTER MONDAY : 1. Bert Hinkler on the Avro-Viper winning the Second Waddon Handicap. 2. Uwins getting off on the Bristol monoplane, with 100 h.p. Bristol "Lucifer" engine. 3. Stocken, on the D.H.9A, 400 h.p. Liberty, winning the Club Handicap. 4. Newall making a double parachute descent in "Guardian Angel" parachutes. 5. The machines lined up for the Club Handicap.

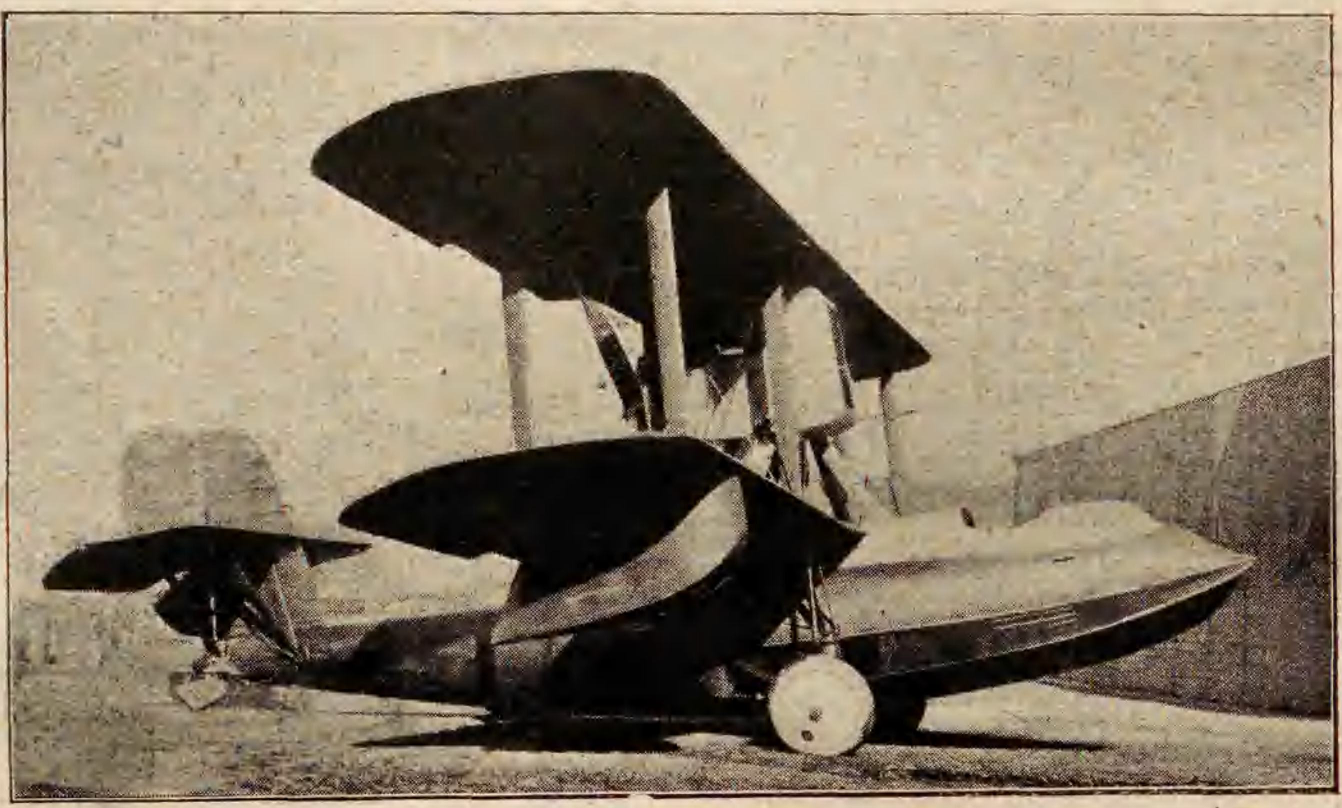
THE SUPERMARINE SINGLE-SEATER FIGHTING SCOUT "SEA KING," MARK II.

An Interesting Amphibian Flying Boat, with Hispano Engine

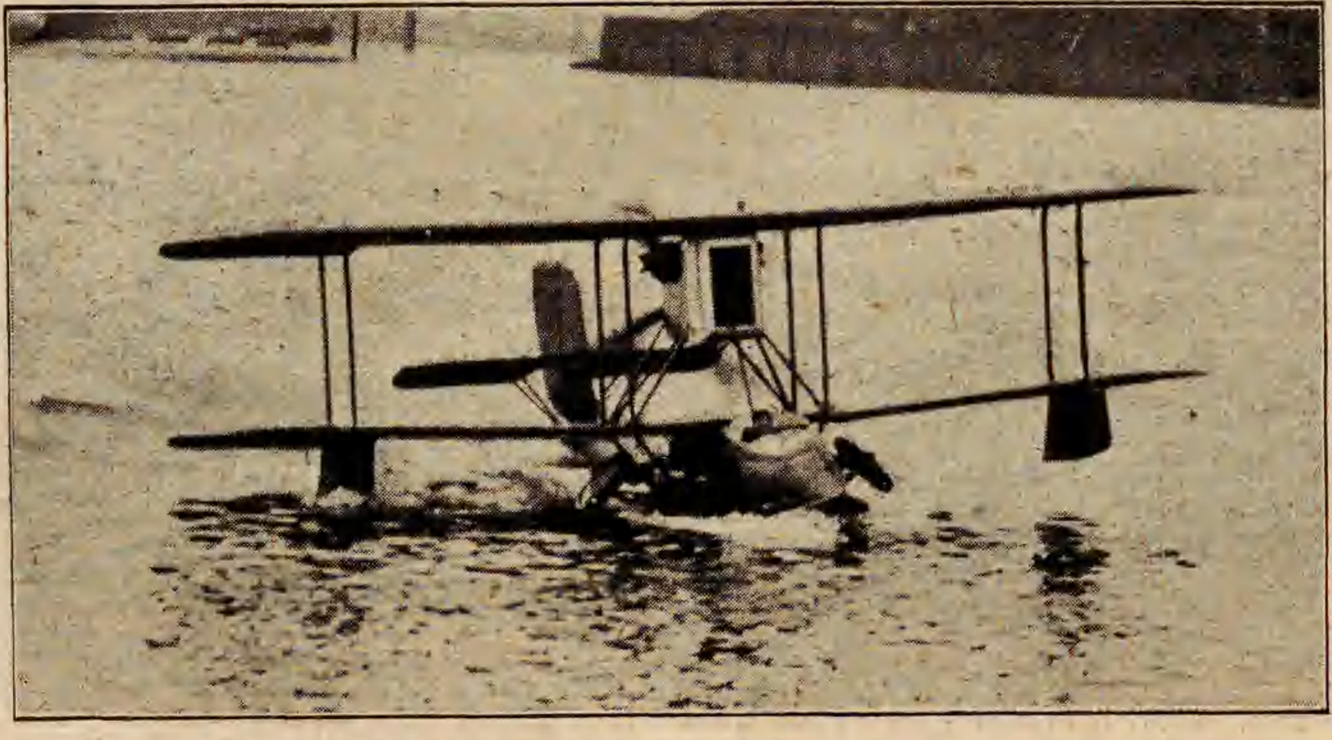
IT is, unfortunately, an indisputable fact that, for some reason or other which is not at all clear, the seaplane type of machine has not received, in this country, the attention which it would appear to merit. In view of the fact that the different parts of our Empire are separated by leagues of ocean, it might have been thought that this type of machine would be the first to come to mind in attempting to visualise the advantages of air travel and air defence. Yet the fact remains, that the seaplane has had very little encouragement, both from the Government and from commercial users of aircraft. It is, therefore, all the more creditable that a few of our firms have, in spite of the severe handicaps imposed by a relative lack of incentive, "carried-on" with seaplane design and construction, in the certain knowledge that sooner or later this type is bound to gain the recognition which it deserves. One might fill columns in enumerating the various uses to which seaplanes can be put, both commercial and service, and yet not exhaust the subject, but this is not the place, nor have we the space here, to do so.

If the seaplane pure and simple is of the very greatest potential value, its latest development, the amphibian, is still more so, owing to its capacity for taking off from, or alighting on, land and water with equal facility. In the case of a commercial machine, this means that a service can be run between two cities which are situated on the coast, or which have running through them rivers suitable for use as "aerodromes," but which are otherwise separated partly by the sea and partly by land. The London-Paris service is a case in point. It has already been demonstrated that it is possible to leave the Thames at Westminster, and to alight on the Seine in the centre of Paris, or *vice versa*, making the complete journey in about two hours, and saving the tedious run to and from the aerodromes to the business section of the respective cities.

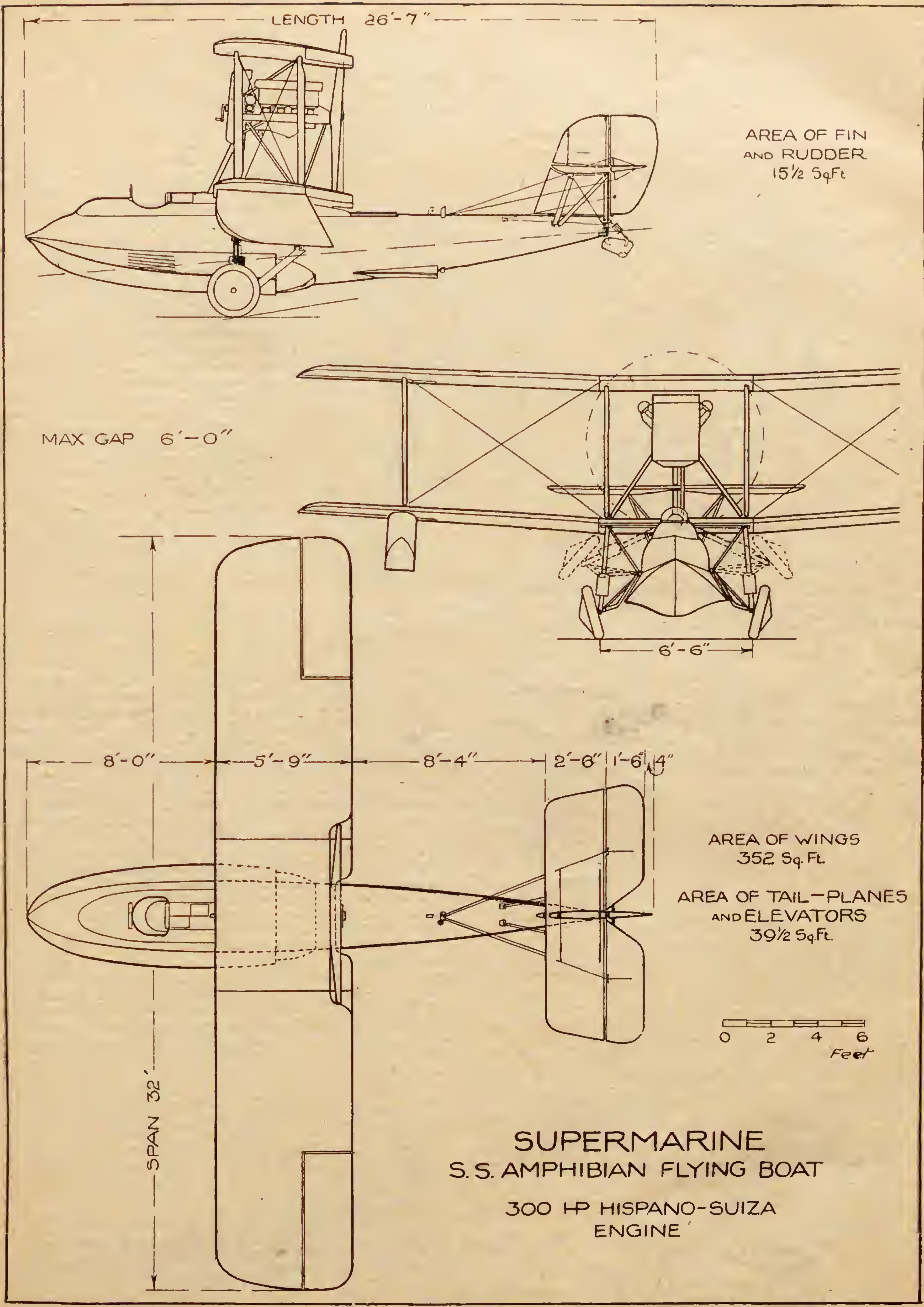
For service purposes, the amphibian scores also, as in the



THE SUPERMARINE "SEA KING": Side view.

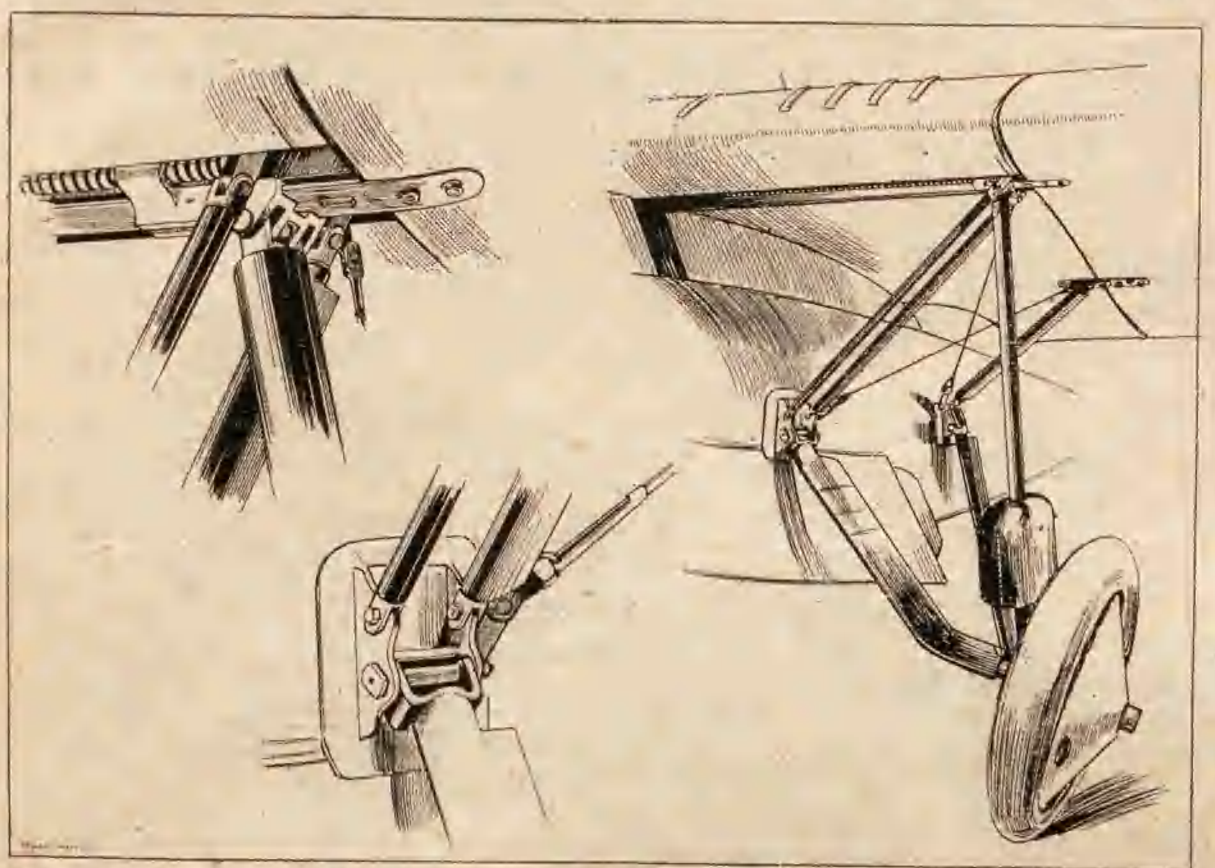


THE SUPERMARINE "SEA KING" TAXYING: Note the wheels lifted clear of the water.


LENGTH 26'-7"
AREA OF FIN AND RUDDER 15½ Sq.Ft
MAX GAP 6'-0"
6'-6"
8'-0"
5'-9"
8'-4"
2'-6"
1'-6"
4"
AREA OF WINGS 352 Sq. Ft.
AREA OF TAIL-PLANES AND ELEVATORS 39½ Sq.Ft.
0
2
4
6
Feet
SPAN 32'
SUPERMARINE
S.S. AMPHIBIAN FLYING BOAT
300 HP HISPANO-SUIZA ENGINE

THE SUPERMARINE "SEA KING": General arrangement drawings.

course of a war, it is often necessary for seaplanes to go inland for considerable distances, and for land machines to fly far out to sea. A machine which can, for instance, fly off the gun turrets of a battleship, scout over the sea and, if desired, far inland, returning either to the ship or alighting on the sea at any desired point, is obviously at a very great advantage as compared with a pure seaplane or a land machine.



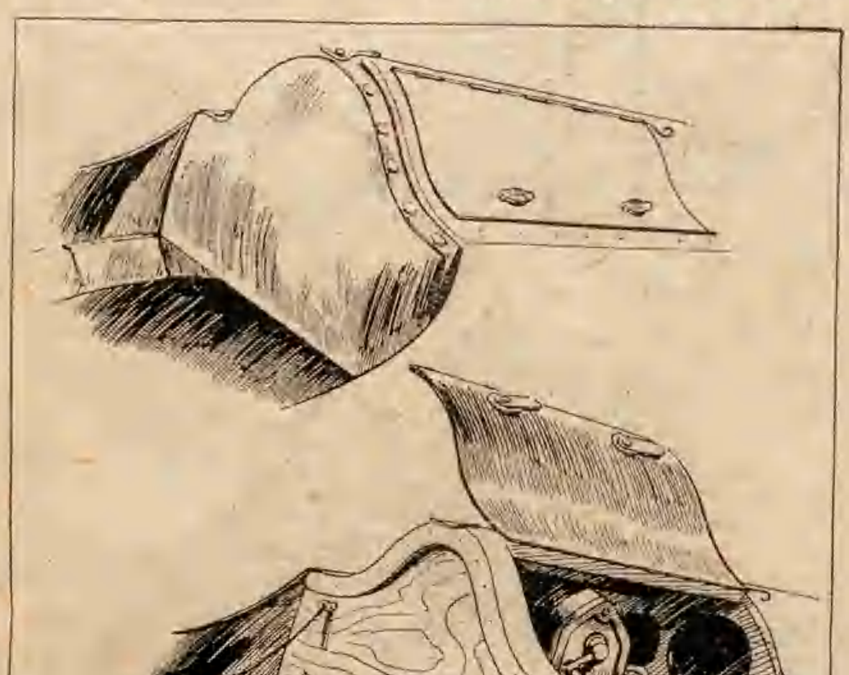
THE SUPERMARINE "SEA KING": General arrangement and details of the retractable undercarriage.

Among the firms who have, from the early days of flying, been believers in, and producers of, seaplanes are the Supermarine Aviation Works, Ltd., of Southampton, who have made a speciality of flying boats and amphibian flying boats. In designing a seaplane, it is possible to attack the problem from two entirely different points of view. One can produce an aeroplane which will get off from and alight on the sea, but which retains, in many respects, the characteristics of an aeroplane. Or one can start with a boat which is seaworthy in the first instance, and then proceed to make this boat fly. The Supermarine Works have always followed the latter procedure, and the hulls of their machines are boat-built structures on to which have been added the necessary wings, etc. Now it will be obvious that, in the initial stages of developments, the one type will probably have the better performance, but at the cost of seaworthiness, whereas the other will be substantial, seaworthy and, probably, somewhat heavy and consequently have an inferior performance. Thus at first, there will be a marked difference in the qualities of the two types, and the choice will depend upon the particular purpose for which a machine is wanted. There is, undoubtedly, room for both types. As time goes on, however, improvements will be made to both types, tending to improve the seaworthiness of the one and the performance of the other, and the time comes when the two types are practically on an equal footing. This would appear to be the logical development, and it is interesting to note that history is already beginning to prove that this is actually what is happening.

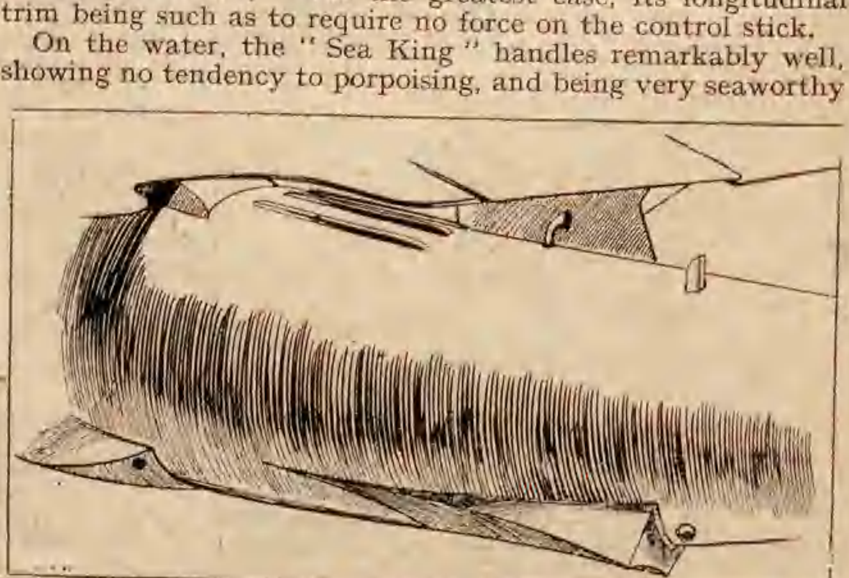
In the case of the Supermarine amphibian flying boat "Sea King," which forms the subject of this article, and photographs of which were published in our issue of March 30, we have a craft which represents the development of a seaworthy hull, fitted with wings and an engine which give it a performance equal, or nearly so, to that of a land machine of the same power. This result has been attained by years of constant application to the problems involved, and always with this idea in view that a start must be made with the boat hull, the performance being a second consideration, although it should be as good as it is possible to make it. Viewed in this light, one is better able to appreciate what it is the "Sea King" represents.

Designed as a single-seater fighting scout, for use with naval units or squadrons, the "Sea King," Mark II, possesses an unusual degree of manœuvrability, being capable of all the stunts which one usually associates with land machines only. The machine can be, and has been repeatedly, looped, rolled, spun, and stunted in every conceivable way. It is thus an ideal machine for fighting, while combined with these qualities it possesses a great amount of inherent stability, a combination which is extremely difficult of attainment, more especially in a machine of the flying boat type. We are informed, by a pilot who has flown the machine extensively, that the "Sea King" is entirely free from that difference in trim, according to whether the engine is "on" or "off," which was at one time thought inseparable from machines of the flying boat type. Once in the air, the machine can be flown "hands off," with the greatest ease, its longitudinal trim being such as to require no force on the control stick.

On the water, the "Sea King" handles remarkably well, showing no tendency to porpoising, and being very seaworthy

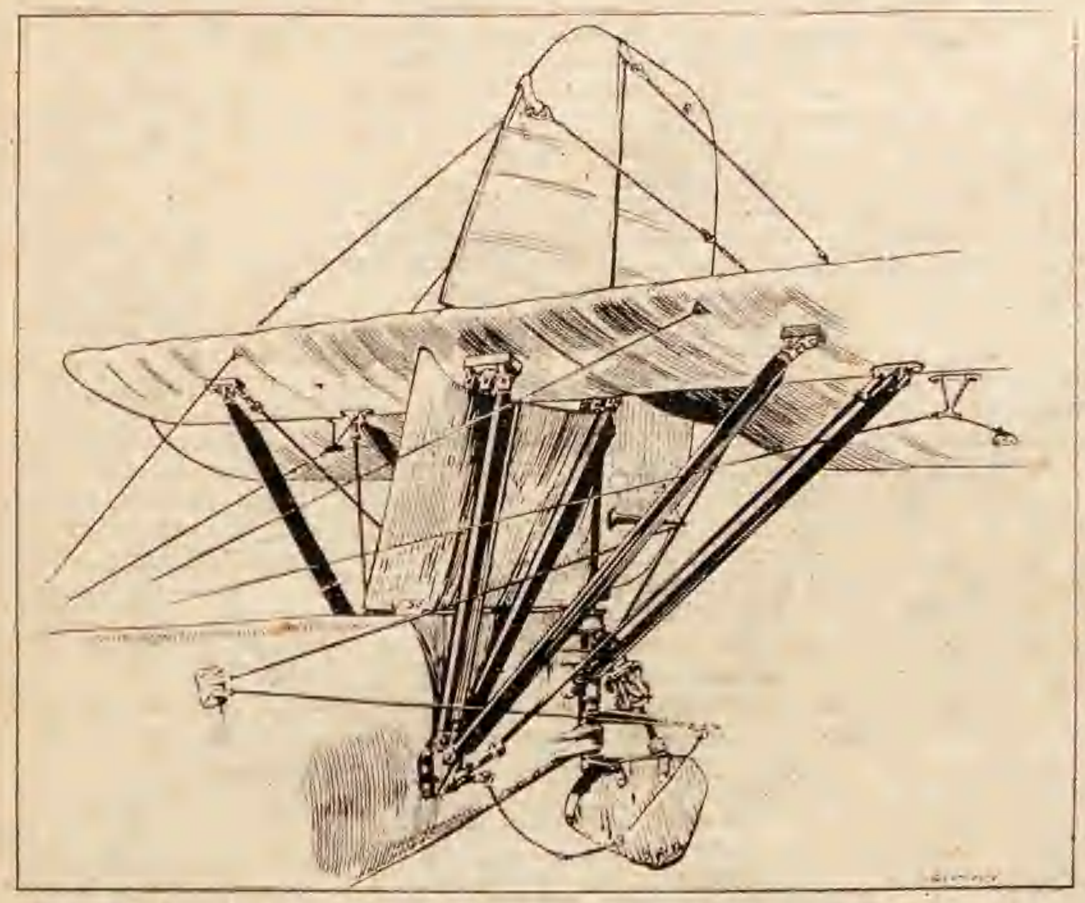


THE SUPERMARINE "SEA KING": The pilot's back rest hinges down to form a step so as to facilitate reaching the starting handle of the engine. The starting magneto is housed in the fairing on the port side. On the starboard side is the petrol filler cap.



THE SUPERMARINE "SEA KING": The rear step is "ventilated" by a tube running through the hull.

for a machine of such small dimensions. We understand that she has been put through all sorts of manœuvres on the sea, in a wind of 30 m.p.h., and has proved capable of riding out a fairly heavy sea. In getting off and alighting, the machine is very dry and comfortable for the pilot, and the view from the cockpit is particularly unobstructed, another feature, which is of great importance in a machine intended for fighting.



Sketch showing general arrangement of tail of the Supermarine "Sea King." The tail plane is negatively cambered.

As already mentioned, the performance is extremely good, the top speed being 125 m.p.h. at sea level, and the ceiling 20,500 ft. The climb to 10,000 ft. only occupies 12 minutes, and the alighting speed is in the neighbourhood of 50 m.p.h. Sufficient fuel is carried for about two hours at top speed, and in this connection one cannot help wondering what would have been the result of the Jutland battle had our fleet been provided with a couple of squadrons of such machines.

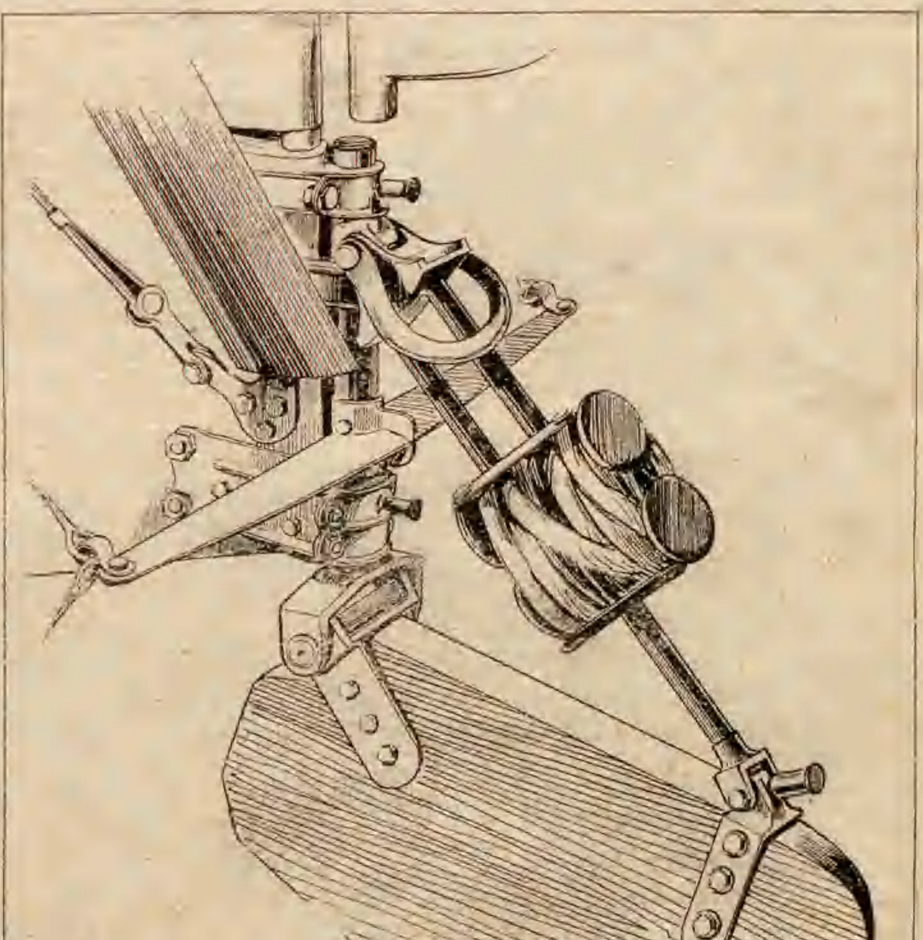
The general arrangement of the "Sea King" is well shown in the accompanying scale drawings and photographs, while some of the constructional details form the subject of our sketches. The boat hull is of the typical Supermarine type, boat-built and through-fastened, with copper or brass fixings throughout. The mahogany single-skin planking is riveted to the rock elm timbers and frames, and covered externally with fabric suitably treated with pigmented dope. The two steps are formed by entirely separate units, attached to the main hull, and can, therefore, be renewed in case of extensive damage. Should the hull itself, which is of approximately circular cross-section, be damaged, it is quite possible to repair it by scarphing in new planks where required.

In order to reduce air resistance a metal fairing, provided with large holes for the easy filling and emptying of water, is fitted behind the main step. This fairing can be seen in several of our illustrations. The rear step is provided with a tube running through the hull, and admitting air to the step when the machine is taxying on the water, thus preventing the rear portion of the hull from being sucked under.

The pilot's cockpit is in the nose of the hull, from which position the pilot has an excellent view, an important consideration not only for fighting, but also for landing on the deck of a ship. His controls are mounted on the triangular tubular frame so well known in all Supermarine boats, and whose function it is to allow the circular hull to flex and "give" in a seaway, without interfering with the smooth working of the controls. When the machine is used for fighting, a Lewis gun will be mounted in the nose of the hull, where it is very accessible by the pilot. A very complete set of instruments is provided, and all necessary mooring and towing tackle is conveniently arranged in and around the cockpit. For starting the engine, a starting handle is provided, and in order the better to reach this, the pilot's back rest is so arranged as to fold down and form a step, as shown in one of our sketches. In the fairing behind the pilot's head are housed, on one side, the starting magneto, and on the other the filler cap of the petrol tank, which latter is carried inside the hull, approximately on the c.g. of the machine.

The undercarriage consists of two Palmer wheels, mounted on bent axles, hinged to the sides of the hull, and strutted to the hull and to the lower plane. A worm runs across the top of the hull and engages with metal claws running along a steel strip guide bolted to the front spar of the lower plane. The accompanying sketches will indicate the arrangement, which is very neat and simple, and yet sufficiently robust to withstand taxying, even on rough ground. When the worm is rotated, the claws are pulled inwards, bringing with them the stout tubes carrying the rubber shock absorbers, and raising the wheels upwards and outwards until clear of the water. It will be noticed that the strutting of the undercarriage is so arranged that landing shocks are not transmitted through the hull. At the stern is a small combined tail skid and water rudder, working in conjunction with the air rudder. We are told by the pilot who has flown the machine on all its tests that on the ground it handles remarkably well, and is as easy to steer as a motor-car.

The engine, a 300 h.p. Hispano-Suiza, is mounted on a structure of steel tubes, which is entirely independent of the wing bracing, so that the engine can be removed without interfering with the wings, or, conversely, the wings may be taken off without interfering with the engine. It is neatly enclosed in an aluminium *nacelle*, and drives a small-diameter four-bladed pusher airscrew. The radiator, which is provided



The very substantial combined tail skid and water rudder of the "Sea King."

(*Concluded on page* 236.)

THE SECOND CROYDON AVIATION RACE MEETING

The Season Opened at Waddon

IN many ways the first flying meeting of the season, held at the London Terminal Aerodrome, Waddon, on Easter Monday, was reminiscent of the good old days at Hendon. In fact, one has to go back a considerable number of years to remember certain conditions and arrangements as primitive as some of those obtaining at Waddon during the races. When, nevertheless, the man in the street and his wife streamed out to the aerodrome in their hundreds and thousands, by motor, train, tram, 'bus, and on foot, in weather which looked anything but promising, and stayed in the various enclosures until all races had been flown, it speaks volumes for the general interest which is still being taken in aviation of a sporting nature. There were many who had expected to find a very poor attendance, and who were agreeably surprised to see the enclosures, especially the 1*s.* one, thronged with people. Nor, in spite of certain shortcomings in the arrangements, did the interest lag throughout the afternoon. Having discovered that people will still go to flying meetings in large numbers, it now rests with the Royal Aero Club to improve the organisation and arrangements until they are at least on a par with those of Hendon at its best, at any rate as far as lies in its power. Certain factors are perhaps outside the direct sphere of influence of the Club, and will have to be attended to by other authorities. For instance, the aerodrome is far from being ideal. The surface is very bad almost everywhere, and with certain wind directions the aerodrome is none too large for fast machines. On Monday the wind happened to be in such a direction as to give an opportunity for a good long run, but more often it blows across Plough Lane, when getting off and landing present far greater difficulties. Modern racing machines run a fair distance before pulling up, not to mention the long glide a couple of feet off the ground before the speed drops sufficiently to allow the machine to touch, and the undulating nature of the ground is a trial to any pilot not familiar with it. These, however, are matters over which, presumably, the Royal Aero Club has no control, beyond the fact that one may question the wisdom of transferring the races there from Hendon. Having done so, these drawbacks have to be put up with, and it is to be hoped that during the year or so which will probably elapse before the air establishment can be transferred to the buildings now occupied by the A.D.C., and the aerodrome correspondingly improved, no serious accident will occur to mar these flying meetings.

With regard to the shortcomings of the organisation, the catering arrangements were of a somewhat primitive nature. One had to stand up while having tea, no tables or chairs being provided. To visitors who had to stand the whole afternoon in the enclosures this was rather trying, and Trust Houses ought to be able to do better than that. The sanitary arrangements also left a great deal to be desired, and were of such a crude nature that they cannot possibly be tolerated again at the next meeting.

In the running and organisation of the races themselves there was room for a great deal of improvement. Not only did the various events not start to time (with this we are not inclined to quarrel violently, as delays were, to a great extent, due to the weather), but the absence of numbers on the machines must have been very perplexing to ordinary visitors, especially as all the machines were given numbers on the programme. It is not everyone who realises that when he sees on a machine the letters G-EATD, the only letters that he need take notice of are the last two. It is a fairly safe guess that the majority of people began reading out all the letters, and in all probability only got as far as the G-EA by the time the machine had passed into such a position that the last two letters were hidden. In the old Hendon days it was always possible to paint numbers on the machines. Why not now? If standard numbers were chosen, these could be kept in readiness and need not be stuck on the machines until the last moment. After the race they could easily be removed and used again at the next meeting. The absence of numbers must have been a trial to the timekeepers as well as to the public.

Then we certainly also think that the Press is entitled to a "grouse." No tent or shelter of any sort was provided for Press representatives, nor, as far as could be ascertained, was anyone given charge of collecting and issuing information such as lap times, etc., to the Press. At Hendon there was a nice little Press club, presided over by the genial "Charlie" Lane, who always had the latest information over the 'phone and handed it out to any Press representative requiring it. At Waddon there was no telephone in the enclosure over which reports could be sent to the various daily papers. In the future better arrangements will have to be made—if the Press is to be given a fair chance of helping aviation by its accounts of the meetings.

Having relieved ourselves of these various criticisms, we may turn to the races themselves. The first race, the Club Handicap, was timed for three o'clock, but owing to weather conditions there was considerable delay in getting started. Three of the Avros failed to start, leaving only the G-EAXY

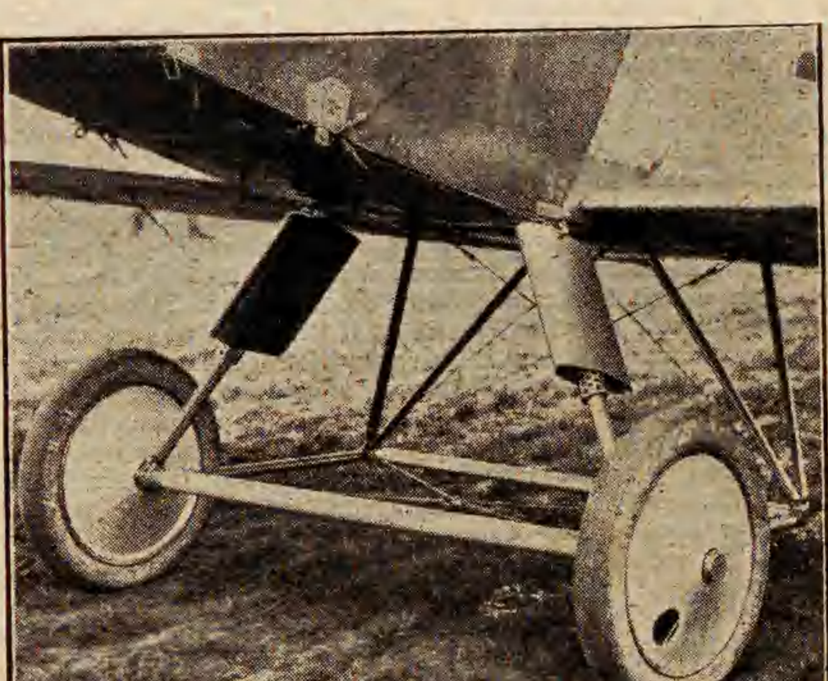
"Snipers" at Croydon: On the left, Vice-Admiral Mark Kerr, C.B., M.V.O., and on the right, Lieut.-Col. C. E. Risk, D.S.O., who competed in the balloon sniping competition. In the centre, Mr. F. P. Raynham, who piloted the Avro for Admiral Kerr.

Avro flown by Major H. Petre, and the Avro-Viper flown by Hinkler. Of other types which were non-starters in this race was the BE2E and the D.H.6. There were still ten machines left, and the race proved a very good one. The limit man was Major Petre on the Avro, 110 le Rhone, who was given 5 mins. 40 secs. start. The next to get away was Hinkler, on the Avro-Viper, whose allowance was 2 mins. 50 secs., and who was followed by Uwins on the Bristol monoplane with a 100 h.p. Bristol "Lucifer" engine. Uwins' allowance was 2 mins. 35 secs. Barnard, on the D.H. 9B, 230 h.p. Siddeley "Puma," got 2 mins. 28 secs., and Muir, on the Parnall Panther, 200 h.p. B.R.2, 2 mins. 11 secs. start. Stocken on the D.H. 9A, 400 h.p. Liberty, roared off next (his allowance being 1 min. 10 secs.), followed by Flying Officer R. S. Carrol on an S.E.5A, 200 h.p. Wolseley-Viper, whose allowance was 50 secs. Flight Lieuts. Longton and Long, on Martinsyde F.4's with 300 h.p. Hispano-Suiza engines, started together at scratch, and looked very impressive as they hurled across the starting line and swung to the left over the end of the enclosures. This race was over a distance of 16 miles, being two laps of the course, and the machines were in sight practically the whole time, except when one or other disappeared behind a hedge, flying very low. The result was that Stocken on the D.H.9A came in first, followed by Barnard on the D.H.9B, with Uwins on the Bristol monoplane third.

The Bristol "Lucifer" 100 h.p. engine, mounted in the very pretty little Bristol monoplane flown by Mr. Uwins. Considering that this engine has three cylinders only, it runs very smoothly and evenly.

As the machines were landing after the race an amusing incident occurred, which damaged two machines but left the pilots unhurt. Carrol had landed on the S.E.5A, and had actually got out of his machine, but had left the engine running. Long came in on one of the Martinsyde F.4 biplanes, but his machine did not pull up as quickly as was expected, and he ran into the tail of the S.E.5, smashing the rear portion of its *fuselage* and damaging his own undercarriage. The S.E.5 cocked its nose into the air, still with the engine running, and presented a most humorous spectacle. The engine was stopped, and the damaged machine "walked" over to its home on the other side of the aerodrome.

The second race of the day was the Second Waddon Handicap, for machines with a speed of not less than 100 m.p.h. The course was the same as that of the first race, but competitors had to cover four laps instead of two, bringing the distance up to approximately 32 miles. The limit man in this race was Bert Hinkler, on the Avro-Viper, whose allowance was 5 mins. 20 secs. Uwins on the Bristol mono. got 4 mins. 11 secs., and Muir on the Parnall Panther 3 mins. 28 secs. start. Barnard on the D.H.9B was given 1 min. 53 secs., and Stocken on the D.H.9A 4 secs., while Longton on the Martinsyde F.4 started scratch. With the exception of Muir on the Panther, who retired during the race, all competitors completed the course, and the result was: Hinkler first, Uwins second, and Stocken third. The undercarriage of Hinkler's Avro-Viper is of a new type, incorporating an oleo gear which appears to be most effective in damping oscillations and preventing bouncing. When the machine gets off, the plunger slowly sinks to the bottom of the cylinder, the undercarriage "legs" coming down quite an appreciable distance. On landing, the first load is taken on the oil, before the rubbers have come into play, and at the end of its travel the plunger prevents bouncing. The result is that the undercarriage is extremely "squashy," and that no shock is felt in the cockpits of the machine. We understand that the machine has been deliberately stalled from about 20 feet, and even then did not bounce, nor was anything strained. This undercarriage certainly appears to be a great step forward, and should go a long way towards minimising breakages of machines in inexperienced hands. As flown by Hinkler, there was, of course, no need for it, but that is no reason why the type should not become very popular, as landings can be effected on very rough ground by its use.



A NEW AVRO OLEO UNDERCARRIAGE: The Avro-Viper, flown by Mr. Bert Hinkler in the races at Croydon, was fitted with an oleo undercarriage, which appeared to have exceptionally good shock-absorbing qualities, and entirely prevented bouncing, even in a pancake landing.

Only two machines started in the Second Croydon Handicap, which consisted of three laps of the course, or a distance of 24 miles. Admiral Mark Kerr, who was flying a B.E.2E, with 90 h.p. R.A.F. engine, was given 36 seconds' start over Major Petre on the 110 h.p. le Rhone Avro. The Admiral, who is no longer a young man and who is probably older than any other pilot now flying, got away very well indeed, and, after crossing the starting line, made a fine left-hand turn to get on his course. As the machines came around the first time, the Avro did not appear to have gained much on the B.E., but on the second lap Petre managed to shorten the distance between them, and on the third and last lap he managed to get in front, coming in about a minute ahead of the B.E. In landing Admiral Kerr had a slight mishap, fortunately, however, without injury to himself, although the old B.E. was somewhat damaged. Touching a little too hard, the machine bounced, but the Admiral opened out his engine, and it looked as if he was going to take off again and make a circuit to land. He swung around to the right before the machine had gathered sufficient speed, and the B.E. described a very small circle, banked up at a rather steep angle, and, losing flying speed, she sank to the ground, touching with the right wing tip and her nose. Fortunately she did not turn over, and the Admiral, whose very sporting spirit was greatly admired by all, was able to climb out of the machine unaided. That he was little the worse for his experience was clear when, shortly afterwards, he went up as passenger with Raynham and brought down three balloons with a sports gun, the first two being particularly pretty shots.

While visitors were waiting for the last race to start, Mr. Newall made a double parachute descent in "Guardian Angel" parachutes from a very low altitude, demonstrating how quickly these parachutes open.

The last race was to have been for machines occupying the first three places in the Waddon and Croydon Handicaps, the race being described as the First Spring Handicap, and the course consisting of four laps. There were, however, only three starters: Petre (9 mins. 36 secs.), Hinkler (3 mins. 43 secs.), and Stocken (scratch), and the finishes were: Stocken first, Petre second, and Hinkler third.

A long interval now followed before the start of the balloon sniping competition. Ultimately this event was run off, in about the best weather of the whole day. It consisted in sending up a machine with a gunner in the rear cockpit, provided with an ordinary shot gun. After the machine had climbed for 3 minutes, three balloons were released at intervals of 2 minutes, and competitors had to destroy the balloons in the shortest time, a limit of 10 minutes being imposed. There were two competitors in this event, Admiral Mark Kerr, who was piloted by F. P. Raynham on an Avro, and Lieut.-Col. Risk, whose pilot was Capt. Muir, also on an Avro. Both competitors did some extremely pretty shooting, and the event was won by Admiral Kerr, who brought down his three balloons in the shortest time. This was hailed with satisfaction by such of the visitors as had had the hardihood to remain to watch this competition, as it was by then getting pretty late. There had been great concern when there was a possibility of the popular Admiral having been injured, and his excellent shooting was an indication that his hand was steady enough after his experience in landing the B.E. Everyone admired his sporting spirit, and it is highly probable that if one could have taken a ballot among the visitors, the gallant Admiral would have topped the list for popularity. May he long live to give his splendid example to the younger generation.

THE DEATH OF SIR ROSS SMITH AND LIEUT. BENNETT

Sad Fatality on the Eve of Great Flight

It is with the deepest regret that we have to record this week the death of Sir Ross Smith and Lieutenant Bennett in an aeroplane crash, following a test flight at Brooklands, on the machine on which these two and Sir Keith Smith were to have attempted the flight around the world, to which detailed reference was made in FLIGHT last week.

The happenings on the day of the accident have been dealt with at such length in the daily press that there is no need for us to do more here than give the briefest *résumé* of the facts, such as they have emerged. During the morning of Thursday, April 13, the Vickers "Viking IV" Amphibian, 450 h.p. Napier "Lion" engine, was brought out of its shed at the Weybridge works of Vickers, Ltd., and, at 11.30 a.m., Capt. Cockerell, the well-known Vickers test pilot, having with him as passengers Sir Ross Smith and Lieut. Bennett, took the machine off, and flew for about half an hour. Sir Ross Smith was sitting on Capt. Cockerell's left in the front cockpit, while Lieut. Bennett sat in the cockpit behind, just in front of the wings. According to Captain Cockerell, the machine behaved splendidly, and there was nothing to indicate that anything whatever was wrong, either with it or with the engine, which ran perfectly.

On landing, Capt. Cockerell handed the machine over to Sir Ross Smith, who took it up in a perfect manner, still with Lieut. Bennett in the aft cockpit. The machine climbed to a height of 1,200 to 1,500 ft., when it was seen to get into a spin. At first it was thought that Sir Ross was "stunting," which surprised everyone, but it was soon realised that the spin was not intentional. After coming down in a spin to about 700 or 800 ft., it looked as if Sir Ross was regaining control, but immediately afterwards the machine commenced spinning again, until quite close to the ground. By then the spin had stopped, and the machine was in a straight nose dive. It was then, however, too late to flatten out, and the machine crashed nose first into some tall fir trees, both occupants being killed instantly.

At the inquest the coroner returned a verdict of death by misadventure, stating it was not known how the machine got into a spin. Whether it was an error of judgment on the part of Sir Ross would never be known. It was proved by the evidence that there was no defect in the actual machine itself, and there was no collapse of any part. The engine behaved perfectly. The jury expressed sympathy with the relatives.

We are sure all readers of FLIGHT will join us in adding our expression of sympathy to all the others. To Sir Keith, who saw the accident, and to his and Lieut. Bennett's parents, the loss is the heaviest of all, but the death of these two gallant officers and gentlemen will be keenly felt the world over, wherever indomitable will and the courage to undertake great things are appreciated. To the directors of Vickers, of Napiers, of "Shell's," and last, but by no means least, all those workers who had had a part in building the machine, into which they had put the very best of which they were capable, the blow is, indeed, a heavy one, and the loss is in this case in actual fact irreparable. The flight may be carried through—we sincerely trust it will be carried through—but a second attempt can never be quite the same, no matter how successful nor by whom undertaken.

Messages of Condolence

SIR KEITH SMITH has received the following telegram from the King and Queen :—

The King and Queen are shocked to hear of the terrible accident in which your brother, Sir Ross Smith, and Lieut. Bennett lost their lives yesterday as they were preparing to embark on yet another daring exploit. Their Majesties feel that by their death the Empire has lost two of its foremost pioneers of flight, and I am desired to assure you of their heartfelt sympathy with you in your sorrow.

"PRIVATE SECRETARY,
"Windsor Castle, Friday"

From the Duke of York, Sir Keith Smith has received the following letter :—

"The Duke of York was deeply grieved to hear of the tragic death of your brother. His Royal Highness has commanded me to express to you his very real sympathy in the heavy loss you have sustained in the death of your brother, who had done so much splendid work, not only for British aviation, but the British Empire as a whole.

"LOUIS GREIG,
"Comptroller to the Duke of York"

Air-Marshal Sir Hugh Trenchard wrote :—

"I am intensely grieved to get the news of the fatal accident that has overtaken your brother, and I hasten to express on behalf of all ranks of the Royal Air Force our deep sorrow. May I say on my own behalf that I am inexpressibly grieved, and that you have my great sympathy with you in the loss of your brilliant brother."

The Minister for Air has sent the following message to Sir Keith Smith :—

"On behalf of the Air Ministry and myself, please accept my most sincere condolences on the tragic death of your brother and of Lieut. Bennett on the eve of your round-the-world flight.

"FREDERICK GUEST"

The Air Ministry has sent the following message to the Australian Government :—

"On behalf of the Secretary for Air and the Air Council, I am commanded to request you to convey to the relatives of Sir Ross Smith and Lieut. Bennett their profound sympathy at the tragic accident which has brought about the deaths of these two distinguished pioneers of aviation, on the eve of their flight round the world, a flight which it had been hoped would not only have eclipsed their historical flight to Australia, but would also have been a further step forward in the linking up by air of the many countries of the world as well as of the different parts of the British Empire. The sudden ending of two lives of such promise will everywhere be felt as an irreparable loss."

The following telegrams have been exchanged between the French and British Air Services :—

From M. Laurent Eynac, Under-Secretary of State for Air, Paris :—"Deeply touched by the fatal accident of which Messrs. Ross Smith and Bennett are the victims. The entire French Air Service shares the mourning for the cruel loss sustained by the British Air Service of the two pilots of great renown."

From the Under-Secretary of State for Air, London :—"Deeply grateful for your telegram of condolence conveying sympathy of France in the terribly sad accident to Ross Smith and Bennett. The loss to aviation is indeed world-wide."

LONDON TERMINAL AERODROME

Monday Evening,
April 17, 1922.

Passenger traffic has been rather disappointing over the Easter holidays. Quite an influx was expected, but it was not until Saturday that there was any sign of anything out of the ordinary. It is possible that the two recent fatal accidents, both of which gained so much publicity, were to some extent responsible; though, on the other hand, it is increasingly apparent that a bad crash has little adverse effect on traffic. On Saturday there were 50 passengers in and out of the air-station in spite of the gale which, at times, reached almost hurricane force at 2,000 ft.

Daimler Airways have abandoned the idea of running a regular service during April, but are hoping to put on their full four services a day in May. In the meantime, they are running an occasional service to supply the demand for seats, and the new D.H.34, which arrived from Stag Lane last Monday, has made two return trips during the week, being used in the meantime for practice flights for the pilots. The machine which forced-landed and turned over at Berck has been dismantled, packed up, and sent by boat and train to Stag Lane to be rebuilt. The first of the K.L.M. monoplanes arrived on Saturday, piloted by Mr. Geysendorfer, and will be ready for the re-opening of the Rotterdam and Amsterdam service on Tuesday, the 18th. Mr. Leverton, whose offices are somewhat out of the way now that there is such a bewildering show of "paint and pomp" along the main-entrance road, has managed to secure six feet of frontage on the aerodrome "Broadway," and has erected a K.L.M. sign and constructed a fenced-in path leading to his office.

Handley Page Transport have now moved into their new offices, and these are really the last word in airway sumptuousness. The long baggage counter, and the ticket counter with its brass rails, give the place a very businesslike air, and there was some excuse for one of the aerodrome's most impecunious inhabitants trying to cash a cheque through the brass rails.

The Anti-Collision Conference

This Handley Page office was used for a meeting of the various air-company managements and pilots on Thursday afternoon to discuss improvements in the organisation of the airways with a view to preventing further accidents, and more especially to plan out routes and rules which would make the chances of air collisions practically nil. Several resolutions were agreed to, the principal being that the pilots should hold meetings amongst themselves to plot out definite routes, all marked by well-known and easily distinguished landmarks, and that once these routes are fixed all "air expresses" must keep to the right of them. It was further resolved that all machines should carry wireless, and it is notable in this connection that the French representatives, whose machines are not fitted with wireless, were as emphatic on this point as were the British. Several further resolutions dealing with the improvement of wireless communication and weather reports, were also passed, and it is understood that these have been forwarded to the Air Ministry for their consideration and, one hopes, "necessary action, please."

The pilots have already held tentative meetings; but from all accounts the business of fixing the routes is not at all easy. Each pilot has his own favourite land-marks on certain parts of the routes, and there appears nothing like agreement as to which are the best, or as to which route offers the most suitable all-weather conditions.

In connection with the collision over France on April 7, the staffs at the air-station have sent a wreath for M. Mire, and, when the Daimler D.H.34 arrived from Paris on Friday evening, it had on board a similar tribute from the pilots and staffs at Le Bourget for Mr. Duke.

British Daily Service to Brussels

The Instone Air Line hope to open their London–Brussels service on May 1, with one machine in each direction daily. Major Greer, who has been C.A.T.O. at Croydon since its inception, is to be their Brussels manager, and the various staffs at the air-station are to present him with a gold cigarette-case when he leaves to take up his new duties. Capt. Baker is now to be in charge at Croydon, while Mr. Davies, who has been C.A.T.O. at Lympne, is also coming to Croydon, leaving Comdr. Deacon in sole charge at Lympne.

On Friday the first of the Renault-Goliaths arrived from Paris. The Messageries Aériennes are to augment their fleet by a number of these machines, which are to be fitted with gas-starters. The first arrival, however, is not so fitted, and, in order to swing the propellers, it is necessary to stand on a platform or truck, making the whole proceeding somewhat hazardous. The exhaust pipes are led back over the petrol tanks, but I am assured that this is not in the least dangerous. These engines are a distinct improvement, and the installation of Renaults should make the "Goliath" one of the best of commercial "air expresses."

Long-distance Air Parcels

There have been a surprising number of parcels arriving by the Messageries Aériennes from Paris, and a number of these were originally consigned by air from Prague, *via* the Franco-Rumanian air line. It is possible in this way for a parcel dispatched from Prague in the morning of one day to be delivered in London in the afternoon of the day following, which, considering the state of many of the European train services at present, must mean a considerable saving of time.

The competitors in today's air-races have been making practice flights throughout the week. Vice-Admiral Mark Kerr has been flying the Royal Aero Club's B.E.2E., and puts up a very creditable performance. The various Disposal Company's entries have also been given trial runs, and the D.H.9 with the 400 "Liberty" is very much fancied; that is, if it can be induced to start.

The aerodrome has been quite a popular rendezvous during the holidays. On Friday there was a constant stream of people in and out of the public enclosure, and Mr. Muir was taking up quite a number of joy-riders.

Making Assurance Doubly Sure

An arrangement which does away with any delay that might be occasioned by unavoidable forced landings has been made by the Messageries Aériennes, in conjunction with the Compagnie Générale Transatlantique. On the Paris-Havre service, in connection with the sailings of liners for New York, it is of vital importance that, no matter what happens, passengers should not miss their ship; and, in order to make this practically certain, the steamship company have a fleet of powerful cars at Rouen, which, in case of an aeroplane forced landing, immediately rush to the spot and, picking up the passengers, transport them by road to Havre.

Mr. L. H. Harris, who has an air-model studio on the aerodrome, has turned out some very fine models during the winter months. His scale models of the Vickers-Vimy "City of London," and of the winner of the Aerial Derby, the Gloucestershire Mars 1, are particularly fine, and photographs of them have been mistaken for air views of the real machines even by those well acquainted with the originals.

The Grands Express have again had to postpone their night journey over the London-Paris airway. They wish to make sure that there shall be no failure that can possibly be avoided on this first night flight, and are waiting for a full moon and a clear night to occur simultaneously. M. Rene Labouchere is to pilot the Goliath when the attempt is made, and this in itself is an augury of the flight's success.

Mr. Larry Carter, who is now piloting for Handley Page Transport, made his first flights in a D.H.18 during the week, and on Thursday flew this machine to Paris, returning to Croydon on Friday, and making very good time.

The semi-final for the Napier football cup was played on Thursday between the C.A.T.O. Customs and Transport and the Meteorological Section, and resulted in a win for the former. None of the air-lines has been able to raise a team this year, and the final will be fought out between two sections of the Air Ministry staff.

Capt. Greig, who was with Aircraft Transport & Travel from the early days, and was later with Air Express, Ltd., is now representing Basil S. Foster, Ltd., on the aerodrome. He will have plenty of work in connection with the big new petrol-plant that the Anglo-American Oil Co. are putting down, as they will have no fewer than nine pumps on the aerodrome when this plant is completed.

A forced landing Mr. Shaw had in France the other afternoon, while piloting a Handley Page D.H.18, had one extremely amusing aspect. Engine trouble causing him to pick a landing in the first suitable field, he pulled up very quickly after his wheels had touched ground, and, climbing from his cockpit, moved back to reassure his passengers. But, though it had been a connecting-rod in the engine that had broken, and Mr. Shaw had been obliged to do some pretty rapid manœuvres in order to get down into the field he had chosen from a height of about 1,000 ft., he not only found his passengers quite unmoved, but one of them, who had been taking a nap while in the air, was still sitting fast asleep in his comfortable chair, not having been wakened either by the engine stoppage or by Mr. Shaw's twists and turns as he came gliding down in a quick descent.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN APRIL 2 AND APRIL 15, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon-Paris	62	162	25	52	53	3 8	D.H. 4a G-EAWH (1h. 50m.)	B. (5), Br. (1), D.H. 4 (2), D.H. 18 (4), D.H.34 (3), G. (9), H.P. (1), Sp. (3), V. (1).
Paris-Croydon	61	241	12	42	53	3 25	D.H.4a G-EAWH (1h. 50m.)	B. (5), Br. (1), D.H. 4 (2), D.H. 18 (3), D.H.34 (3), G. (11), H.P. (1), Sp. (2), V. (1).
Totals for 2 weeks ...	123	403	37	94	106			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

NOTICE TO GROUND ENGINEERS

Bristol "Tourer" and Bristol "Fighter" Aircraft: Aileron Controls.

1. THE attention of ground engineers is directed to the *aileron* control cable fairlead which passes through the compression rib adjacent to the *aileron* control pulley in the wing on Bristol "Tourer" and Bristol "Fighter" aircraft. Instances have occurred of *aileron* control cables badly fouling these fairleads during normal travels of the *ailerons*.

2. When fitting modified pulley guards as detailed in Notice to Ground Engineers No. 9 of 1921, or in cases where they have been fitted, it will be necessary for the fairlead through the compression rib adjacent to the pulley to be deleted. The hole remaining in the compression rib should be elongated to allow the *aileron* control cable to clear at all positions of the pulley.

(No. 4 of 1922.)

Spain Scores with 'Planes in Morocco

ON April 10 the Spanish Air Force in Morocco made an effective raid, according to advices from Madrid, from end to end of the Riff coast, a distance of 200 miles. Several hundred bombs were dropped on the hostile tribes opposite the Peñons. The Spanish forces now have two well-organised aerodromes—the one at Nador, which is also the base of the hydroplane squadron, and the other at Tetuan. The open-air markets held by the Moors provided excellent targets.

Wazirs still Worrying

ANOTHER instance of the rapid effects of aircraft work in the East is recorded in the dispersal of 2,000 Wazir outlaws who had been besieging Wana, under the notorious Abdul Razak from over the Afghan border. Encouraged by the Naib Tahsildar, the political officer in charge, the Khassadars, although Wazirs, *The Times* Simla correspondent states, held out from April 4 to 9. On April 7 six aeroplanes from Tank came to the rescue and bombed the besiegers for three days, dispersing them to the hills.

The exploit should increase the *moral* of the Khassadars, who are practically at the beginning of their career in the Waziristan. It also indicates the potentialities of the Air Force and the necessity of keeping this Force up to the requisite standard of efficiency. The reports suggest that the Air Force is starved for spare parts and spare machines, and it is doubtful whether it will be able to repeat the Wana performance, except as a special effort, in view of the deficiencies mentioned.

"O! for a float in a 'Fairey' boat": Mr. C. R. Fairey—who has been taking a long overdue rest—tries a novel form of "stream line." Crossing the famous ferry to the third tee at Cannes Golf Course.

THE ROYAL AIR FORCE

London Gazette, March 28, 1922

General Duties Branch

The following are granted short service commns. as Flying Officers, with effect from, and with seniority of, the dates indicated :—H. J. T. Saint, D.S.C. ; March 13. M. Tallentire ; March 15.

Pilot Officer (on prob.) W. Pritchard, M.M., resigns his short service commn. ; March 29. Flight-Lieut. A. C. H. Groom, D.F.C., relinquishes his short service commn. on account of ill-health contracted on active service, and is permitted to retain the rank of Capt. ; March 29. Flying Officer D. I. M. Kennard relinquishes his short service commn. on account of physical unfitness for flying duties, and is granted the rank of Capt. ; March 29.

Stores Branch

Flight-Lieut. A. G. N. Belfield is granted a permanent commn. as a Flight-Lieut., with effect from September 12, 1919, and is transferred to the Stores Branch for Accountant duties, with effect from October 25, 1921 (*Gazette* of September 12, 1919, appointing him to a short service commn. is cancelled). Flying Officer R. F. C. Metcalfe is granted a permanent commn. as a Flying Officer, with effect from December 5, 1919, and is transferred to the Stores Branch for Accountant duties, with effect from December 26, 1921. (*Gazette* December 5, 1919, appointing him to a short service commn. is cancelled). The seniority of officers granted commns. in the Stores Branch for Accountant duties is provisional only. The final seniority list of all such officers will be promulgated when the establishment is completed.

Medical Service

Flight-Lieut. D. Le Bas is granted a short service commn., retaining his present substantive rank and seniority ; April 1. The following Capts., Army Dental Corps, are granted temp. commns. as Flight-Lieuts., while attached for duty with the R.A.F. ; February 21. They will continue to receive emoluments from Army funds :—Capt. H. E. Flavelle, Capt. R. M. King.

London Gazette, March 31, 1922

Memoranda

F. McK. Miller is granted a temp. commn. as a Pilot Offr. for service with the Electrical Services Works Company ; April 1. Pilot Offr. W. J. Root relinquishes his temp. commn. on ceasing to be empld. ; April 1.

London Gazette, April 4, 1922

General Duties Branch

C. B. Greet is granted a short service commn. as a Pilot Off. on probation, with effect from, and with seny. of, April 1. Flying Off. G. Verden is placed on the retired list on account of ill-jeath, contracted on active service ; April 5. The short service commn, of Pilot Off. on probation, W. I. N. Grant, is terminated on cessation of duty ; March 18.

Stores Branch

The short service commn. of Pilot Off. on probation, C. B. Great, is terminated on transfer to the Gen. Duties Branch ; April 1.

Medical Service

V. R. Smith is granted a short service commn. as a Flight-Lieut., with effect from, and with seny. of, March 18. Temp.-Capt. C. Fox-Pitt, Dental Surgeon, granted a temp. commn. as a Flight-Lieut. while attached for duty with the R.A.F.; March 8 (he will continue to receive emoluments from Army funds). Flight-Lieut. S. E. Duff, M.B., resigns his short service commn., and is permitted to retain rank of Capt.; April 5.

Memoranda

Sec.-Lieut. J. Hogan to be Lieut. (tech. grade A), without pay and allowances of that rank (June 22, 1919 (since demobilised). Hon. Sec.-Lieut. R. D. Saunders relinquishes his hon. commn. on joining the Army ; March 7.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

Air Commodores.—H. R. M. Brooke-Popham, C.B., C.M.G., D.S.O., from Headquarters Inland Area (Inland Area) to R.A.F. Staff College (Inland Area) as Commandant. 1.4.22. R. H. Clark-Hall, C.M.G., D.S.O., from Air Pilotage School (Cadre) (Inland Area) to R.A.F. Staff College (Inland Area) for duty as Instructor. 1.4.22.

Wing Commanders.—P. B. Joubert de la Ferte, C.M.G., D.S.O., from Air Pilotage School (Cadre) (Inland Area) to R.A.F. Staff College (Inland Area) for duty as Instructor. 1.4.22. W. R. Freeman, D.S.O., M.C., from Air Pilotage School (Cadre) (Inland Area) to R.A.F. Staff College (Inland Area) for duty as Instructor. 1.4.22. C. H. K. Edmonds, D.S.O., O.B.E., from Air Pilotage School (Cadre) (Inland Area) to R.A.F. Staff College (Inland Area) for duty as Instructor. 1.4.22. A. T. Whitelock from Headquarters, R.A.F., India to R.A.F. Depôt (Inland Area) (Supernumerary). 2.3.22 to join 1.5.22. J. Mead, O.B.E., M.C., from R.A.F. Depôt (Inland Area) to Inland Area Aircraft Depôt (Inland Area). 27.3.22. J. E. A. Baldwin, D.S.O., O.B.E., from No. 7 Group Headquarters (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22.

Squadron Leaders.—B. E. Sutton, D.S.O., O.B.E., M.C., from Air Pilotage School (Cadre) (Inland Area) to R.A.F. Staff College (Inland Area), for duty as Instructor. 1.4.22. G. S. M. Insall, V.C., M.C., from No. 6 Flying Training School (Inland Area) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.4.22. R. F. S. Morton, from Inspector of Recruiting (Liverpool) (Coastal Area) to No. 2 Flying Training School (Inland Area). 3.4.22. A. S. Morris, O.B.E. from No. 6 Flying Training School (Inland Area) to No. 1 Flying Training School (Inland Area). 1.4.22. R. S. Maxwell, M.C., D.F.C., from Air Ministry (Directorate of Training and Organisation) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.4.22.

Flight Lieutenants.—C. B. Dick-Oleland, from Air Pilotage School (Cadre) (Inland Area) to R.A.F. Staff College (Inland Area) for duty as Adjutant. 1.4.22. C. H. Keith, from No. 230 Squadron (Coastal Area) to R.A.F. Cadet College (Flying Wing) (Cranwell), for duty as Instructor in Aerial Navigation and Pilotage. 15.4.22. F. Tedman, M.B.E., from R.A.F. Depôt (Inland Area) to R.A.F. Base, Gosport (Coastal Area). 4.4.22. J. Roberts, from Headquarters (Inland Area) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.4.22. E. Meynell, D.C.M., from R.A.F. Depôt (Inland Area) to Headquarters (Inland Area). 1.4.22. H. S. Shield M.C., from R.A.F. Depôt (Inland Area) to Armament and Gunnery School (Inland Area). 3.4.22. G. C. Bailey, D.S.O., from Central Flying School (Inland Area) to School of Photography (Inland Area) (Supernumerary). 3.4.22. H. G. P. Rees, from No. 1 Wing Headquarters (India) to R.A.F. Depôt (Inland Area) (Supernumerary). 23.2.22. to join 1.5.22. C. Fox-Pitt to R.A.F. Depôt Inland Area (Supernumerary). On attachment from Army, 8.3.22. C. E. H. James, M.C. from School of Photography (Inland Area) to No. 1 Flying Training School (Inland Area). 3.4.22. W. S. Caster, M.C., from No. 6 Flying Training School (Inland Area) to No. 24 Squadron (Inland Area). 28.3.22. C. Musgrave, A.F.C., from No. 6 Flying Training School (Inland Area) to No. 100 Squadron (Inland Area). 31.3.22. H. M. K. Brown, from No. 6 Flying Training School (Inland Area) to No. 39 Squadron (Inland Area). 31.3.22. A. S. Maskell, from Inspector of Recruiting (Portsmouth) (Coastal Area) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.4.22. N. Keeble, D.S.C., D.F.C., from No. 6 Flying Training School (Inland Area) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.4.22. A. H. Wann, from R.A.F. Airship Base (Coastal Area) to Headquarters (Coastal Area) (Supernumerary). 24.2.22. A. J. Briddon, from R.A.F. Depôt (Inland Area) to Headquarters (Coastal Area). 3.4.22. A. J. Capel, from R.A.F. Cadet College (Ground wing) (Cranwell) to Headquarters R.A.F., Cranwell. 3.4.22. L. N. Hollinghurst, D.F.C., from R.A.F. Depôt (Inland Area) to R.A.F. Cadet College (Ground Wing) (Cranwell). 31.3.22. A. C. Snow, from R.A.F. Depôt (Inland Area) to No. 11 Wing Headquarters (Inland Area). 31.3.22. L. H. Slatter O.B.E., D.S.C., D.F.C., from half-pay list to No. 230 Squadron (Coastal Area). 21.3.22. H. O. Long, D.S.O., from Instrument Design Establishment (Inland Area) to Aeroplane Experimental Establishment (Coastal Area). 15.4.22. R. E. P. Wigglesworth, D.S.C. The notification which appeared wherein this officer was posted from R.A.F. Depôt to Inland Area Aircraft Depôt, with effect from 20.3.22, is hereby cancelled. J. H. Hagon, from R.A.F. Depôt (Inland Area) to School of Photography (Inland Area). 18.4.22. J. M. McEntegart, from Air Ministry (Director-General of Supply and Research) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.4.22.

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IN PARLIAMENT

Aeronautical Research Committee

CAPTAIN VISCOUNT CURZON, on April 6, asked the Secretary of State for Air how many paid members comprise the Aeronautical Research Committee ; how much is paid to them and how they are paid ; how many sittings have been held during the last year ; what was the total expenditure involved ; have the number of sittings increased ; and will he reduce the expenditure upon this service ?

Following is the reply :

The Aeronautical Research Committee works mainly through Sub-committees and including the latter, the paid members as at December 31 last numbered 31. They are paid, in addition to travelling expenses, 10 guineas each per sitting, reducible to 5 guineas per sitting after 10 sittings, subject to an overriding maximum of £200 for each member of one Committee, of £350 for each member of two Committees, and of £450 for each member of three or more Committees ; payment is made on vouchers certified by the Secretary and submitted to the Air Ministry. During the year ending December 31, 1921, 88 meetings in all took place. The total expenditure in that year was £4,861, being £4,247 for fees and £614 for travelling expenses. The number of meetings has, on the whole, been considerably reduced. Steps to reduce expenditure have already been taken, and it is expected that not more than £2,000 will be spent on fees in the financial year 1922-23.

Bomb Attacks or Battleships

MR. RAPER on April 10 asked the Prime Minister whether his attention has been drawn to the substantial divergence of opinion between the Air Ministry and the Admiralty regarding the proved potentialities of aircraft in sinking battleships and the experiments carried out in the United States ; and whether he will make a statement thereon ?

Mr. Chamberlain : It is not considered that it would be in the public interest to make a statement on this matter at present.

Mr. Raper : Is it not a fact that the speech of the First Lord of the Admiralty in another place on March 30 was fair neither to the Navy nor to the Air Force, and was calculated surely to belittle the work of the Air Force ?

Mr. Chamberlain : I am afraid I am not sufficiently familiar with what took place in another place, and I could not answer that question without notice.

London-Paris Air Service Accident

MR. RAPER on April 10 asked the Secretary of State for Air if he will make a statement regarding the lamentable accident to the London-Paris passenger aeroplanes on Friday last, and, further, whether in order to reassure the public as to the safety of air travel he will state the total number of casualties which have occurred and the total number of passengers carried since the different London-Paris services were inaugurated ?

Captain Guest : I have as yet no information which would enable me to amplify the Press reports of this regrettable accident, which is, I am glad to say, of a kind that is very rare in the air. The British subsidised London-Paris air service carried nearly 6,000 passengers during the year just ended, or nearly 1,100 machine voyages, without a single fatal accident. Comparable figures of French London-Paris air service are, approximately 1,600 machine voyages, carrying 4,500 passengers.

Air Council

REAR-ADMIRAL SUETER asked the Secretary of State for Air whether he has considered the desirability of arranging with the Admiralty for the appointment of a junior admiral, with knowledge of fleet work, submarines, and aircraft, to the Air Council to give advice on naval matters connected with the air ?

Captain Guest : As the hon. and gallant member is no doubt aware, the question of how best to co-ordinate the Services is under active consideration by the Government, and I have no doubt that, in the course of the thorough examination of the subject, his suggestion will come under review.

(*Concluded from page 229.*)

with shutters operated from the cockpit, is so mounted as to be unaffected by engine vibration, even in the case of a badly missing engine. It might also be mentioned that the complete wing structure, and, if desired, the engine unit, can be removed after undoing eight bolts.

As already mentioned, the petrol tank is mounted in the hull, and the fuel is fed to the carburettor by pressure from a pump. This is the usual arrangement on seaplanes, and for some reason has not been found to give as much trouble as does a similar petrol system on a land machine. One would prefer gravity feed, but it is difficult to see how this could be attained, and practical experience appears to indicate that it is not really necessary on a machine of this type.

The wings are of usual design, with one pair of inter-plane struts on each side. Bracing is by stream-line wires. Both upper and lower planes are provided with *ailerons*, controlled by cables in the usual way. Attention has already been called to the method of mounting the engine independently of the wings, and apart from this fact the wings do not possess any unusual features. The fittings are very robust, and treated to withstand the action of salt water. Also they are very accessible and easily renewed. The machine is steadied laterally, when on the water, by wing tip floats of the usual Supermarine type.

Figures relating to the performance have already been given. The following are the main characteristics of the Supermarine "Sea King":—

Length of hull, 24 ft. 9 ins.; wing span, 32 ft.; chord 5 ft. 9 ins.; gap (maximum), 6 ft.; area of main planes, 352 sq. ft.; weight of machine (empty), 2,115 lbs. The useful load is composed as follows:—Pilot, 180 lbs.; Lewis gun and six double trays, 100 lbs.; instruments, 20 lbs.; equipment, 30 lbs.; petrol (50 gallons), 365 lbs.; oil (4 gallons), 40 lbs.; total useful load, 735 lbs. Weight of machine fully loaded, 2,850 lbs. Wing loading, 8.1 lbs./sq. ft. Power loading, 8.4 lbs./h.p.

* * *

PERSONALS

Death

Lieut.-Col. Francis Maude-Roxby, O.B.E., D.F.C., Legion of Honour, who died on April 12 at Marlow, Bucks, of acute pneumonia, was the fourth son of the late Rev. Henry Meux-Roxby, of Buckden, Huntingdonshire.

Items

The will of Group Captain Alan John Lance Scott, C.B., M.C., D.F.C., of Wilton Street, S.W., Secretary to the Secretary of State for Air, who died on January 16 last, aged 39, has been proved at £3,389. Letters of administration have been granted to his mother as the only next-of-kin.

The will of the late Squadron Leader Geoffrey Main Thomas, D.F.C., R.A.F., of the Airship Station, Pulham, St. Mary, Norfolk, formerly of Black River, Jamaica, who was killed at Hull, in the diaster to "R.38," on August 28, aged 26 years, has been proved at £1,327.

* * *

Royal Air Force Club

Dances at the Club as follows have been approved by the Committee:—

April 21, May 5, and May 19, from 9 p.m. to 2 a.m. (Tickets, 10*s*. 6*d*.)

May 31 (Derby night), from 10 p.m. to 3 a.m. (or later). (Tickets, 15*s*.)

The number of dance tickets, which includes buffet supper, cups, iced coffee, etc., will be limited to 200.

It is considered wiser to discontinue the dances during the summer months of June, July, August and September.

The Zeebrugge Annual

The Annual Zeebrugge Dinner will be held at the Café Royal on the Eve of St. George's Day, April 22. All R.A.F. officers who took part in the operations leading up to and culminating in the attacks on Zeebrugge and Ostend are invited to be present. Tickets one guinea each.

Any officers who have not yet received notification, and who wish to attend, should communicate with Air Commodore C. L. Lambe, Air Ministry.

R.A.F. Hon. Cricket Secretary

The duties of Hon. Secretary of the R.A.F. Cricket Association have been taken over by Group Capt. N. D. K. MacEwen, C.M.G., D.S.O., who commands the Central Flying School at Upavon. Group Capt. N. J. Roche, O.B.E., whom Group Capt. MacEwen succeeds, is shortly proceeding overseas.

THE LONDON AERO-MODELS ASSOCIATION

A very successful meeting was held at Headquarters, 20, Great Windmill Street, Piccadilly, W., on Thursday, the 13th inst. Four new members joined the Association, namely, Mr. Houlberg, Mr. W. Hersom, Mr. Brough and Mr. Bedford; all these gentlemen are areo-modellists of repute and already have proved themselves energetic supporters. The competition which was to have been held on Sunday, the 16th, at Wormwood Scrubs, was postponed on account of the unsuitable weather conditions, there being a wind estimated by those present at over thirty miles per hour. There were approximately forty members present and in spite of the conditions many of the members unpacked their models and gave an excellent demonstration of what model aeroplanes can do in a high wind. The most prominent display was given by the members from Leytonstone, and also Mr. L. Grey, whose enclosed model gave wonderful performances, to the admiration of the general public who attended in large numbers.

The competition will be held on Sunday next, the 23rd inst., at Wormwood Scrubs, at 11 a.m., when it is hoped that members will put in an even better attendance than they did last Sunday. Meetings are held every Thursday at Headquarters, 20, Great Windmill Street, at 7.30 p.m., where Mr. A. E. Jones, Hon. Sec., or the Assistant Secretaries, Mr. Hatfull or Mr. Rippon, will be pleased to give full particulars of the Association.

* * *

PUBLICATIONS RECEIVED

Annual Report of the Smithsonian Institution, 1919. The Smithsonian Institution, Washington, D.C., U.S.A.

Technical Note No. 87. Hydrostatic Test of an Airship Model. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 92. Full Scale Determination of the Lift and Drag of a Seaplane. By Max M. Munk. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 134. Performance of Maybach 300 h.p. Airplane Engine. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

* * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published April 13, 1922

1,184. O. Ebersbach. Dirigible balloons. (157,276).
3,876. Zeppelinwerk-Lindau Ges. and C. Dornier. Wings, etc. (158,840.)
7,649. J. H. W. Gill and E. D. Hobson. Screw-propellers and similar appliances of the axial-flow type. (177,047.)

If you require anything pertaining to aviation, study "Flight's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "Flight," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xiv.)

LEATHER CLOTH—

New Pegamoid Ltd., 134, Queen Victoria St., E.C.
City 9704 (2 lines).
"Pegamoid," Phone, London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Arnott & Harrison, Ltd., Hythe Road, Willesden Junction.
Willesden 2297.
Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 275; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15.
Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.
Grahame-White Company, Ltd., Hendon, N.W. 9.
Kingsbury 120.
London Office: 12, Regent Street, Pall Mall, S.W. 1.
Regent 2084.
Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.
Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

MOTOR CARS AND MOTOR BICYCLES—

Auto-Carriers (1911), Ltd., 181-182, Hercules Rd., Westminster Bridge Road, London, S.E. 1.

NIGHT LANDING LIGHTS—

Allen-Liversidge, Ltd., amalgamated with Imperial Light, Ltd., 106, Victoria Street, S.W. 1.
Victoria 4155; "Aceterator," Sowest, London.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2.
Paddington 6332.

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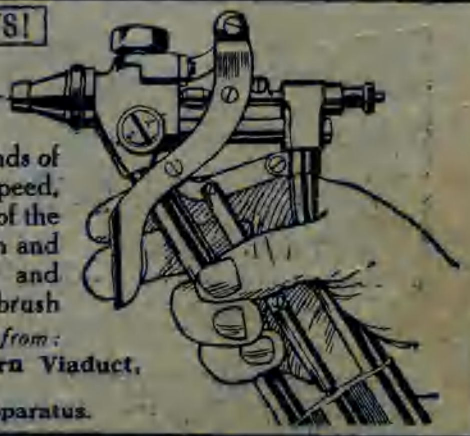

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
June 1	**Entries close for Schneider Cup Race**
June 5	**R.Ae.C. Whitsun Race Meeting, at Waddon**
June 23–25	**International Competition for Touring Aeroplanes, Brussels**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT

Our Future in the Air

WE are extremely glad to see that Brig.-Gen. P. R. C. Groves is returning, in the columns of *The Times*, to the vitally important question of our future in the air. It is by articles such as these that the layman, the man-in-the-street, is made aware of the true position, and it is by public pressure, and by public pressure only, that the Government may be persuaded to move at all. Past history shows this time after time, and this pressure, backed by a vast volume of public opinion, can best be initiated by such great daily newspapers as *The Times* and others, which reach the man who is not directly interested in aviation, but who is very directly interested in the safety of the Kingdom and of the Empire.

The previous series of articles by Gen. Groves dealt with the air policy of the Government during the three years since the Armistice. The present articles discuss the future policy of the Air Ministry, as foreshadowed by the Air Minister in the House of Commons, and by the Chief of the Air Staff, Sir Hugh Trenchard, in his inaugural address at the opening of the R.A.F. Staff College at Andover. This policy, as Gen. Groves interprets it, consists in maintaining a small regular Air Force, and in establishing a Territorial Air Force upon which to draw in case of emergency. Up till a very short time ago, Gen. Groves points out, we had no home defence against air attack, in the only form possible, *i.e.* a striking force of aircraft which, by being ready to attack at short notice the centres of any enemy who may contemplate an attack upon us, shall ensure that we are immune from such attack. It was not until, as Gen. Groves puts it, the Air Ministry "suddenly realising the obvious, resorted to panic measures and set aside three squadrons for the purpose," that anything was done, and even then, the three squadrons (totally inadequate to deal with the problem) were obtained by taking away from the Army and Navy squadrons which were badly needed by these services for co-operative work.

In concluding his articles, Gen. Groves gets home with the very telling point that, as the Air Force is now admitted to be our first line of defence, it is futile to model it on military lines, with a small Regular and a, not very large, Territorial Force. Rather should we found our Air policy on the service which was, until comparatively recently, our first line of defence—the Navy, which was ever prepared for any eventuality, and not relying on a small Regular Force and a Territorial Force in reserve. The logic of this argument should be sufficiently obvious. And to maintain an aerial Striking Force capable of coping with any demand can only be done by close co-operation with, and the establishment of, a strong Civil Aviation. On any other basis this task would assume impracticable proportions, both financially and practically. By fostering Civil Aviation, on the other hand, such a Striking Force could be maintained at a relatively small expense to the taxpayer, as to a certain extent Civil Aviation could be made self-supporting, quite apart from the advantages which the possession of the most rapid means of communications would confer on the Empire.

◆ ◆ ◆

The New Russo-German Air Route

It is a well-known fact that negotiations have been proceeding for some considerable time between the Soviet Government and German aircraft and financial circles, with a view to establishing German-operated air services between Berlin and Moscow. These negotiations have now been completed, and the German Aero Union combine have secured the rights to run this service. Not only so, but, possibly as a result of, or at any rate in close connection with, the recent Russo-German agreement of Genoa, these concessions are to be extended, and the combine has been granted exclusive rights to operate postal and passenger services between all the principal cities of Russia. The flying stock for these services will be built in factories erected on Russian soil, but financed and run by, it may safely be presumed, German capital and a large percentage of German *personnel*. At the best, this may—indeed, will—mean the extension of German air power and civil aviation right across Russia to the shores of the Pacific. At the worst—and not at all an unlikely supposition—it may mean the establishment of a huge civil aviation industry, nominally Russian but in reality dominated by Germany, which would form a potential "striking force," much of the character as that for which Gen. Groves pleads so strongly in his articles. And how are we to prevent it? So long as the machines are built in Russia and other countries, it would appear that we are powerless to stop construction on any scale which Germany may choose, and for which she is capable of paying. For that matter, what guarantee have we that she will not establish factories in Denmark, Sweden, Norway and Holland, as well as in Russia, ostensibly for the purpose of operating commercial air services to these countries, but forming a force which, in time of need, could quickly be massed on any frontier and used against any enemy. In this connection it is significant to recall the words of Gen. Ludendorf who, in 1920, advocated a treaty such as that now concluded between Germany and Bolshevist Russia, as a means "to destroy the consequences of our defeat and realise in the near future the idea of revenge." It does not require a great deal of imagination to visualise what might happen, and in the meantime we are carrying on with a pitiful "home defence" against air attack of three squadrons! One begins to realise that France, by keeping a strong Air Force and constantly adding to it, is playing for safety. She does not complain that she cannot afford it. She sees in it a form of insurance against aerial aggression, and pays the premium. An aerial defence, to be of any value, must be ready at a moment's notice. In the next war no time will be lost by the enemy. The first act of hostility will be an air attack, launched on a stupendous scale and directed against a number of points. The only defence is one which is always ready, not one which has to call up reserves, train personnel, etc. Are we ready to take our place under such a contingency? The answer is an emphatic NO.

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The Atlantic Flight

The magnificent performance of the two gallant Portuguese officers, Capt. Cabral and Capt. Coutinho, in flying from Lisbon to St. Paul's Rocks, deserves to rank high among the historical flights of the years after the war. With a minimum of organisation, and in spite of extremely unfavourable weather conditions, they have managed the most hazardous portion of their journey, and have succeeded in covering the longest non-stop distance entailed in the trip. That they should have come to grief after getting thus far is an unkindly blow of fate, but it appears probable that a fresh machine will be despatched, and that they may thus be able to complete their journey by air in the manner contemplated.

The fact of having been able to locate St. Paul's Rocks, which are visible at no great distance, and which are of quite minute extent, is a feat of navigation of which Capt. Coutinho may well be proud, and for which he deserves the very highest credit.

To British aviation the flight is of the greatest importance, in having shown once more the superiority of British aircraft and British engines for work of this nature. Our only regret is that the crew of the machine were not also British. Most of the world's long-distance flights have been made by British crews in British machines, engined by British power plants, and it would have been desirable that in this instance also the daring adventures should have been of our race. However, both officers are of a nation which has been for centuries our ally, and with which we still have the very closest relations, and we can therefore view without jealousy their splendid achievement. Our heartiest congratulations to them, to the Fairey Aviation Company, the builders of the machine, and to Rolls-Royce, Ltd., whose engine carried them to St. Paul's Rocks.

* * *

Transatlantic Airmen Honoured

The two Portuguese airmen, Capt. Cabral and Capt. Coutinho, have arrived at the Brazilian island of Fernando do Noronha, where they had a brilliant reception.

President Pessoa has sent a cordial message of congratulation to them, offering any assistance which the Brazilian Government can render.

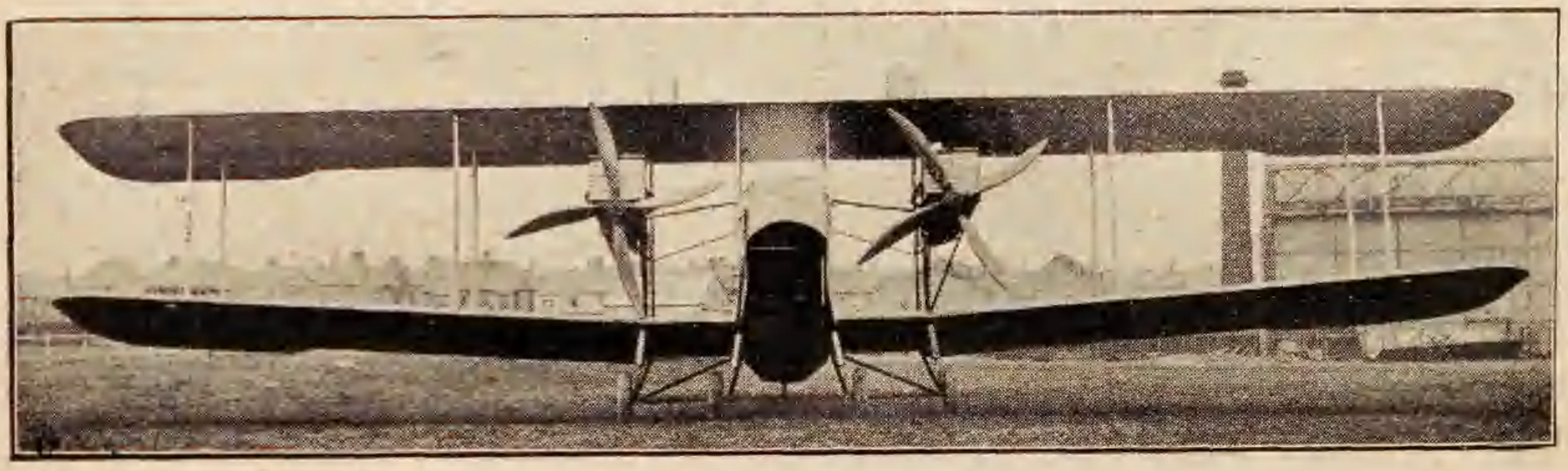
The two airmen have been awarded the Portuguese military Order of the Torre e Espada. The cruiser "Carvalho de Arajou" will leave Lisbon shortly with a new seaplane for the completion of the flight to Rio de Janeiro.

THE HANDLEY PAGE W.8B

Two Rolls-Royce "Eagle" Engines

THE first of the new Handley Page W.8B commercial machines, general arrangement drawings and preliminary description of which appeared in our issue of January 19, 1922, is now completed, and will, by the time these notes appear, be at Martlesham, undergoing its type tests. As soon as these are completed, which should be in about one week's time, the machine will be put on the London-Paris service, where it will gradually supplant the 0/400 type, which, although it has done excellent work, is scarcely to be considered an up-to-date passenger machine.

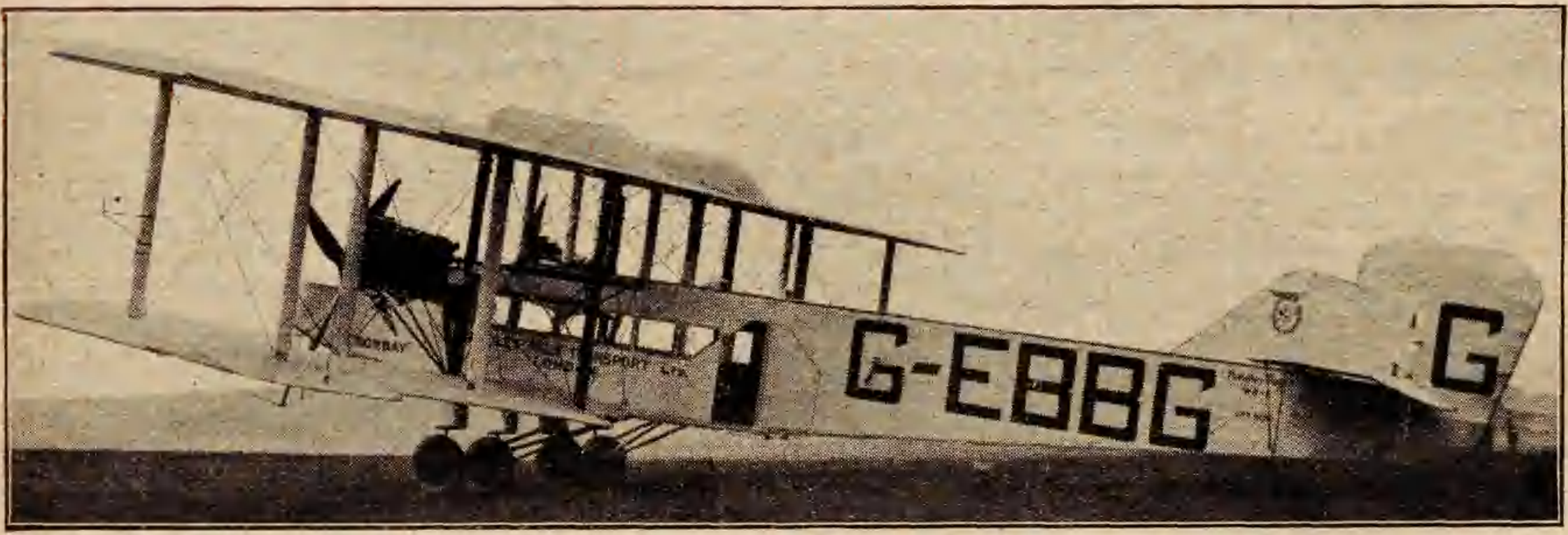
The W.8B is, generally speaking, similar to the machine which won the Air Ministry Competition at Martlesham, with the exception that it is fitted with engines of lower power. The present power plant consists of two Rolls-Royce "Eagle" engines, mounted on a structure of steel tubes between the wings. Certain modifications have been carried out with regard to the details of the structure, although, in general, it resembles that of the older machine. The main alteration, apart from questions of dimensions, has been caused by the placing of the petrol tanks on the top plane, instead of in a streamline tail piece behind the engine. As shown in the accompanying illustrations, the Rolls-Royce engines are left entirely uncovered, a feature which is rarely seen on modern machines. After making very careful estimates, however, the designers have come to the conclusion that, by the time the weight of cowling had been added, and considering the extra complication and difficulty of getting at the engines, the gain would have been so small that it has been considered better to leave the engines bare. It should be remembered that one result of this is that smaller radiators can be fitted, as a goodly portion of the heat is carried away from the engine direct when exposed to the air current. Also, from the point of view of running the machines in service, the ease with which all parts of the uncovered engines can be reached and attended to is a very great point in favour of the uncovered engine. Enclosing an engine entirely looks neat, and has, undoubtedly, great aerodynamic advantages, although, as has just been pointed out, not perhaps as great as might be imagined at first sight, owing to the very complicated question of cooling. At any rate, the ground engineers will appreciate the uncovered engine, and an engine which is easy to get at is more likely to be well looked after than is one which is so tucked away in its cowling as to be almost inaccessible.



THE HANDLEY PAGE W.8B : Front view.

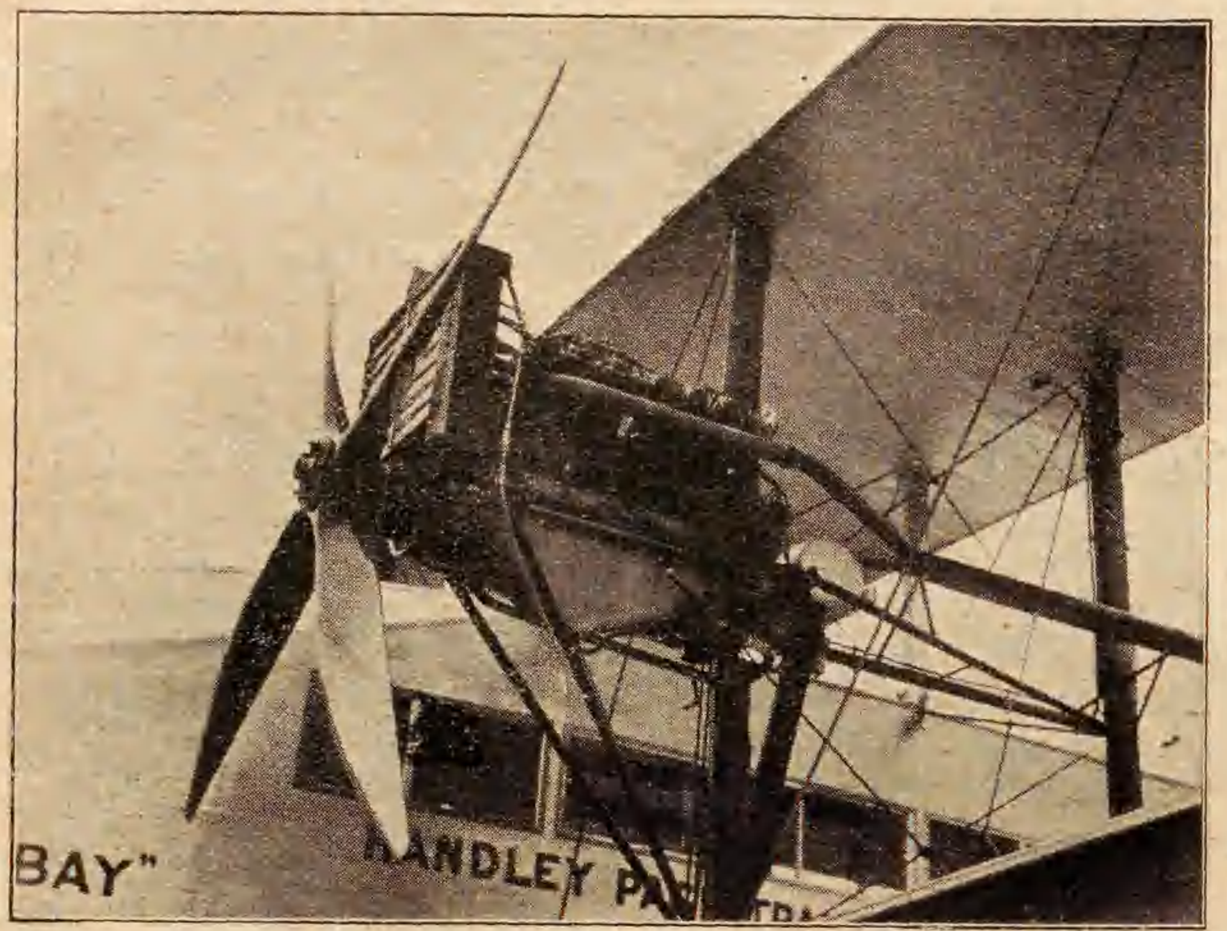
The Petrol System

The petrol system of the W.8B is of the simplest possible, *i.e.*, direct gravity feed from tanks placed on top of the top plane. There should, therefore, be very little chance of trouble with the petrol system, quite apart from the fact that a very considerable saving in weight has been made possible by the adoption of the gravity feed system. It is interesting to note in this connection that, by doing away with pressure petrol feed, and by omitting the gear for folding the wings, a saving in weight of 500 lbs. has been effected. As this is equivalent to three passengers of average weight, or at any rate to two passengers with a fair amount of luggage, this saving becomes of very considerable importance, as it results in an increase in earning capacity of £13 to £20 per trip between London and Paris. In the course of a year, this should amount to a considerable sum, and as the arrangement has the further great advantage of a simplified and more reliable petrol system, the change appears to have been distinctly worth while.



THE HANDLEY PAGE W.8B : Three-quarter rear view.

The petrol tanks, as already mentioned, are mounted on top of the top plane, and pipes run down to the engines along the inter-plane struts. Very large filters are incorporated in the system, so that there should be practically no chance of a choked petrol feed. Metal piping is used, with the new Air Ministry metal coupling about which the Director of Research spoke so highly in one of his lectures before the Royal Aeronautical Society. The oil tanks are mounted behind the engines, as may be gathered from our illustrations. Silencers of a simple type are fitted, consisting of long steel tubes with slots. The two branch pipes from right and left hand cylinder banks meet behind the engines and exhaust into the single silencing pipes. It is now quite easy to carry on conversation in the cabin, and in this respect the W.8B is a great improvement on the 0/400's.



View of the mounting of one of the Rolls-Royce "Eagle" engines in the Handley Page W.8B.

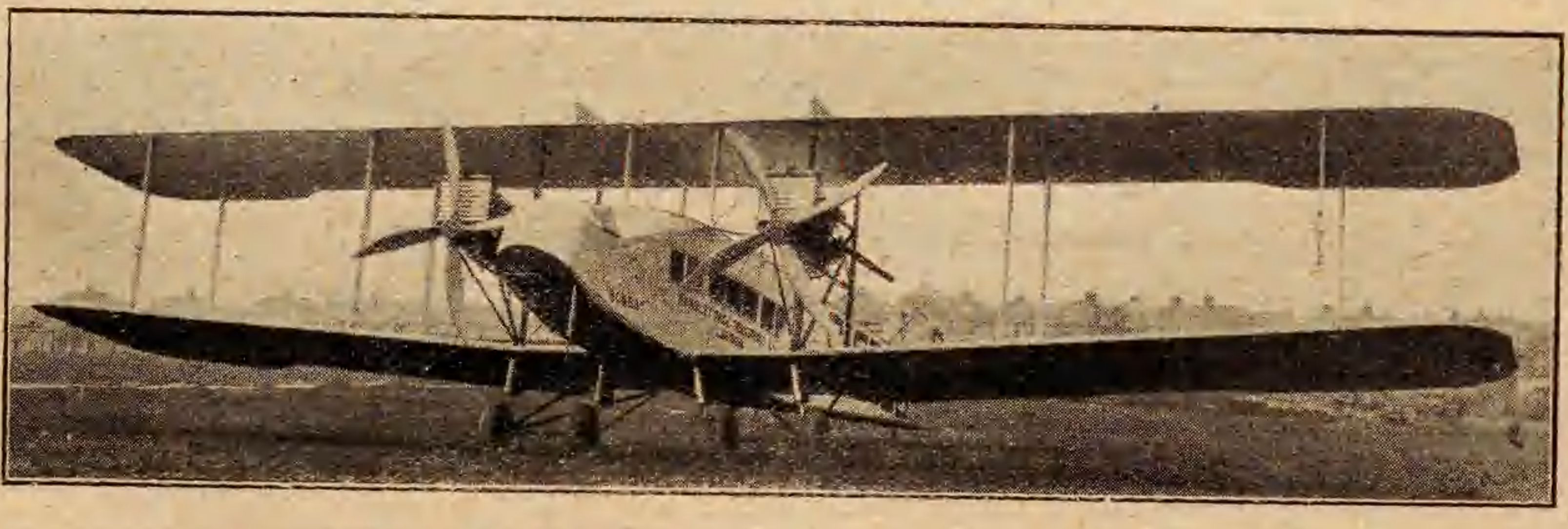
The Pilot's Cockpit

There is one point about the design of a commercial aeroplane which, in spite of recent efforts, is not always given the consideration which it deserves. We refer to the view from the pilot's cockpit. In this respect, whatever may be the case in others, the twin-engined machines score over the single-engined type. No matter how one arranges the pilot in a single-engined aeroplane, his views in certain directions must necessarily be obstructed by the engine. In the twin-engined type, on the other hand, the pilot can be, and usually is, placed in the extreme nose of the *fuselage*, whence his view is to all intents and purposes, unobstructed in all directions that matter. In the Handley Page W.8B the view from the pilot's cockpit is exceptionally good, as normally he can see straight ahead and, by craning his neck a little, he can see over the nose of the *fuselage* and to the left.

The instruments, of which a fine equipment is carried, are mounted on a dash in front of the pilot in such a manner as to be easily visible. On the extreme left is the reel for winding up the wireless aerial. Then follow, going from port to the starboard side, Smith's thermometers, petrol capacity gauges and air-speed indicator. A Short and Mason altimeter and an Aero Turn Indicator (Ogilvie Pressure gauge) are mounted towards the starboard side, and on the extreme right, set back into a niche, is the Campbell-Bennett aperiodic compass. The placing of the compass has been well thought out, as it is easily seen after a very small movement of the pilot's head, assuming him to be seated normally with his head a little to the right, looking over the starboard edge of the cockpit. The front covering of the *fuselage* is so hinged that the ground engineer can get at the back of the instrument board very easily, which is a great advantage from a practical point of view. The revs. counters and oil pressure gauges are mounted on the inner side of the engines, and have large dials which can be easily read from the cockpit.

The Controls

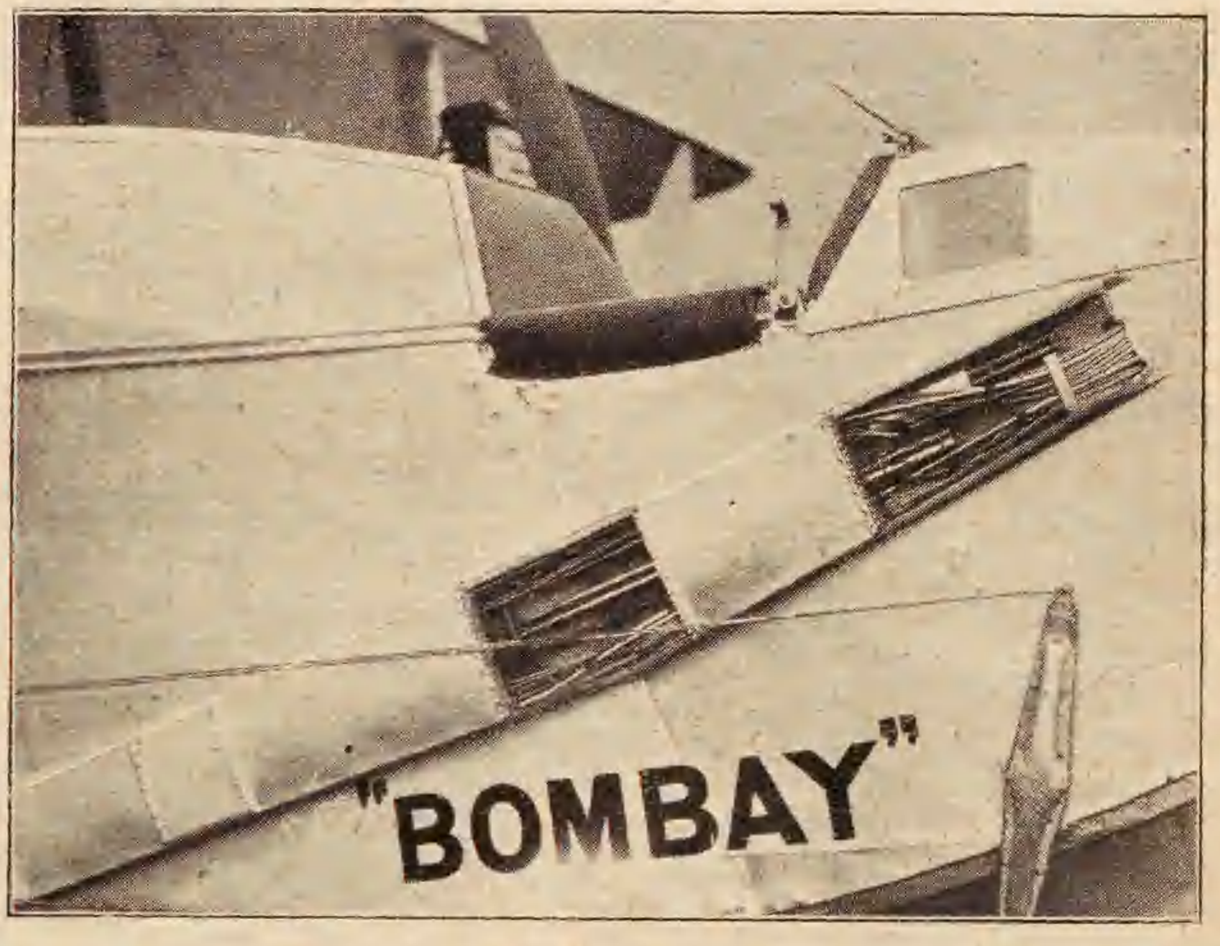
The controls are of usual type, with a foot bar for the rudder and wheel for elevator and *ailerons*. The engine controls, as already mentioned, are taken along the outside (starboard) of the *fuselage*, and are enclosed in a casing, those to the port engine running across under the floor of the cabin. The controls for shutting off oil and petrol have knobs of red fibre, and a large lever is provided to the right of the pilot's seat, by means of which, in case of emergency,



THE HANDLEY PAGE W.8B : Three-quarter front view.

the pilot can shut off both tanks simultaneously. The switches, which are mounted on the dash, are to be connected up by a short wooden rod so that both engines may be switched off in an instant in case of trouble.

Behind the pilot's cockpit, between it and the cabin, is a small compartment in which the wireless instruments are installed. The lower portion of this compartment is also used for luggage, there being a separate door in the port side of the *fuselage*, in addition to those communicating with the cabin and pilot's cockpit. This compartment may be loaded up to the extent of 6 cwt., that aft of the cabin being of similar maximum capacity.



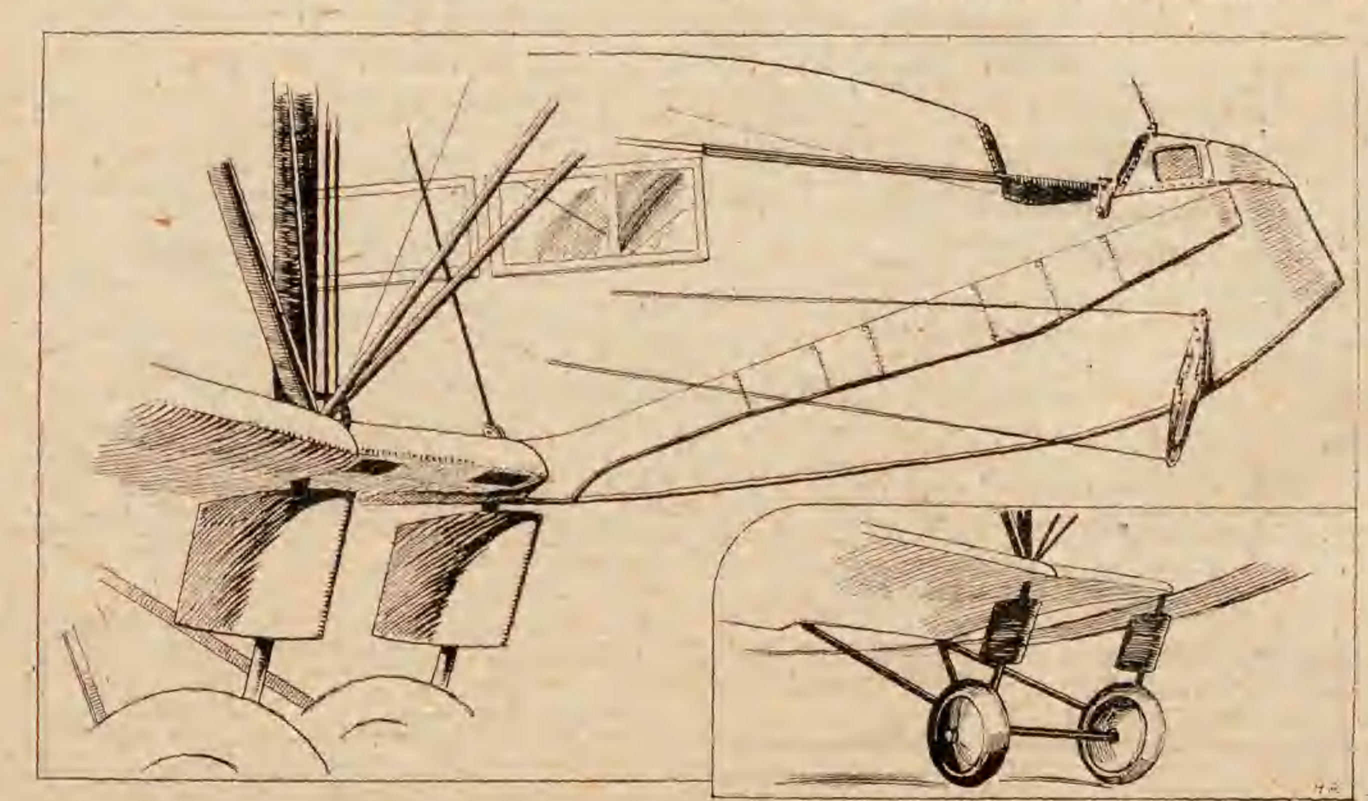
The Handley Page W.8.B : All engine controls, etc., are carried along the starboard side of the *fuselage*, and are enclosed in a casing having detachable covers at intervals.

Passenger Accommodation

The cabin, which has seating accommodation for 12 passengers, is large and well lighted by large windows in the sides. These are of the famous Triplex, non-splintering type, and the second and third on each side are made to open by sliding, so that the cabin may quickly be aired should the passengers find the need for so doing. In addition to the function as ventilators, the windows would form excellent emergency exits, as they are sufficiently large to allow a man easily to climb through them. There is also an emergency ripping panel in the roof. Fresh air, apart from any that may enter through opened windows, enters through a scoop in the roof of the cabin, *via* a diffuser box, and the used air escapes through a duct, also in the roof, but placed near the after-end. At present, no provision has been made for heating the cabin, but as the machines will first be used during the summer, there is probably no great need for heating. In the autumn, should it prove necessary, it should be a comparatively simple matter to heat the cabin from the exhaust.

The passengers' seats, as indicated in one of our sketches, are of wicker work, and very comfortable. There is reasonably ample leg room, and it is possible for a passenger of average height to stretch his legs without leaving his seat. As notices displayed in the cabin state that passengers may get up and move about, it should be possible to make the journey between London and Paris without experiencing undue fatigue.

On the front wall of the cabin are mounted three instruments for the information of passengers : clock, altimeter and air speed indicator. Also a rack with two tumblers, and on the



The Handley Page W.8 B : All engine controls are carried on the starboard side of the *fuselage*, and are enclosed in a casing, as shown. Inset shows, diagrammatically, one of the under-carriages.

side a container with drinking water. There only remains the push button by the side of each seat for summoning the waiter, but possibly these will come in due course.

While on the subject of the cabin, it is of interest to mention that the view, considering that the machine has twin engines, is exceptionally good, owing to the fact that the engines are mounted fairly high in the gap, and forward of the leading edge of the lower plane. Thus the view laterally is far less restricted than one would expect in a twin-engined machine.

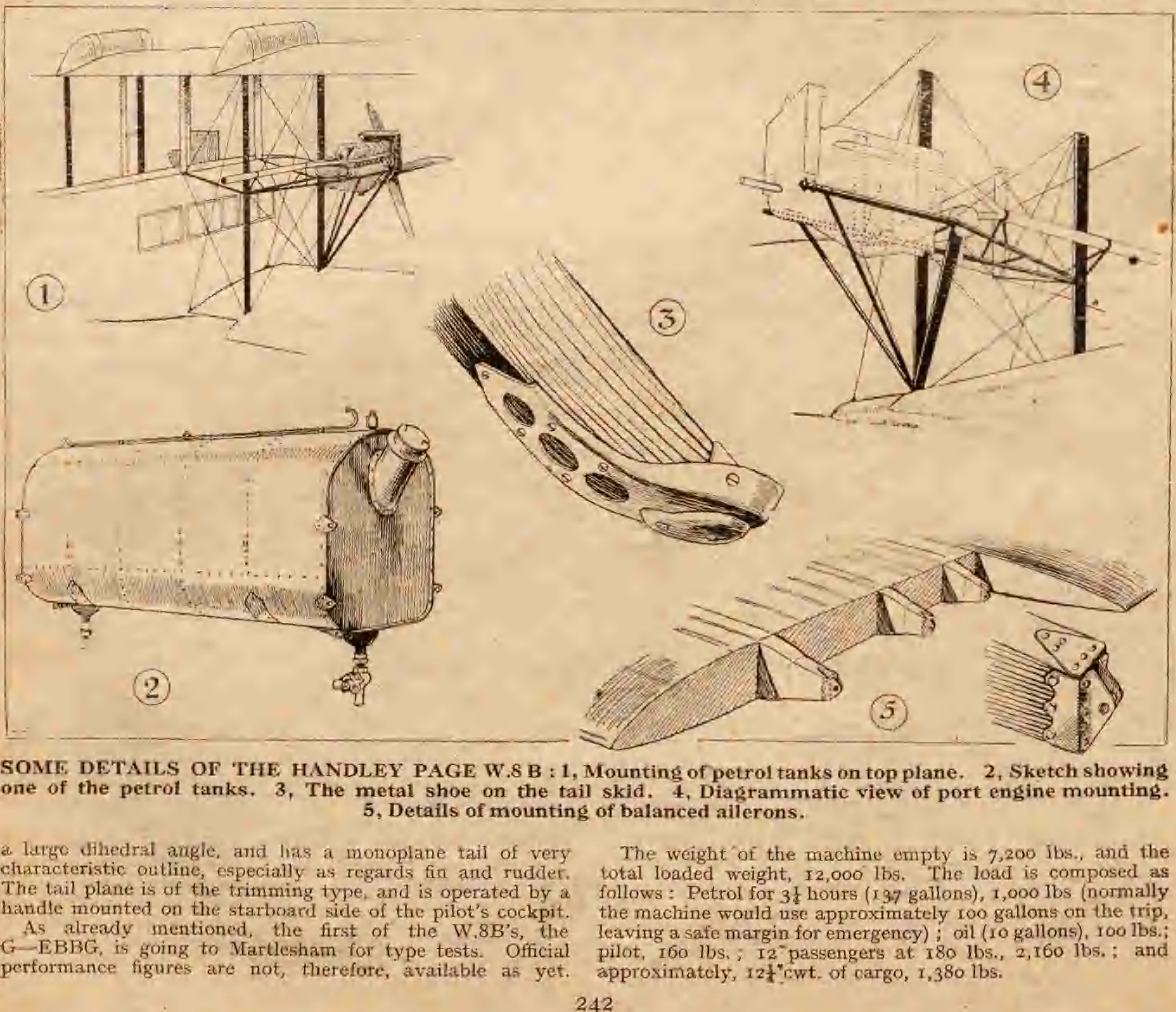
The lavatory is placed at the after-end of the cabin, and the door arrangement of it is one of the neatest we have seen. When the machine is on the ground and the outer door open, the lavatory door closes back and shuts off only a small triangle of the lavatory, while, when the machine is in the air and the outer door is closed, the door closes the end of the cabin and the lavatory extends right across the *fuselage*.

The Undercarriage

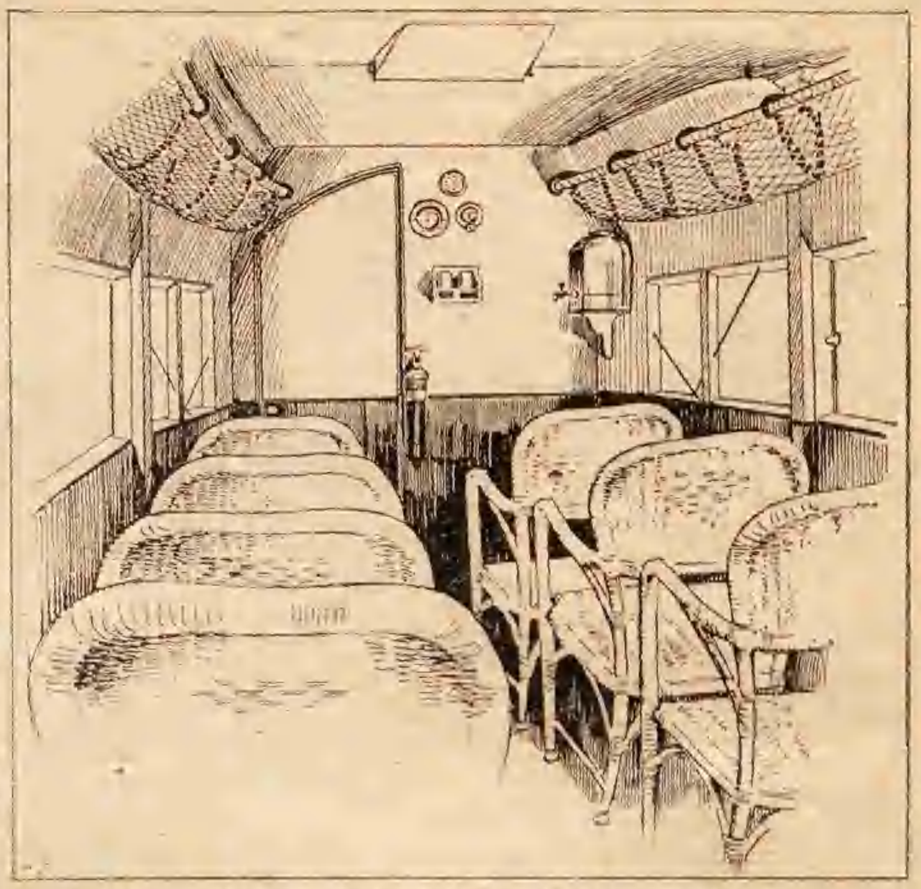
In the main, the undercarriage is similar to that of the W.8, consisting of two Palmer wheels on each side, strutted to the lower longeron of the *fuselage* and to the interplane and engine struts respectively by telescopic tubes. The rear "legs" of the Vees are braced by a diagonal tube. Thus each undercarriage consists of two wheels and five struts. The whole looks very simple and strong, and is probably of as low resistance as it is possible to get an undercarriage with four wheels. Universal joints are incorporated in the struts wherever movement occurs, so that in case of the machine being slightly listed, or one wheel striking a rut, the framework can "give." The tail skid is a substantial ash member, with an easily renewable metal shoe of the shape shown in one of our sketches.

Such features of the machine as wing plan and arrangement, tail planes, etc., were shown in the scale drawings published in our issue of January 19, 1922, and as they are of orthodox design they do not call for any special reference here. The machine is, of course, a biplane, with the lower plane set at a large dihedral angle, and has a monoplane tail of very characteristic outline, especially as regards fin and rudder. The tail plane is of the trimming type, and is operated by a handle mounted on the starboard side of the pilot's cockpit.

As already mentioned, the first of the W.8B's, the G—EBBG, is going to Martlesham for type tests. Official performance figures are not, therefore, available as yet.



SOME DETAILS OF THE HANDLEY PAGE W.8 B: 1, Mounting of petrol tanks on top plane. 2, Sketch showing one of the petrol tanks. 3, The metal shoe on the tail skid. 4, Diagrammatic view of port engine mounting. 5, Details of mounting of balanced ailerons.



View inside cabin of Handley Page W.8 B.

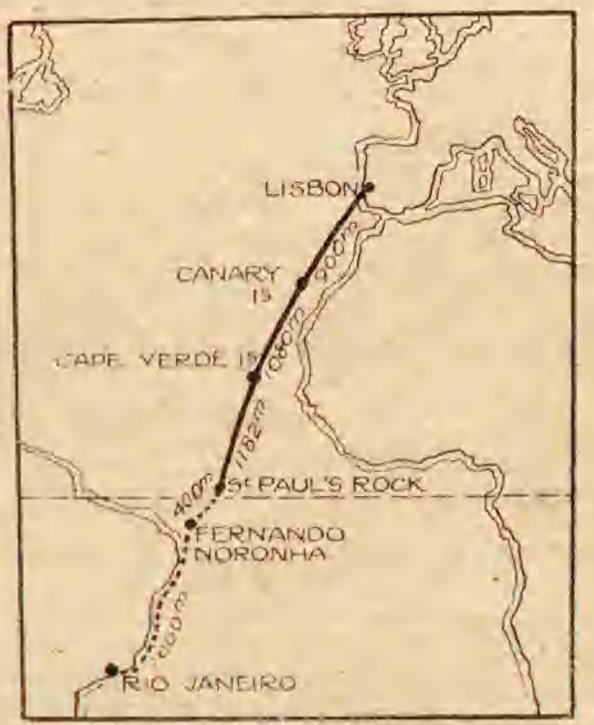
The following figures, obtained on tests at Cricklewood by the makers, may, however, be regarded as approximately correct. Maximum speed, 104 m.p.h.; landing speed, 50 m.p.h.; maximum speed at 5,000 ft., 101 m.p.h.; ground rate of climb, 550 ft. per minute; service ceiling, 10,000 ft.

The weight of the machine empty is 7,200 lbs., and the total loaded weight, 12,000 lbs. The load is composed as follows: Petrol for 3½ hours (137 gallons), 1,000 lbs (normally the machine would use approximately 100 gallons on the trip, leaving a safe margin for emergency); oil (10 gallons), 100 lbs.; pilot, 160 lbs.; 12 passengers at 180 lbs., 2,160 lbs.; and approximately, 12¼ cwt. of cargo, 1,380 lbs.

THE LISBON TO RIO TRANSATLANTIC ATTEMPT

Flight Delayed by Mishap

A MISHAP in alighting on a rough sea has resulted in temporarily postponing the completion of the splendid flight undertaken by Capt. Sacadura Cabral and his navigator, Capt. Gago Coutinho, in a Fairey seaplane, Rolls-Royce "Eagle" engine. It appears that in alighting near St. Paul's Rock the machine was badly damaged in the rough sea, and that unless another machine, or at any rate spare parts such as floats, etc., be sent, the flight will have to be abandoned. We learn, however, that one or the other is to be sent, and that the gallant officers will thus be able to continue the flight so splendidly begun, with, let us hope, better success.



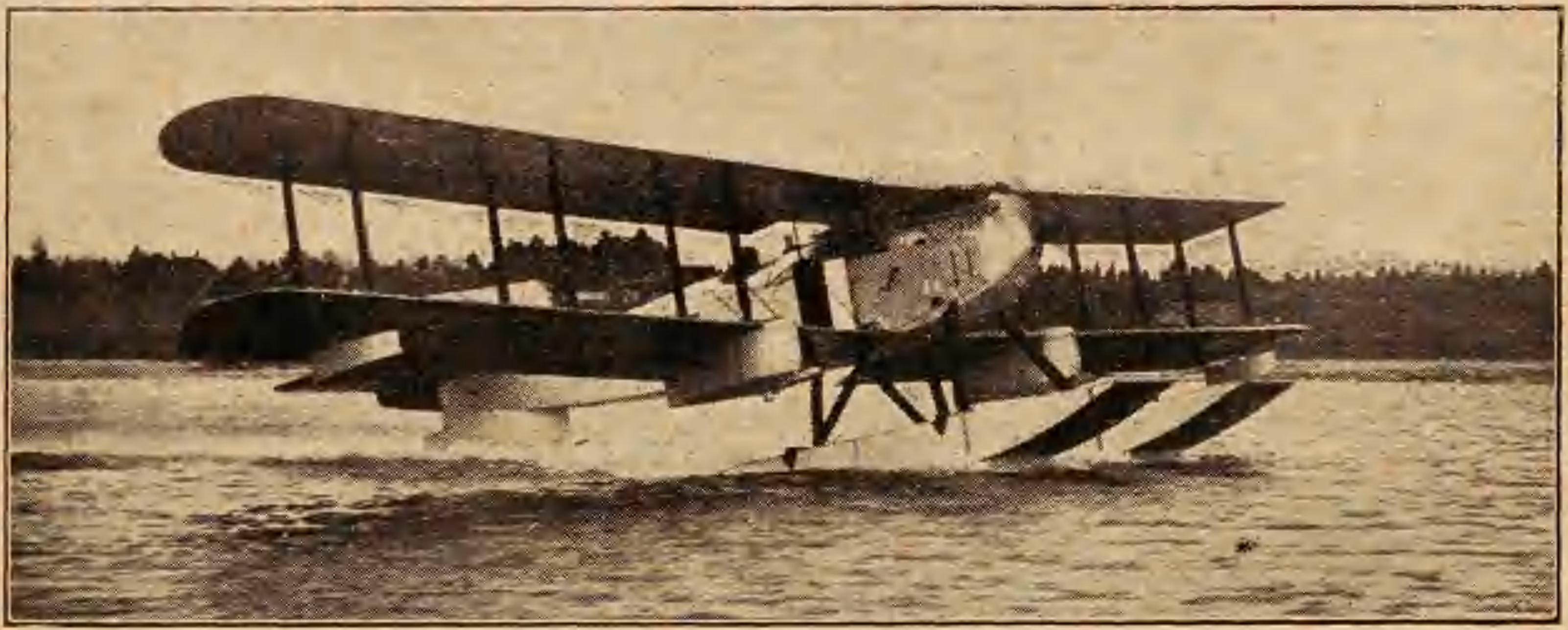
The Lisbon-Rio Flight: Sketch map of the route. The distances marked are approximate only.

It may not be without interest to summarise briefly the facts relating to the first stages of the flight. Leaving Lisbon on March 30, at 6.55 a.m., the "Lusitania," as the machine has been christened, arrived at Las Palmas, Canary Islands, at 3.30 p.m., having covered a distance of approximately 900 miles in 8½ hours. Unfavourable weather conditions prevented a start being made until April 2, when, the weather moderating a little, the machine got away. It had not, however, proceeded far before the weather again became very bad, and the machine had to come down in the bay of Gando. It was some little time before news of the machine reached this country, and some anxiety was beginning to be felt, although it was generally hoped that the Fairey would be able to weather the storm. A couple of days were now spent waiting for the weather to improve, and on April 4 another start was made at 8.30 a.m., the machine reaching St. Vincent, Cape Verde Islands, after a flight of about 10 hours' duration.

A period of tempestuous weather, quite unusual for this time of the year, delayed the "Lusitania" at the Cape Verde Islands until April 17, when the machine was flown from St. Vincent to Santiago, another island of the Cape Verde group. The next morning, before dawn, a start was made from Santiago, and the machine commenced its longest trip, to Fernando Noronha, a small island off the Brazilian coast. It was realised that difficulty might be experienced in reaching Fernando, and a Portuguese man-of-war had been stationed at St. Paul's Rock, a very small piece of rock situated almost on the line and in approximately 29° west longitude. It will easily be realised that to have "made" this tiny rock in the wastes of the Atlantic Ocean must have required no mean navigational skill, and it is to the credit of Capt. Coutinho that he succeeded in guiding the machine so unerringly. A slight miscalculation might easily have resulted in the loss of both machine and crew.

The reports dealing with the facts which led to the wreck of the machine at St. Paul's are somewhat vague, but it appears that in alighting the floats were damaged, a high sea running at the time. Presumably it was found that the petrol was running short, and it was then decided to alight, in order to take on board fresh supplies from the Portuguese vessel stationed at the rock. That the machine should have been damaged is greatly to be regretted, but it is hoped that the remainder of the trip may be completed without accident as soon as the necessary spares, or a fresh machine, can be sent out.

In the meantime, what has already been accomplished is a very fine performance indeed, and deserves to rank among the historical flights of the world. It is a credit not only to the pilot, and, especially, the navigator, but also to the machine and engine. The Fairey seaplanes have established an enviable reputation for robustness and long life, and the Rolls-Royce engines already have to their credit such flights as the London to Australia, Cairo to the Cape, flight across the Atlantic (non-stop), etc. Thus the British aircrafts industry cannot fail to benefit from such a splendid performance, even if the crew of the machine are not British. We are certain that no one, least of all British pilots and navigators, will be grudging in their praise of what has already been accomplished, and that all will join us in wishing the two gallant Portuguese officers every success on the last stages of their memorable flight.



The Lisbon-Rio Flight: The Fairey seaplane "Lusitania," Rolls-Royce "Eagle 8" engine, taxying.

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London's War Scars

"THE scars that London received during the air raids are rapidly healing, and there will soon be few of these historic marks left. Such as these are, are treasured as honourable wounds, but none more so than those caused by the bomb which fell at the base of Cleopatra's Needle, which itself was slightly chipped. The Sphinxes were hit in several places and the paving torn up, but when it was repaired such stones as were not hopelessly damaged were carefully replaced, and thousands have visited the spot to look with interest at the scars. Men have recently been at work on the pavement, and fear was felt that these damaged stones would disappear, but the authorities had no such vandalistic ideas, and, after re-bedding, the stones have been laid again in their former position. So Londoners will still be able to show each other these marks."—(*Morning Post*).

MEMORIAL SERVICE TO SIR ROSS SMITH AND LIEUTENANT BENNETT

VERY impressive was the Memorial Service for Capt. Sir Ross Smith and Lieut. J. M. Bennett, on April 20, at The Sanctuary of Australia House—St. Clement Danes—when the sacred edifice was very beautifully decorated with Easter lilies and other flowers. Sir Keith Smith and members of every branch and rank of the R.A.F. were there to pay a last honour to the two famous aviators, and a vast assembly of friends and sympathisers filled the church to overflowing. Many officials of the Australian Commonwealth and of the Australian community in London being present. The special service was conducted by the Rev. W. Pennington-Bickford, Rector; the lessons were read by the Rev. Henry Howard (South Australia); Mr. Arthur Mason (late organist, Sydney Town Hall) was at the organ, and the central band of the Royal Air Force, under Flying Officer J. Amers, was present; its buglers, after the blessing, sounded the Last Post; and the band played the Dead March in "Saul" and the Hallelujah Chorus.

Towards the end of the service the Rev. H. D. L. Viener, Chaplain-in-Chief to the R.A.F., gave a short address, in which he paid a high tribute of admiration to the dead pilots.

"A Masonic Prayer," on the Passing of a Brother, by Louie Pennington-Bickford, concluded the great tribute of sympathy and sorrow accorded to the men who had been so suddenly taken from us.

Besides Sir Ross' brother, Sir Keith Smith, amongst those who attended the Service were Mr. George W. Chamberlain, cousin, and Mr. and Mrs. R. E. Brindley, uncle and aunt of Lieut. Bennett. The congregation included: Brig.-General E. P. Trotter, representing the Prince of Wales; Lord Gorrel (Under-Secretary for Air) and Sir W. H. G. Salmond (Director-General of Supply and Research), representing the Air Ministry; Air-Marshal Sir H. M. Trenchard, Chief of the Air Staff; Major-General Sir Frederick Sykes, Colonel Stuart Sankey, representing the Lord Mayor, and Colonel Hogben, representing the High Commissioner for Australia.

Messrs. Vickers, Ltd., were represented by Mr. Douglas Vickers, M.P. (Chairman), Commander Sir Trevor Dawson, Sir Vincent Caillard, Lieut.-Colonel W. C. Symon, Mr. Percy Grant, and Mr. W. F. Sadler; while on behalf of the Aviation Department of the firm there were present Capt. H. E. P. D. Acland, Brig.-General W. D. Caddell, Mr. Percy Maxwell-Muller, Mr. R. K. Pierson, Capt. S. Cockerell, and Capt. F. C. Broome.

Lord Wodehouse, representing Mr. Churchill, Capt. the Hon. F. E. Guest, M.P., Secretary of State for Air, Air Vice-Marshal Sir J. M. Salmond, Col. the Hon. Sir James Allen, the High Commissioner for New Zealand, Sir Harry Brittain, representing Messrs. Napier and Sons, Mr. A. H. Ashbolt, Agent-General for Tasmania, the Hon. John McWhae, representing the Agent-General for Victoria, Maj.-Gen. Sir Sefton Brancker, Mr. Patrick Alexander, representing the Aeronautical Society.

Lieut.-Col. F. K. McLean and Lieut.-Comdr. H. E. Perrin, representing the Royal Aero Club, Mr. Andrew Fisher, ex-High Commissioner for Australia, Capt. A. S. Littlejohns, C.M.G., the Naval representative for Australia, Air Vice-Marshal J. F. A. Higgins, Air Vice-Marshal A. V. Vyvyan, Air Commodore O. Swann, Air Commodore F. R. Scarlett, Air Commodore H. R. M. Brooke-Popham, Air Commodore C. L. Lambe, Air Commodore J. M. Steele, Air Commodore C. A. H. Longcroft, Brigadier-General R. K. Bagnall-Wild, Air Commodore F. C. Halahan, Mr. John Cates, Colonel Beatty, Mr. F. Fisher, representing Sir Charles Wakefield, Mr. J. L. Jones, representing Lloyd's, Mr. C. G. H. Winter (Napier Aviation Depôt), etc., etc.

On Saturday, April 22, a special service was also conducted at Messrs. Vickers, Ltd., Weybridge Works. Here were gathered together in grief for the men they had known, loved and so much respected, the employees and others associated with the actual construction side of Messrs. Vickers' Aviation Works. Some 700 or 800 workers, in addition to the Management Staff and Head Office representatives, were present and the associations of the scene added to the sincerity and pathos of the ceremony. It was at these Works that the machine was constructed in which Sir Ross Smith and Lieut. Bennett lost their lives, and also the aeroplane upon which was accomplished the great Australian flight, as well as the machine upon which the late Sir John Alcock and Sir A. Whitten Brown—who was at the service on Saturday—made their historic Atlantic crossing. And, finally, the service was conducted within a few hundred yards of the spot of the disaster. The surroundings were a fitting frame to the solemn ceremony.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN APRIL 16 AND APRIL 22, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	44	38	13	33	44	2 32	D.H. 4a G-EAWH (1h. 46m.)	B. (4), Br. (1), D.H. 4 (2), D.H. 9 (1), D.H. 18 (2), D.H. 34 (1), G. (8), H.P. (1), Sp. (1), V. (1).
Paris–Croydon	42	105	6	24	39	3 24	D.H.4 G-EAMU (2h. 7m.) ...	B. (7), Br. (1), D.H. 4 (2), D.H. 18 (2), D.H. 34 (1), G. (6), H.P. (1), Sp. (1), V. (1).
Croydon–Rotterdam–Amsterdam.	5	5	2	5	5	4 44	Fokker H-NABK (4h. 3m.)	F. (4).
Amsterdam-Rotterdam–Croydon.	6	7	6	6	5	4 55	Fokker H-NABK (3h. 41m.)	F. (5).
Totals for week ...	97	155	27	68	93		Also one flight each way between Croydon–Brussels.	

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E. 5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

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Berlin–Moscow Air Service

AN agreement has been signed between the Soviet Government's representatives and the German Aero Union for the formation of a company with the object of establishing an air service between Berlin and Moscow. The service is to be postal only at first, with three flights weekly each way, and it is hoped to do the journey within twenty-four hours.

LONDON TERMINAL AERODROME

Monday evening,
April 24

A FRESH newspaper service to Paris has been started this week. *The Times* have chartered a special machine from the Instone Air Line which is scheduled to leave at 6 a.m. each day. Morning mist has interfered with this, and other morning services to some extent, but on the whole these early-morning services are quite good for the time of year.

The K.L.M. re-started their service between London and Amsterdam on Tuesday, and are already beginning to get back some of their parcels' traffic, which was the chief feature of this service last year. Several Dutch journalists have made the air journey during the week, and were keenly interested in all they saw at Croydon, being much impressed with the arrangements and the general air of activity.

The Fokker monoplanes have been overhauled during the winter. New compass-mountings have been provided, and the interference which was caused by the old steel " joy-stick " has been eliminated by the fitting of a non-magnetic one. Each monoplane has also been provided with an emergency exit in the roof, which is opened by pulling two straps, and gives access to the top of the wooden wing. The emergency exit, however, seems only to have been designed for slim people. A stout passenger would certainly be in trouble if he had occasion to use it. Once out on the top, ropes are provided for stranded passengers to hang on by, as it is calculated that the wing would float like a raft.

All the pilots on the K.L.M. service are now of Dutch nationality, and Messrs. Hofstra and Geysendorfer, who flew on the service last year, are bringing the new pilots across as passengers to enable them to get used to the route. Mr. Van der Hoop made his first trip as pilot during the week and, on arriving at Croydon, had to land down the slope of the aerodrome into a north wind. Even pilots with plenty of experience of Croydon find this a ticklish job at times, and Mr. Van der Hoop only just managed to avoid running into the Disposal Company's hangars. Other new pilots on the K.L.M. service are Messrs. Warnaar, Silevis and Pyl.

Fixed " Air Roads " to Paris

SEVERAL meetings of pilots have been held during the week to attempt to select definite routes on the London–Paris airway, and certain suggestions have been submitted to the Air Ministry as the result of these meetings. The stretch of railway between Oxted and Ashford was suggested as one section of the route on the British side, while in France the railway from Etaples to Abbeville, and the main road from Abbeville to near Le Bourget, were considered the best guides. It was also suggested that, in addition to the rigid observance of the rule " Keep to the right," pilots who did not wish to fly along this route should keep at least a mile away from it, and also maintain a sharp look-out.

The usual spring disturbance of the aerodrome has begun. Throughout the winter, when there is little traffic, the whole of the landing-ground is free from obstruction ; but as soon as traffic begins to " boom," and machines are constantly arriving and departing, workmen swarm over the 'drome, and stick up obstruction flags until there has almost to be a committee meeting of pilots and managers, before the departure of every machine, to decide how these flags can be dodged. As to pilots coming in, it is surprising that they manage to land at all.

At present harrowing and rolling operations are being carried out, and " bumps " are also being levelled ; while the petrol-filling points which are being constructed seriously handicap machines " taxying " up to the departure platform. More than one machine has damaged its under-carriage by sinking into a pipe-line trench which has been badly filled-in.

The New Handley Page " Express "

THE first of the Handley Page " W.8 B's " visited the aerodrome on Friday to pick up a new " prop," before proceeding to Martlesham Heath for " type " tests. The machine appears to be very satisfactory, and lands at something under 45 miles an hour. It is to be hoped that Martlesham will manage to pass this machine out in time for it to be put on the service this year, as Handley Page Transport have already been obliged to refuse passengers owing to a shortage of flying stock.

The Daimler Airway is now running more smoothly, and Col. Searle was at the aerodrome on Friday, making a tour of the offices and hangars of that firm. The erection of the dynamometer for testing the " Lions " in the Daimler D.H. 34's is still uncompleted, although a water-tower has made its appearance above the shed, and a miniature railway has been laid down from the hangar to the dynamometer shed.

Popularity of the French " Goliath "

MORE and more " Goliaths " are being put on the service by the French companies. This machine appears to be the only really commercial proposition that the French have turned out as yet, and both the French companies are using it in increasing numbers. One day during the week there were four of these giant machines at Croydon, and the " C.A.T.O." was hard put to it to find shed accommodation, one of them having finally to be housed in the Handley Page shed.

Parcels by Air from Morocco

THE Messageries Aériennes have received a parcel by 'plane from Paris which was despatched by air from Morocco. It travelled by air between Casablanca and Toulouse, from there to Paris by train, and on to London in one of the M.A. machines. The parcel contained overcoats—though why overcoats should come from Morocco nobody has yet been able to explain.

The M.A. have now two of their own vans for parcels collection and delivery, painted the firm's own particular shade of brown. Their early-morning newspaper service from Paris has been maintained with considerable regularity, but the service to Paris has suffered from interruption owing to the prevailing northerly winds, which have blown the London smoke across the aerodrome at Croydon, seriously impairing visibility in the early hours.

The installation of wireless telephones is causing considerable trouble and anxiety to the foreign companies. The apparatus supplied to them is not apparently up to the standard of British sets. No foreign machine, in fact, seems as yet to have had a wireless set which was satisfactory, although several have been tried. It has been suggested that British sets might be supplied to foreign companies through Marconi ramifications in various countries. The air transport people are very anxious, now, to provide their machines with wireless, but naturally they are not keen on paying for apparatus which is useless.

Fresh Road Transport Arrangements

A NEW motor-car firm for the conveyance of passengers between London and the aerodrome has made its appearance. It is employed by the K.L.M. and the Messageries to handle the road transport of their passengers. If there is anything in a name this one should be lucky, as the motor firm rejoices in the title of " The Black Cat " Motor Company. Each car has, in fact, a black cat on its radiator.

Another regular user of the airways has come into the limelight this week. A lady dressmaker, with an exclusive clientèle in the West-end, is now in the habit of visiting Paris by air each week in order to keep in touch with the latest vagaries of fashion. So regular have her aerial trips become that the Grands Express, upon whose machines she always travels, have come to regard her as a mascot.

The Surrey Flying Services are now getting an increasing number of joy-riders, and Capt. Muir is quite busy fixing up arrangements to provide flying facilities at country fairs and fêtes. This company is hoping to have in operation, shortly, several machines for air taxi work.

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A Cairo-Baghdad Air Service Testimonial

MR. MONTAGUE BELL, managing directing of *Near East*, who left Cairo on March 6, by air mail for Baghdad, has since returned, states *The Times* Cairo correspondent. He had an adventurous voyage, which was delayed by several false landings.

Mr. Bell could not speak too highly of the ingenious method by which this newest air mail route is marked and the organisation which combined to eliminate the perils of a journey of 500 miles over a trackless desert. His experiences showed him what grit and endurance the maintenance of the navigation of this route demand, and the keenness and pluck with which the Air Force carries out the mail duties. He had opportunities of gauging the moral effect that this service exercised on the peoples of the regions traversed, which augurs well for the success of the experiment which is about to be introduced in the direction of entrusting the Air Force with the military control of Iraq.

ROYAL AERONAUTICAL SOCIETY NOTICES

Students' Section.—The following revised programme has been arranged :—

Friday, April 28.—Library of Royal Aeronautical Society, 6.45 p.m. Student's paper (postponed from March 3). "Some Notes on Commercial Aircraft," by Stanley H. Evans. Mr. H. P. Folland in the Chair.

Saturday, May 6.—Visit to the de Havilland Aircraft Works, Edgware. Meet at Works, 10.15 a.m. 'Bus leaves Kilburn Park Station (Bakerloo Tube) at 9.30 a.m.

Wednesday, May 31.—Visit to the Royal Aircraft Establishment, South Farnborough. Meet at 8.40 a.m. for special tickets at Booking Office, Waterloo Station (L. and S.W.R.), for 9 a.m. train.

Saturday, June 3.—Visit to the National Physical Laboratory, Teddington. Meet at 9.15 a.m. for special tickets at the Booking Office, Waterloo Station (L. and S.W.R.).

Students are requested to give in their names *immediately* for the visits they wish to attend in order to obtain cheap travel facilities. The Hon. Secretary will meet Students at places and times mentioned for issue of these tickets.

W. LOCKWOOD MARSH, Secretary

THE INSTITUTION OF AERONAUTICAL ENGINEERS

By the courtesy of Mr. F. R. Simms a visit was paid on April 12 by the members of the I.Ae.E. to the works of Simms Motor Units (1920), Ltd. The whole process of manufacture of the Simms Magneto was seen, from the raw materials to the finished product; the use of hot brass pressings and die castings was explained in detail. Note was especially made of the various testing and inspection methods at every stage of manufacture, more particularly in regard to armatures and condensers. Some interesting devices were shown in the laboratory for making mechanical and heat tests on moulded insulation. The testing of magnets was demonstrated, and the very high magnetic qualities of those made in this country noted. A short visit was also made to the magneto repair works. Repairs to all makes of magnetos are carried out in a very systematic manner, the same care and testing methods being applied as with the new magnetos.

Fixtures.

April 28, 6 p.m.—Paper, "Some Unsettled Problems of Aeroplane Design," read by Capt. Sayers, Engineers' Club, Coventry Street.

May 10, 2.30 p.m.—Visit to the National Physical Laboratory, Teddington. The number of the party is limited to 15. Tickets must be obtained from the Secretary of the Institution. Members should apply for their tickets early.

May 25, 6 p.m.—Paper, "The Seaplane's Place in Aviation," read by Maj. Hume, Engineers' Club, Coventry Street.

June 7, 3 p.m.—Visit to the Aeronautical Section of the South Kensington Museum.

June, date to be announced.—Visit to the Croydon Aerodrome.

CORRESPONDENCE

LIFEBELTS.

[2054] The question of lifebelts for use in commercial aircraft was considered at a meeting recently held in the City, and the unanimous opinion expressed was that the present type is not satisfactory, and is dangerous unless used intelligently.

What appears to be wanted is a compact and light life-saver which is entirely foolproof and small in size.

This would appear to be a fruitful avenue of research for the inventive genius of many of your readers, and I should be obliged if you would give this matter publicity.

Yours faithfully,
H. R. GILLMAN,
Secretary, Lloyd's Aviation Record

53, Cornhill, E.C. 3
April 22, 1922.

Marseilles–Monaco–Marseilles Race

THIS French seaplane contest was run off on April 19, when six naval and two civilian pilots took part. M. Eynac, Under-Secretary of State for Aeronautics, evinced the keenest interest in the event, and had flown, in a Goliath from Paris, to Marseilles in 5½ hours' flying time a couple of days previously, in order to be present at the start and finish. The finish found M. Poirée, on a 135 h.p. Clerget-Caudron, the winner in 5 hours 1 min., Brou on a Farman being second in 8 hours 14 mins.

The Zeebrugge Annual Reunion

AT the reunion dinner on St. George's Day (April 23), at the Café Royal, of officers who took part in the naval operations of April 23 and May 10, 1918, which resulted in the blocking of the harbours of Zeebrugge and Ostend, about 100 officers from the Royal Navy, Royal Marines, Royal Air Force, Royal Naval Reserve, and Royal Naval Volunteer Reserve were present, including :—

Commander A. Cooper-Key, Maj. E. Bamford, V.C., D.S.O., Capt. Sir Ion Hamilton Benn, D.S.O., M.P., Lieut. J. C. Keith Wright, D.S.C., Lieut.-Com. F. J. Lambert, Maj. T. F. V. Cooke, D.S.O., Commander F. E. B. Haselfoot, R.N., Lieut.-Com. L. S. Chappell, D.S.O., Lieut.-Com. P. T. Dean, V.C., M.P., Lieut.-Com. G. H. Drummond, V.C., Admiral the Hon. Algernon Boyle, Capt. H. O. Oliphant, R.N., and Air-Commodore A. L. Lambe, D.S.O.

It is intended that these dinners shall be held on St. George's Day in each year. The hon. secretary to the Dinner Committee, Lieut. J. C. Keith Wright, D.S.C., 59, Mark Lane, E.C., will be glad if any officer who has not been notified of these arrangements will communicate with him. As announced last week, R.A.F. officers should address themselves to Air-Commodore C. L. Lambe, Air Ministry.

Italian Air Contests

DETAILS are now available from the Italian Aero Club regarding the Piedmont Grand Prix International Contest. Forty thousand lire will be handed to the firm entering the winning machine, and 10,000 lire to the pilot. The contest will take place in the last week of June, over a circuit Turin-Coni-Alessandria-Novare-Biella-Turin, a distance of about 220 miles, to be covered three times. Machines will be judged on their commercial utility, cargo carried, petrol consumed, commercial speed, and minimum speed. Entries should be sent to the Société Aviazione, Torino, Galleria Nazionale, Scala B, by June 15, at the latest. Each entry must be accompanied by an entrance fee of 1,000 francs, half of which will be repaid to firms entering machines which leave the starting line.

Altogether, about eleven Italian aeronautical meetings have been announced for 1922, from May to October, including the Schneider Cup at Naples. In order to encourage foreign entries for the International events, the Italian Ministry of Finance has consented to exempt foreign machines participating in aeronautical races which will take place in Italy during the current year from Customs Duty during their temporary importation.

Institute of Transport

FROM May 17 to 20, a Congress of the Institute will be held in London, when suitable papers will be read and discussed. A very attractive round of items has been arranged, and included in this programme are a visit, on May 18, to the works of Messrs. D. Napier and Son, Ltd., at Acton, and the Aviation Works of Messrs Vickers, Ltd., at Weybridge. On May 19, the members go to the Croydon Aerodrome. The absence of an aviation paper from the Congress is due to the fact that an exhaustive and valuable paper was read before the Institute by Sir Henry White-Smith as recently as February 13 last. The Institute cordially recognises the future position of Aviation in Transport, and the indefatigable Hon. Secretary, Mr. H. E. Blain, in this respect, points out that "it is the desire of the Institute that aviation shall be given the prominence to which it is entitled, and it might not be out of place to mention that those engaged in aviation circles are eligible for membership, and, in view of the comparative infancy of this branch of transport, special consideration will be given to applications for membership."

Further particulars can be obtained from Mr. Blain by those interested at the Institute of Transport, 15, Savoy Street, Victoria Embankment.

THE RITH SEMI-RIGID DIRIGIBLE

APART from the terrible loss of life, the recent regrettable accident to the "Roma" airship was particularly unfortunate in that much valuable data relating to the capabilities of the larger, semi-rigid type of dirigible would have been forthcoming had the series of tests planned for this ship been carried out. As we have remarked in FLIGHT before, it must be admitted that theoretically the semi-rigid type as compared with the rigid type of airship presents many favourable characteristics from the commercial service aspect. The accident to the "Roma," it should be pointed out, does not necessarily indicate a failure of type, any more than the wreck of the "R.38" proved that the rigid type of airship is deficient. At any rate, the semi-rigid as a type should certainly be the object of further investigation and development.

In a recent issue of our American contemporary *Aerial Age* there appeared an article by William Knight, M.E., on an interesting type of semi-rigid, designed by Léon Rith—a French engineer, for many years director of the Eiffel Laboratory—and we give herewith some extracts from the article in question describing this dirigible.

In a great inclination of the axis of a dirigible over the horizontal, which might be produced by a number of causes without always having the time to correct them, the tension in the gas-bag at the end which is more elevated is greatly increased. Furthermore, if the air ballonnets are partially full the gas has a tendency to rush towards the elevated end of the envelope, thus giving rise to sudden blows which are so much more powerful as the cubature of the airship is larger. We thus have new stresses in the envelope which are added to the static stresses due to the inclination of the airship on the horizontal. The transverse gas partitions do not help much under these conditions, because they will deformate, and their deformation cannot entirely be prevented by the use of cables without hindering the use of the ballonnets.

Again, a dirigible which is advancing at a certain speed in the air is subject to the same condition as if it were kept stationary in a strong wind. Under these conditions it is almost impossible to keep the axis of a non-rigid dirigible always in the direction of the wind. As soon as a movement of a rudder or any other condition slightly changes the direction of its axis in relation to the direction of the wind, the action of the wind will have a tendency to still further increase the angle between the axis of the dirigible and the direction of the wind. The result is that the dirigible follows an unstable route which must always be corrected by the rudders. Thus, unless the envelope is subjected to relatively high internal pressure it must necessarily bend, and the dirigible will be subject to some snake-like movements in its flight.

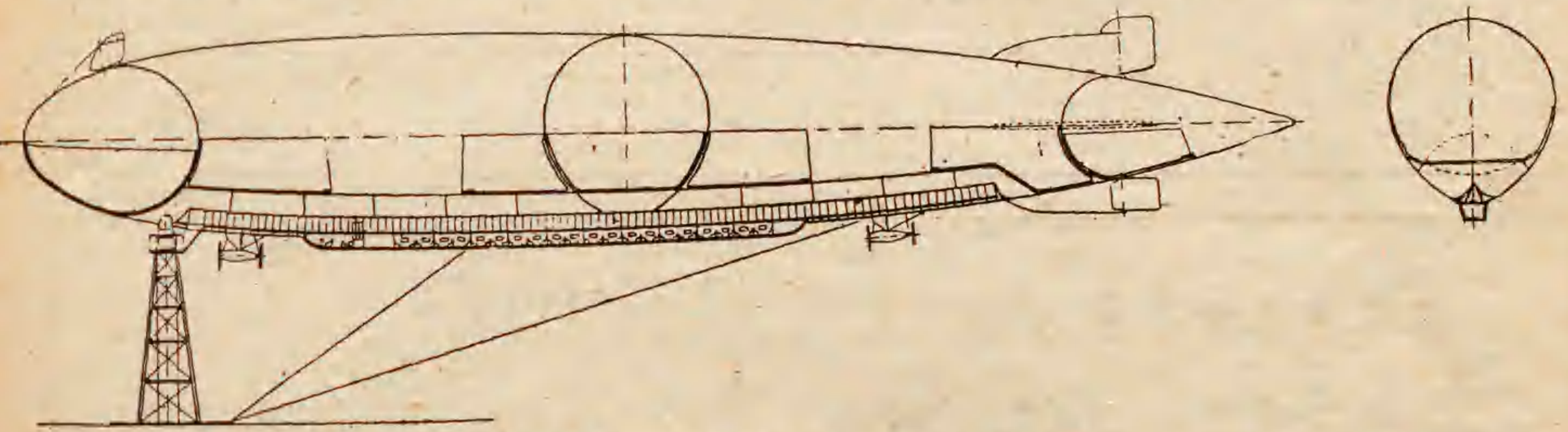
In order to be able to build dirigibles of the non- or semi-rigid type with a large cubature, we must devise some means of giving the dirigible a sufficient degree of rigidity, and also we must stabilise its nose. In the Rith dirigible (*see* illustration) the rigidity is obtained by placing in the middle of the ship a bi-convex gas ballonnet in which the gas pressure is maintained slightly superior to the external gas pressure on each side of it. In this way the two sides of the ballonnet are under pressure, and in the case of a rapid inclination of the axis of the dirigible over the horizontal, either one side or the other is ready to resist the impact of the gas. At the same time movements of large masses of gas are prevented. In addition to containing hydrogen this central partition ballonnet also contains an air ballonnet. The excess pressure in the partition ballonnet can be slight, and is useful only in the case of sudden changes of the direction of the axis of the dirigible with respect to the horizontal.

In order to stabilise the nose of the dirigible, Mr. Rith's project provides automatic stabilising planes each rotating around the axis perpendicular to the direction of the relative wind, and located at the front end of the dirigible. The automatic operation of each plane is produced by a windmill.

The axis of rotation of each stabilising plane and the axis of the corresponding windmill are connected to each other by an articulated parallelogram or by a cable passing over pulleys of slightly different diameters. These automatic control planes may be very small, due to the fact that they are located on the front of the dirigible, which renders their action a good deal more powerful than the control planes placed on the rear. It should be easy to calculate the mechanical attachments of these planes so as to make them sufficiently strong. Under these conditions the dirigibles shall be able to advance in the air without deviating from the straight route, due to the fact that its inertia is considerably larger as compared to the inertia of the automatic stabilising planes. In order to prevent the action of these automatic control planes in front of the dirigible from interfering with the action of the rudders on the rear, it shall be sufficient to arrange a cable transmission leading to the pilot pit which will allow the pilot to act at the same time both on the front and the rear planes simultaneously, the motion of the control planes in front of the airship being the reverse of the motion of the corresponding rear planes. In this way the dirigible can turn more rapidly and can ascend or descend, preserving always the horizontal position. When the dirigible strikes a transversal wind, the front control planes automatically accomplish the necessary manœuvring for keeping the ship in the desired direction.

It is claimed the new design by Rith (if its practical realisation shall prove to be successful) allows to build non-rigid dirigibles of large cubature and great speed of a simple and economical construction and easy operation, without increasing either the weight or the air resistance to any appreciable extent. The illustration gives the outline of a 52,000 cubic metre dirigible with helium compartments designed by Rith. Only one central partition ballonnet has been considered necessary for this design. Two other similar ballonnets are located at both ends of the ship, the one at the front end being subject to a pressure slightly above the aerodynamic pressure prevailing at that point in flight. The rear ballonnet, being under pressure, offers the advantage of providing a better support for the control planes. The length between either the front or the rear ballonnet to the centre ballonnet, is not larger than the length of a small non-rigid dirigible. If more than one ballonnet at the centre shall be needed, this can be done without increasing the weight to any appreciable extent. In a military dirigible it would be desirable to have, instead of one central partition ballonnet, two of them placed on each side of the centre of gravity. This would allow the throwing of heavy bombs without any danger. These two partition ballonnets would not in any way prevent the establishment of static equilibrium by using double air ballonnets.

Two other particulars of this design are worth mentioning. One is the carriage placed at the front end of the ship, moving on a rail around the mooring mast. This it is anticipated will reduce the vertical oscillations of the ship when it is moored



The Rith 52,000 Cubic Metre Simi-Rigid Dirigible.

and allow unloading rapidly without losing gas. (See illustration.)

The other particular of this design is the provision made for using helium in a series of compartments located above the passengers' cabin and all other places subject to fire risks. In the illustration is given the transversal section of this balloon when helium compartments are used at the bottom. The surface separating the hydrogen and the helium shall consist of two light fabrics; the lower one has some holes in it, the upper one is gas-tight and of a larger surface so as to allow for the expansion of the helium. The upper dotted line shown in the transversal section in Fig. 1 shows the position of this separating surface in the expanded position. The lower dotted line shows the position of the partition if, due to an accident, a helium compartment should break, letting the helium escape. Altogether the volume of the helium used in this design will be about one-tenth of the volume of hydrogen used.

PERSONALS

To be Married

The engagement is announced between Capt. A. G. A. HODGES, Northamptons and R.A.F., elder son of the Rev. and Mrs. H. A. Hodges, of the Vicarage, Barrow-on-Trent, and EILEEN, only daughter of Mr. and Mrs. JAMES STIRLING STEWART, of Ayrshire, and the Argentine.

Death

Lieut.-Col. FRANCIS MAUDE-ROXBY, whose death was briefly recorded last week, and who was the fourth son of the late Rev. Henry Meux Roxby, Vicar of Buckden, Huntingdonshire, married, in 1912, Louise, second daughter of the late John Linton, of Stirtloe, Buckden. Col. Maude-Roxby had a distinguished and varied career in the War. He joined the British Expeditionary Force in France in April, 1915, when he was attached to the Suffolk Regt., with whom he served in the trenches. Later he was transferred to the Balloon Section of the R.A.F., taking out a section to France in March, 1916. He was promoted major (squadron-commander) in December, 1916, and lieutenant-colonel (wing-commander) in November, 1917. As wing-commander he was able to render national service of the highest importance, for under Maj.-Gen. E. B. Ashmore he was directly responsible for the organisation and construction of the balloon defences of London. In this work he had approximately 3,500 officers and men under his command. In August, 1918, he again went out to France in command of a wing, and remained there till February, 1919. Col. Maude-Roxby was four times mentioned in dispatches, and was awarded the Order of the British Empire, the Distinguished Flying Cross and the Legion of Honour, the last being given in recognition of important services rendered at the battle of Vimy Ridge.

The funeral took place at All Saints' Church, Marlow, on Easter Eve, and at the same time a memorial service was held at St. Mary's Church, Buckden.

Death of Mrs. C. J. Fairfax Scott

WE regret to learn of the death of Mrs. Fairfax Scott, wife of the hon. organiser and secretary of the Imperial Air Fleet Committee, who died in London last week. She designed bronze mascots for all the different aeroplanes (13 in number), the presentations of which were organised by her husband, from eleven different towns of the United Kingdom to the six Dominions, including India. These designs are symbolic of the national sentiment of each of the Dominions. The King accepted a reproduction of the mascot of the Leicester-Canada aeroplane as a souvenir of the farewell flight of the machine to Leicester on the occasion of His Majesty's visit to the town. Mrs. Fairfax Scott also initiated and designed embroidery work for Dominion flags of all the Imperial Air Fleet aeroplanes. At Taplow Court hangs a Union Jack representing, in embroidered lines and figures, the record of all the Imperial Air Fleet presentation aeroplanes, which flag was presented to Lord and Lady Desborough by Mr. and Mrs. Fairfax Scott on October 27, 1918, on the occasion of the presentation of the City of Glasgow aeroplane to Canada.

IN PARLIAMENT

Airships' Gas.

CAPTAIN BOWYER, on April 12, asked the Parliamentary Secretary to the Admiralty whether his attention has been drawn to the invention of a process for manufacturing a non-inflammable gas, of approximately the same lift as hydrogen, called currenium; and, in view of the fact that it is reported that this gas can be produced much more cheaply than helium, will the Admiralty take the necessary steps to obtain full information, in view of the greatly increased value that the practical application of such a gas would make to airship development?

Mr. Amery: The Admiralty is watching progress in experiments with non-inflammable substitutes for hydrogen as a filling for airships, but the active pursuit of this question will, no doubt, be considered by the Secretary of State for Air should he decide to re-establish an airship service.

Aircraft Carriers

REAR-ADMIRAL SUETER asked the Parliamentary Secretary to the Admiralty whether he is satisfied that the Air Ministry have provided for the requirements of the Navy suitable machines for flying on and off the decks of the aircraft carriers; and whether a sufficient number of machines have been ordered by the Air Ministry to meet all reasonable naval requirements?

Mr. Amery: The problem of flying aircraft from and on to carriers is still in its infancy. Consequently, of the aircraft supplied up to the present by the Air Ministry, some types have been more successful than others. So far as the larger types are concerned, the matter is still in the experimental stage, but it is hoped that the new machines now under construction by the Air Ministry will prove suitable. With regard to the second part of the question, the provision of aircraft to meet naval needs which was originally agreed on between the two Departments for this financial year, has recently been considerably reduced as the result of the further economies required of the Air Ministry by His Majesty's Government.

Captain Viscount Curzon: Will the Navy secure enough aeroplanes for the carriers now under construction?

Mr. Amery: That would come into the Estimates for subsequent years.

Imperial Airship Service

CAPTAIN BOWYER asked the Parliamentary Secretary to the Admiralty whether his attention has been called to the projected airship service to Australia and the Far East; and, in view of the value of such a fleet of airships with bases throughout the Empire as an auxiliary reconnaissance force in time of war, what is the attitude of the Admiralty to this scheme?

Mr. Amery: The Admiralty view on the question of the airship service has already been given in this House. We viewed with regret the decision, for financial reasons, to abandon the existing airship service. That airships, if available in sufficient numbers, would be of great value in naval warfare is undoubted, and the possession in any future war of a considerable number of these craft would certainly be of importance to the Empire. Any development, therefore, of airships for commercial purposes would be welcomed by the Admiralty. The exact manner in which they would be used in war would depend on the circumstances.

Continental Air Couriers

THE latest development in aviation is contained in an announcement that an Air Courier Service has just been put into operation between London and Paris. Mr. Ransley S. Thacker, a barrister who has for several years been interested in aviation work, is the one responsible for this new enterprise.

Mr. Thacker travels every other day by aeroplane to Paris, and returns in the same way next day. Shortly he may go to Paris and return on the same day. If the amount of business makes it necessary, and Mr. Thacker states that from his present experience it soon will be necessary, he will employ other couriers, who will be despatched by each of four daily services.

Mr. Thacker is prepared to transact business or to execute commissions of any reasonable nature, and we can imagine many and varied will be the missions which he will be asked to undertake.

Mr. Thacker's offices at Granville House, Arundel Street, Strand, are open day and night, so that instructions may for urgent reasons be made at any time during the night, and in order to develop this service to the full, special night flying services will, it is proposed, later on be in operation; and in a short time it is hoped to have a Courier Air Service to Amsterdam, with connections to Berlin and Copenhagen, and also to Brussels, a direct service of couriers between London and Marseilles, and from Paris it will be possible to reach the most remote points by air.

The personal nature of this service is its *raison d'être*, and the commercial and legal experience and negotiating ability of its founder should be most valuable assets.

Mr. Thacker's charges vary from six guineas to ten guineas according to the nature of the transaction involved, but in any case it is considerably lower than the cost of sending one's own messenger.

It is shortly intended to open up offices in Paris, so that the business on that side may be developed also.

THE ROYAL AIR FORCE

London Gazette, April 7, 1922

General Duties Branch

The follg. Pilot Offrs. on probation are confirmed in rank.—F. K. Wright; Feb. 28. S. F. Coles; March 4. R. H. Mahon; March 5.

The follg. are restored to full pay from half-pay.—Group Capt. U. J. D. Bourke, C.M.G.; April 10. Flying Offr. T. H. Moon; April 3.

Memorandum

Capt. R. H. Shears (Capt. Shrops. L.I.) relinquishes his temp. commn. on ceasing to be empld.; Oct. 31, 1919 (substituted for *Gazette*, Oct. 31, 1919).

London Gazette, April 13, 1922

General Duties Branch

J. E. Arnott is granted a short serv. commn. as a Flying Officer, with effect from and with seny. of March 23. F. H. W. Guard, C.M.G., D.S.O., is granted a short serv. commn. for three years on the active list as a Squadron Leader, with effect from and with seny. of April 3. Flying Officer V. Croome is restored to full pay from half-pay; April 1. Flying Officer H. V. Puckridge, D.F.C., to take rank and prec. as if his name appeared in the Air Force List immediately below that of Flying Officer L. G. Harrison (reduction to take effect from March 28). Flying Officer, W. V. N. Grant relinquishes his short serv. commn. on account of ill-health contracted on active serv., and is permitted to retain the rank of Lieut.; April 5. Flight Lieut. E. L. Johnston, A.F.C., is transferred to the Res. Class B; April 10. Flying Officer W. A. N. Appleford resigns his short serv. commn.; March 28. The grant of a short serv. commn. to A. K. Crowther notified in *Gazette*, Jan. 13, is cancelled, with effect from April 1.

Stores Branch

Flying Officer J. A. Allen is placed on the retired list on account of ill-health contracted in the Service, and is granted the rank of Capt.; April 12. The temp. commn. of Flying Officer H. A. Lotherington is terminated on cessation of duty; April 11.

Medical Service

R. H. Wace, M.B., is granted a temp. commn. as a Flight Lieut., with effect from and with seny. of March 28.

Memoranda

Lieut. S. J. Croad relinquishes his temp. commn. on ceasing to be employed, and is permitted to retain his rank; March 25. Lieut. J. Sharman is deprived of permission to retain his rank, on conviction by the Civil Power; Feb. 9.

London Gazette, April 14, 1922

General Duties Branch

Wing Comdr. H. A. Williamson, C.M.G., A.F.C., is placed on half-pay, Scale A; April 3. Wing Comdr. R. G. D. Small is restored to full pay from half-pay; March 14.

London Gazette, April 18, 1922

General Duties Branch

Flying Offr. A. H. Flower is granted a permanent commn., retaining his present substantive rank and seny.; Oct. 24, 1919. *Gazette*, Oct. 24, 1919, appointing him to a short service commn., is cancelled.

The following are granted short service commns. as Pilot Offrs. on probation, with effect from, and with seny. of, the dates indicated:—H. S. C. Bassett, A. E. B. Bateman, R. F. Daniell, D. R. Dawson, B. C. Duke, R. B. Fleming, E. J. Heaven, L. P. Hirsh, P. J. A. Hume-Wright, J. C. Lindsay, M.C., H. W. Pierce, S. H. G. Trower, E. S. C. Vaughan, M.C., G. Wake, A. W. B. Walker, M. Wiblin, J. B. Wilson, L. Young; April 1. J. B. Rose; April 3.

Flight Lieut. H. M. Massey, M.C., is placed on half-pay, Scale B, from Feb. 16 to Feb. 23 inclusive.

The short service commn. of Pilot Off. on probation J. Dawson is terminated on account of ill-heath; April 19. Flight Lieut. C. C. Clark resigns his short service commn., and is permitted to retain rank of Capt.; April 1.

Stores Branch

The short service commns. of the following officers are terminated on cessation of duty:—Flying Off. on probation W. L. Price; April 9. Pilot Off. on probation R. G. W. N. Tinley; April 11.

Medical Service

Flight Lieut. C. W. T. Baldwin relinquishes his temp. commn. on ceasing to be empld., and is permitted to retain rank of Capt.; March 24.

Chaplains' Branch

The Rev. T. Browne, D.D., Ph.D., is granted a short service commn. as a Chaplain (R.C.), with the relative rank of Squadron Leader (Jan. 11).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

Air Commodore B. C. H. Drew, C.M.G., C.B.E., from Headquarters Middle East Area (Middle East Area) to command Egyptian Group Headquarters (Middle East Area). 1.1.22.

Group Captain P. F. M. Fellowes, D.S.O., from Palestine Group Headquarters (Middle East Area) to Headquarters Middle East Area (Middle East Area). 1.1.22.

Wing Commanders.—R. P. Ross, D.S.O., A.F.C., to R.A.F., Base Leuchars (Coastal Area) for Air Staff Duties with C.-of-C. Atlantic Fleet, in H.M.S. "Queen Elizabeth." 12.3.22. R. E. C. Peirse, D.S.O., A.F.C., from No. 29 Group Headquarters (Coastal Area) to R.A.F. Staff College (Inland Area). 1.4.22. W. H. Primrose, D.F.C., from No. 6 Flying Training School (Inland Area) to School of Technical Training (Men) (Inland Area) (Supernumerary, on disbandment of No. 6 Flying Training School. 1.4.22. H. L. Reilly, D.S.O., from No. 6 Flying Training School (Inland Area) to School of Technical Training (Men) (Inland Area) (Supernumerary) on disbandment of No. 6 Flying Training School. 1.4.22. H. A. Williamson, C.M.G., A.F.C., from Air Ministry (Directorate of Equipment) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.4.22. P. K. Wise, C.M.G., D.S.O., to command R.A.F. Depôt (Inland Area). 3.2.22.

Squadron Leaders.—F. H. W. Guard, to R.A.F. Depôt (Inland Area) (Supernumerary) on appointment to Short Service Commission for duty with Armoured Car Company (on formation). 3.4.22. A. J. C. Wigmore, M.B., from No. 45 Squadron (Middle East Area) to Palestine Group Headquarters (Middle East Area) for duty as Senior Medical Officer. 14.3.22. M. Henderson, D.S.O., from No. 216 Squadron (Middle East Area) to command No. 47 Squadron (Middle East Area). 13.3.22. R. S. Overton, from Palestine Group Headquarters (Middle East Area) to R.A.F. Depôt (Inland Area) (Supernumerary). 17.3.22.

Flight Lieutenants.—E. F. Turner, from Air Ministry (Director General of Supply and Research) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.4.22. J. P. Wells, B.A., from Coastal Area Aircraft Depôt (Coastal Area) to Marine and Armament Experimental Establishment (Coastal Area). 2.4.22. V. R. Smith to Research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to Short Service Commission. 18.3.22, and to Central Medical Board (Inland Area). 14.4.22. J. R. Howett from Instrument Design Establishment (Inland Area) to No. 207 Squadron (Inland Area) (Supernumerary). 10.4.22. G. H. Reid, D.F.C., from Instrument Design Establishment (Inland Area) to R.A.F. Depôt (Inland Area) (Supernumerary) to attend School of Military Administration. 10.4.22. V. H. Tait, from No. 39 Squadron (Inland Area) to No. 4 Squadron (Inland Area) (Supernumerary). 1.4.22. L. W. Hall, from Inspector of Recruiting (Liverpool) (Coastal Area) to No. 5 Flying Training School (Inland Area) 13.4.22. A. W. Clemson, O.B.E., D.S.C., from Inspector of Recruiting (Glasgow) (Coastal Area) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.4.22. A. D. Newbury, from Inspector of Recruiting (Birmingham) (Coastal Area) to Inland Area Aircraft Depôt (Inland Area) (Supernumerary). 13.4.22. T. Henderson, M.C., A.F.C., from No. 6 Flying Training School (Inland Area) to School of Technical Training (Men) (Inland Area) (Supernumerary). 1.4.22. H. P. Lale, D.S.O., D.F.C., from No. 6 Flying Training School (Inland Area) to School of Technical Training (Men) (Inland Area) (Supernumerary). 1.4.22. W. C. Clark from No. 6 Flying Training School (Inland Area) to School of Technical Training (Men) (Inland Area) (Supernumerary). 1.4.22. J. M. Burke, from No. 267 Squadron (Mediterranean) to R.A.F. Depôt (Inland Area) (Supernumerary). 25.3.22. To join 17.4.22. A. T. Cooper from Air Ministry (Director of Equipment) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.4.22. R. J. Aherne, M.C., from Headquarters Middle East Area (Middle East Area) to No. 45 Squadron (Middle East Area). 3.3.22. N. H. Medhurst from Headquarters Middle East Area (Middle East Area) to No. 216 Squadron (Middle East Area). 3.3.22. E. L. P. Morgan, from Aircraft Park (Iraq Group) to Aircraft Depôt (Middle East Area). 17.2.22. A. Hunter, O.B.E., from Aircraft Depôt (India) to R.A.F. Depôt (Inland Area) (Supernumerary). 6.3.22. M. H. Butler, D.F.C., from R.A.F. Depôt (Inland Area) to Inland Area Aircraft Depôt (Inland Area). 5.4.22. R. H. Wace, to Research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to Temporary Commission. 28.3.22.

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ROYAL AIR FORCE SPORTS BOARD

Inter-Services Boxing Tournament. Championships at Halton Air Station

The Imperial Services Boxing Association has arranged that for the future each service will, in turn, be responsible for the organisation of the Inter-Services Boxing Tournament in successive years. This year, the responsibility has been delegated to the Royal Air Force Boxing Association, and the competitions will be held at Halton Camp, near Wendover (by permission of Air-Commodore F. R. S. Scarlett, C.B., D.S.O.), on May 3 and 4.

This year, there will be four service entries, Royal Navy, Army, Royal Air Force and Royal Marines, the last-named coming in as a separate service for the first time. The competitions will consist of individual championships for officers (feather, light, welter, middle and heavy weights) and other ranks (all weights). The Inter-Services Team Championship will be gained by the Service securing the highest number of points in the two classes of individual championships.

The contests will take place in a large hangar at Halton Air Station in which seating accommodation has been provided for nearly 4,000 spectators, all of whom will have good views. There will be two sessions, at 2 p.m., and 8 p.m., on May 3, and the finals will be fought at 8 p.m. on the following day.

Halton Air Station is readily accessible from London, and special travelling facilities have been arranged for the finals on the second day.

The Central Band of the Royal Air Force, under the direction of Flying Officer J. H. Amers (Director of Music), the R.A.F. Band, Halton, and the massed drums and trumpets of the R.A.F., Halton, will play during the Tournament.

The tickets for each session range in price (the three sessions at reduced rates) from 1s. to 10s. for ring-side seats. They can be obtained from Messrs. Alfred Hays, 26, Old Bond Street, W. 1, and from all naval depôts, marine barracks, army commands and Air Force stations, or on admittance.

Any enquiries should be addressed to Squadron-Leader J. E. Parkin, M.B.E., Hon. Sec. Imperial Services Boxing Association, R.A.F. Depôt, Uxbridge.

SIDE-WINDS

In connection with the Easter Monday Air Races at Waddon, we think it certainly deserves to be put on record that, but for the Aircraft Disposal Company, there might have been no races, or at any rate not the interesting races which did take place. Of the machines belonging to the A.D.C. some were entered by that firm, while in the case of several others only a nominal charge was made to the pilots flying them. Not only so, but the engineers who worked on the machines to get them in racing trim did so without pay, simply for the sport of the thing. Such a state of affairs is highly commendable, and the workers no less than the firm deserve the thanks of all interested in aviation for the share taken in making the meeting a success. That the organisation partly handicapped their efforts is in no way the fault of these enthusiasts, and it is to be hoped that they will not be discouraged by the way in which the race meeting was handled, but will do as well next time, when those responsible for the organisation must do a great deal better.

- - -

It is significant of the progress of commercial aviation that the Anglo-American Oil Company has recently installed another filling-point at the London Terminal Aerodrome at Croydon, in what must be record time for work of this nature. This increased facility for supplying aviation spirit has been necessitated by the recent inauguration of the new Daimler Hire, Ltd., Air Service to the Continent.

This new "Golden Pump" installation has a tank capacity of 3,000 gallons, and a unique feature is that the aviation spirit after passing through the pump is propelled through some 250 ft. of supply pipe underground to the required filling point, where it is discharged into the aeroplane tank. The arrangement is such that the details when not in use are stored underground leaving no projection on the surface of the aerodrome. Thus speed of supply is coupled with absolute safety to aeroplanes leaving or arriving.

When it is considered that the storage tank was not lowered into its pit until March 30 last, and that the installation was completed, tested and handed over for use on April 2, it will be realised how exceptionally quick the work was effected. This makes the third "Golden Pump" erected at the Croydon Aerodrome by the Anglo-American Oil Co.

* * * *

IMPORTS AND EXPORTS, 1921-1922

Aeroplanes, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "Flight" for January 25, 1912; for 1912 and 1913, see "Flight" for January 17, 1914; for 1914, see "Flight" for January 15, 1915; for 1915, see "Flight" for January 13, 1916; for 1916, see "Flight" for January 11, 1917; for 1917, see "Flight" for January 24, 1918; for 1918, see "Flight" for January 16, 1919; for 1919, see "Flight" for January 22, 1920; for 1920, see "Flight" for January 13, 1921; and for 1921, see "Flight" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
Mar. ...	14	1,471	118,199	166,607	1,565	100
	6,852	3,190	265,156	312,288	3,869	1,223

* * * *

Germany and Military Aircraft

An announcement was made in Berlin on April 22 upon the above matter to the following effect.—"The Inter-Allied Guarantee Committee which will supersede the Inter-Allied Air Commission on the 5th prox. (on which date Germany, under certain conditions, may resume the manufacturer of civilian aircraft) will consist of thirteen Inter-Allied officers and twenty-eight non-commissioned officer and soldiers.

"One of the committee's principal tasks will be to see that Germany observes the rules prohibiting the manufacture of military aircraft. One-seaters of over 60 h.p., air machines which can fly without a pilot, air machines with protective armour, or capable of being equipped with any armament will be considered military. No heavier-than-air machine with full cargo must be able to rise over 4,000 metres; no machine with full cargo at 2,000 metres must be able to travel faster than 170 kilometres an hour. Airships whose cubic content exceeds the following figures will be considered military:—Rigid dirigibles, 30,000 cubic metres; half-rigid, 25,000 cubic metres; non-rigid, 20,000 cubic metres."

THE LONDON AERO-MODELS ASSOCIATION

A very interesting meeting was held at Headquarters on Thursday, the 20th inst., over 30 members being present.

Competition No. 3 (for members only), for R.O.G. Duration, limited to enclosed models weighing not less than 8 ozs., any power, loading limit (minimum) 6 ozs. to the square foot for monoplanes and 5 ozs. per square foot for biplanes. To take place on Wimbledon Common at 11 a.m. (start at 11.15 a.m.), May 7. Flights timed from release of propellers. Judges, Mr. A. F. Houlberg and Mr. W. E. Evans. Prizes to the value of 2 guineas for this competition were kindly given by Messrs. W. G. Evans and Sons.

Competition No. 5.—Mr. F. J. Camm's Challenge Cup, value 10 guineas and silver medal. The Cup is won outright by the entrant winning it for three consecutive years.

1. Machines to be of Farman type.
2. Propeller to be placed nearer to the main plane than to the tail.
3. Total length not to be greater than the span (not including protector).
4. Loading limit (minimum) 6 ozs. per square foot for monoplanes and 5 ozs. per square foot for biplanes.
5. Best of three flights.
6. Competition to be held Saturday, June 24, at 4 p.m.

Mr. Camm is making arrangements for this to be held on Messrs. Handley Page's ground, Cricklewood.

Judges will be appointed later.

Entrance fee for non-members, 5s.

Competition No. 7.—Mr. D. A. Pavely kindly offered a prize to the value of three guineas for an Ornithopter Competition. Minimum weight 4 ozs., minimum duration 20 seconds. Further particulars will be published later.

Competition No. 2 was held on Wormwood Scrubbs, on Sunday, the 23rd inst. Over a dozen members entered same, the Judges being Mr. Houlberg and Mr. Wilson. Unfortunately, the weather was very unfavourable for such a competition, the tractor machines having great difficulty in rising off ground.

Mr. Hatfull was first, doing 59⅘ secs.; Mr. C. Hersom was second with 53⅕ secs.; and Mr. Bedford third with 49⅘ secs.

Many members had built new models, the majority of which were of a very interesting design and excellent workmanship. Mr. D. A. Pavely had his compressed air machine out, which was very much admired by the public. Mr. Colebach and Mr. Grey gave an interesting exhibition with their enclosed type machines.

Members are specially requested to meet on Wanstead Flats on Sunday, April 30, at 11 a.m., in order to give a flying demonstration.

Mr. W. E. Evans reports good progress with his propeller testing apparatus, and hopes to have same finished in three weeks' time.

A Research Committee has been formed, the following members having volunteered to serve on same:—Messrs. W. E. Evans, A. F. Houlberg, A. B. Clark, D. A. Pavely and F. J. Camm. Meetings are held at Headquarters, 20, Great Windmill Street, Piccadilly, W. 1, every Thursday at 7.30 p.m.

Competition Secretary, Mr. C. A. Rippon, 52, Fairbridge Road, Holloway, N. 19.

A. E. Jones, Hon. Secretary, 48, Narcissus Road, West Hampstead, N.W. 6.

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

Continued from p. xiv.)

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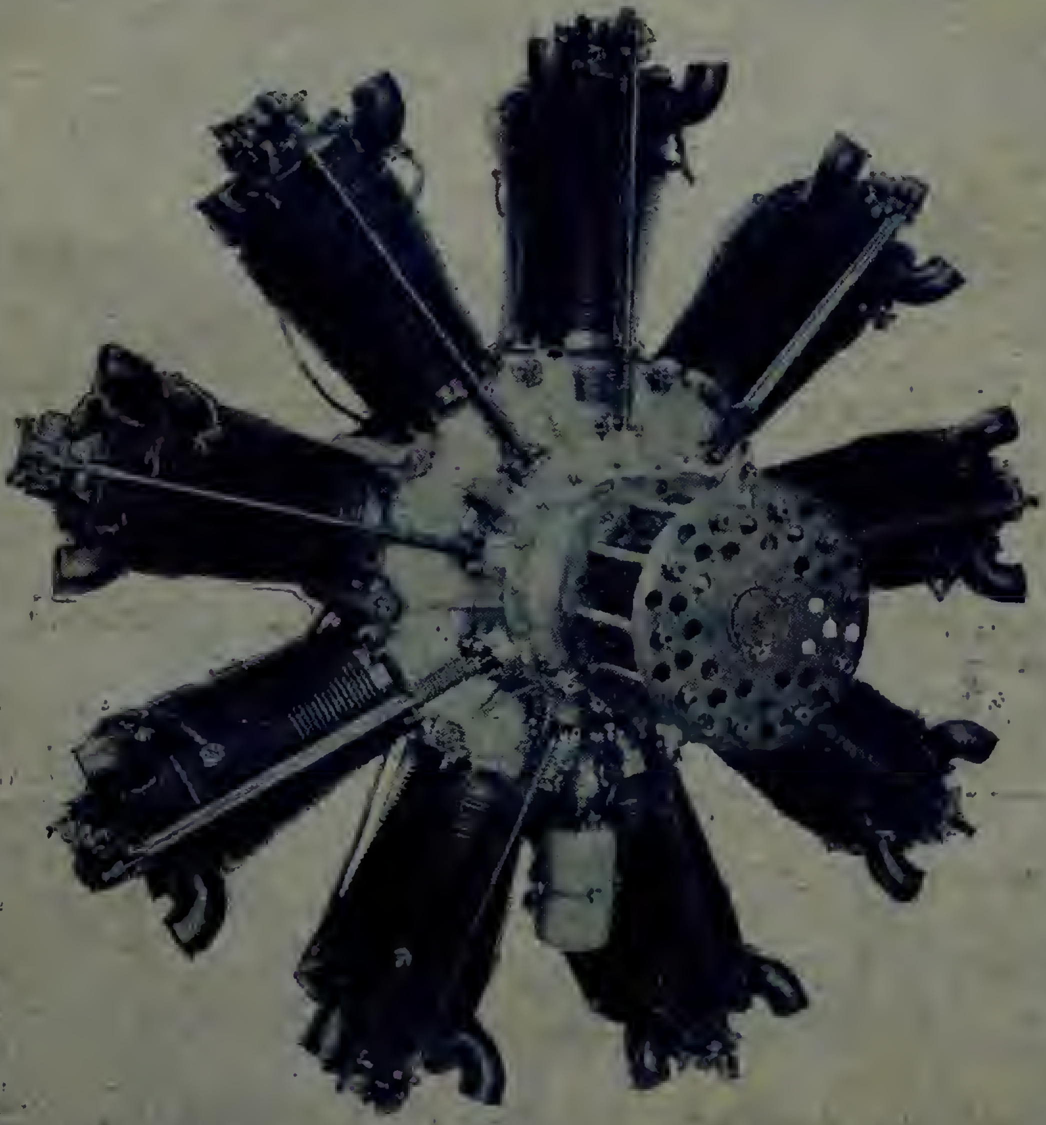

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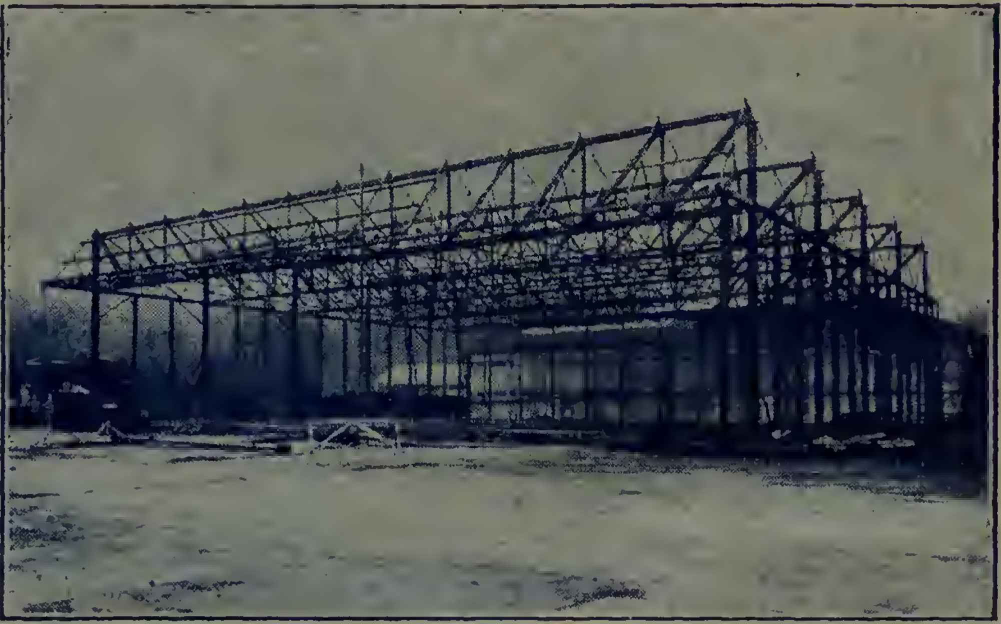

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
June 1	**Entries close for Schneider Cup Race**
June 5	**R.Ae.C. Whitsun Race Meeting, at Waddon**
June 23–25	**International Competition for Touring Aeroplanes, Brussels**
July 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT

The French Engine Competition

THE regulations governing the engine competition to be held in France during 1924 have now been issued, and are published elsewhere in this issue of FLIGHT. The total prizes amount to 1,600,000 francs, but out of that foreign competitors can only qualify for 1,000,000 francs. At the present rate of exchange this represents approximately £20,000, and the winning firm would also be drawing royalties on manufacture, at the rate of 8,000 francs per engine for the first 100, 7,000 for the next 100, and so on until the 601st, from which onward there would be a fixed royalty of 2,000 francs per engine. Thus, in the unlikely case of 600 engines being manufactured, the winner of the competition would get the original prize of £20,000 plus 3,300,000 francs (£66,000) in royalties, or a total of £86,000. It is, however, unlikely that any one engine, no matter how good, will be manufactured in France during the next few years to the extent of 600, although even in smaller numbers the royalties will amount to a not inconsiderable sum. There is further the consideration that foreign competitors will be free to sell their engines anywhere outside France, her colonies and protectorates, and thus might, even without winning the competition, possess an engine which would find a ready sale. Taking it all round, the competition offers a distinct encouragement to engine manufacturers everywhere, and we sincreely hope to find among the entrants more than one British firm.

As regards the technical side of the competition, there is, we think, not much wherewith to find fault. The regulations appear to be eminently sensible, and there is little doubt that more than one engine will be produced which is capable of fulfilling the conditions in a creditable manner. Even present-day engines, with minor modifications, should be able to make a very good showing. The size of engine which it is hoped to encourage—350 to 450 h.p.—appears to be one well suited to commercial demands for several years to come, and we are glad to see that those responsible for the framing of the regulations have not asked for engines of much higher power. It will be a good many years before we are likely to require single units of much higher power than about 400 h.p.

The weight limit, 7·26 lbs./h.p., including fuel and oil for five hours, is fairly generous, and there is more than one British engine in existence today which should be able to score considerably on the weight allowance. It we take the weight per b.h.p. as about 2·25 lbs. and the fuel and oil consumption as ·65 lbs./h.p./hour, the total weight works out at 5·5 lb. per h.p., leaving a margin of 1¾ lbs./h.p. As the weight of the cooling water is not, apparently, taken into account, except such as remains in the water jackets, water pump and piping after the five hours' run of the acceptance test, the figure of 7·26 lbs./h.p. should not be difficult of attainment.

The actual endurance tests, 30 periods of 8 hours each, not extending over more than 100 days, are stiff, but not unduly so, and it will be possible to run the engine for one period of 8 hours and then give it one or two days' rest, and still be within the limit of 100 days. This is, apparently, the procedure which is aimed at, as there does not appear to be any marks awarded for completing the endurance tests in less than the 100 days.

The system of penalties appears, generally speaking, to be good. The renewal of such parts as plugs and valves is not heavily penalised, and is not subject to cumulative penalising, as are certain other parts. In other words, parts which are known to require attention, renewal or repair in any engine are treated rather lightly, while certain accessories and important engine parts are severely penalised, especially if breakage occurs repeatedly. On the whole the penalties given suggest that it has been the object of those framing the rules to attempt to ensure that an otherwise good engine is not condemned on account of a mishap to some minor part—which may be due to faulty material—but that, on the other hand, an engine in which important parts or units keep giving trouble, and which, therefore, suffers from defective design or workmanship, is heavily penalised.

It would not be easy to improve upon the regulations, and we congratulate those responsible for the fair-mindedness and evident endeavour to draft really useful rules upon the manner in which they have carried out their difficult task.

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The Safety Fuel Tank Competition

The Air Ministry Competition for safety fuel tanks, which was held at Farnborough, is now ended, and the official report on the competition and on the result has been issued. Extracts from it are published elsewhere in this issue, from which it will be seen that the winner of the First Prize of £1,400 is the India-Rubber Gutta-Percha and Telegraph Works Co., Ltd., of Silvertown. Second Prize (£400) has been awarded to Imber Anti-Fire Tanks, Ltd., and Third Prize (£200) to Commander Boothby, R.N. It will be noticed that in the preliminary tests, the order of merit of the three tanks was exactly the reverse of the order in the final award.

But little has been disclosed in the Air Ministry report relating to the actual design of the different tanks, except such data as capacity, weight and shape. We should have liked to see detail drawings of the tanks, so as to form an opinion of the design. In the absence of these it is scarcely possible to form an opinion of the progress represented, and one is but little the wiser, except for the Air Ministry statement that the competition "has produced a type of safety fuel tank which is available for immediate introduction on Service and civil aircraft, and which, for a slight increase in weight, gives almost complete immunity from fire, either in a crash or in action with enemy machines."

So far this appears to be satisfactory, and it is to be hoped that some of these tanks, or later developments of them, may soon be found on all commercial aircraft. The danger from fire is a very real one, and anything which tends to eliminate, or at any rate reduce, this risk is to be welcomed. At the same time, if the fitting of these tanks is to be made compulsory, it should be kept in mind that the conditions of the tests were so severe (we are now referring particularly to the crashing tests) that to ensure the tanks standing up against them they had to be made heavier than is probably necessary for commercial work. This should be borne in mind if there is any intention of making their fitting compulsory, and a slight reduction in weight should be allowed. This should not seriously interfere with the resistance to fire due to crashing. With regard to Service aircraft, questions of danger from fire, due to enemy action, may render it advisable to retain the tanks at the competition strength and weight.

◆ ◆ ◆

Heavy Loading or Light Loading

In this issue of FLIGHT we publish a description of the Vickers "Vulcan" commercial biplane, with Rolls-Royce "Eagle" engine. This machine is of more than usual interest, inasmuch as it represents the first modern attempt to produce a lightly loaded machine for commercial use. At present there may be said to be two schools of thought on the subject of commercial machines. One maintains that the heavily-loaded machine which lands very fast is just as safe in case of accident, while its high loading gives it an advantage at top speed, and certain structural advantages arising out of its smaller size. The other considers low landing speed necessary for safety and economy, maintaining that the high landing speeds reached during the war were only brought about and tolerated on account of the demand for high performance at almost any cost. Hitherto the "high-loading'ites" have been most prominent as regards actual machines in use, and it remained for Mr. Pierson of Vickers to produce a lightly-loaded machine in which modern features were incorporated. The performance of the "Vulcan" on actual service will therefore be watched with very considerable interest, and if, as seems probable, this machine is able to give a good account of itself, it may mean a return to landing speeds more of the order of those obtaining before the war, with, probably, corresponding increase in the useful load.

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Russo-German Air Mail.

FROM Berlin it is reported that next month will see the inauguration of the air mail over portions of the route between Berlin and Moscow. Mails will be sent from Berlin to Königsberg by the night train, and the mail aeroplane will leave Königsberg in the early morning. The first stage of the flight is to be to Vitbesk, a distance of approximately 400 miles. Here the mails will be transferred to another machine, which will cover the remaining 350 miles to Moscow. In the opposite direction the mail 'plane will leave Moscow in the early morning, arriving at Königsberg in time for the mails to catch the night train for Berlin. On the Russian side, it is stated, the service will be run by the Soviet Government, while on the German side it will be operated by the Aero Union Company. This company has a capital of 5 million marks, and such well known firms as the Hamburg Amerika Line, the Zeppelin Co., and the Allgemeine Electricitätsgesellschaft are stated to be interested in it.

THE VICKERS "VULCAN" EIGHT-PASSENGER COMMERCIAL BIPLANE

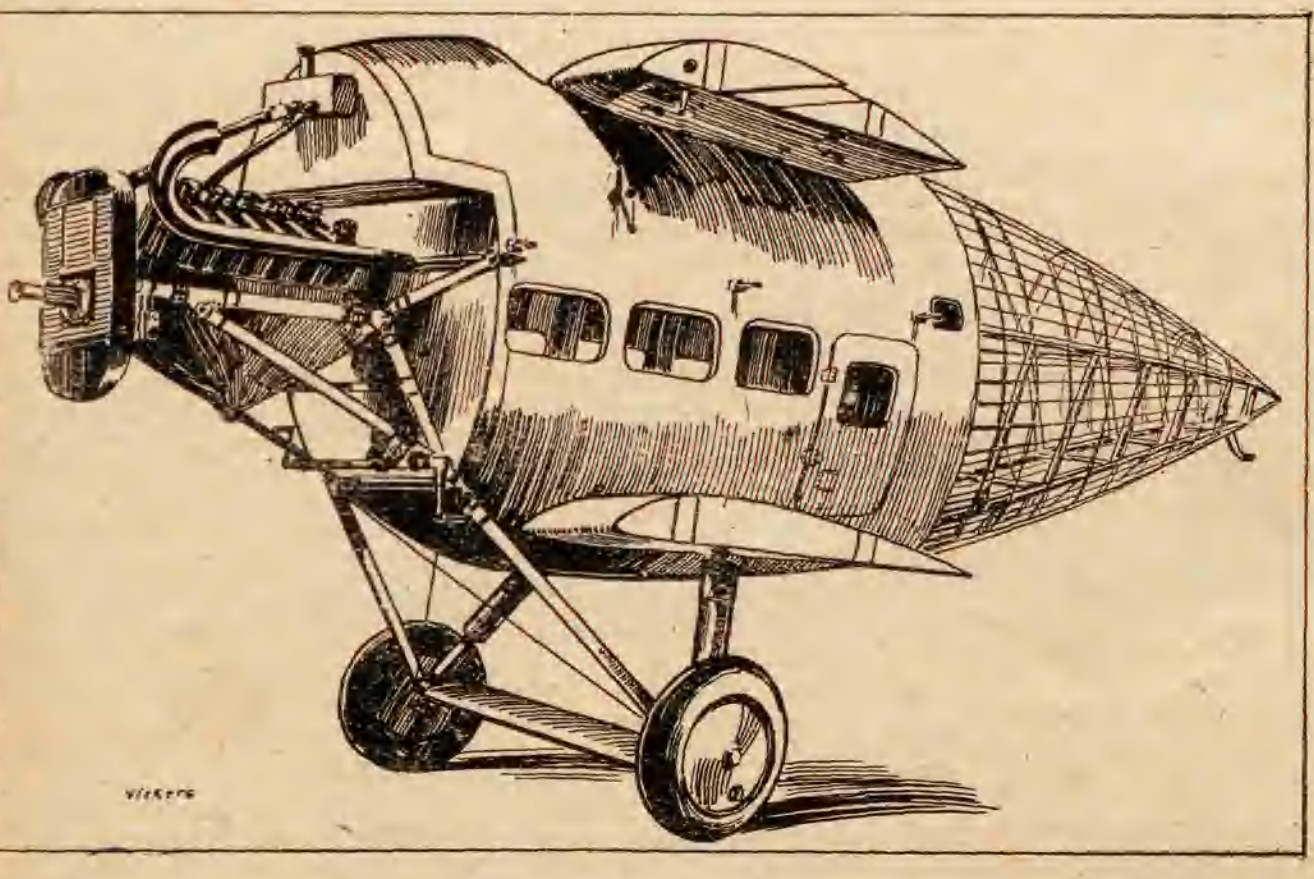
360 H.P. Rolls-Royce "Eagle VIII" Engine

AT the Weybridge works of Messrs. Vickers, Ltd., a new commercial aeroplane is nearing completion; in fact, by the time these notes appear, the first machine of the "Vulcan" class will probably have been put through its preliminary tests by Capt. Cockerell. As distinct from recent Vickers land machines of Mr. R. K. Pierson's design, the "Vulcan" is a single-engined biplane, although retaining in other respects many of the features which distinguish Vickers machines.

At the time of our visit to the works, the first of the "Vulcans" was not completed, and it has not, therefore, been possible to include in this description photographs of the machine. The scale drawings on p. 254, will, however, give a very good idea of the general lay-out. The first feature which one notices is the unusual depth of the *fuselage*, which extends right up to and serves as a support for the top plane. One result of this great depth is that in side view the *fuselage* looks somewhat stumpy, although the streamlining is uncommonly good. The width of the *fuselage* is not, of course, nearly so great, as will be seen from the plan view, and the resistance of the *fuselage* is probably very low.

General Design

Although of considerable span—49 ft.—there is only one pair of interplane struts on each side. This reduction in the wing bracing has been made possible by the adoption of a thick section, high-lift wing. The actual section employed is one of the airscrew sections, No. 62, we believe, with flat bottom camber. The space available for spars is, therefore, considerable, and the long bays are further relieved by building up the wings as continuous beams. In the drawing, it will be noticed that the wing roots, both top and bottom, extend some distance out from the *fuselage*. The reason for this arrangement is that the joint between spar root and inner end of end section spar occurs at the point of contraflexure, where the bending moment is zero, and where, consequently, the fish plates of the joint have to resist shear only.



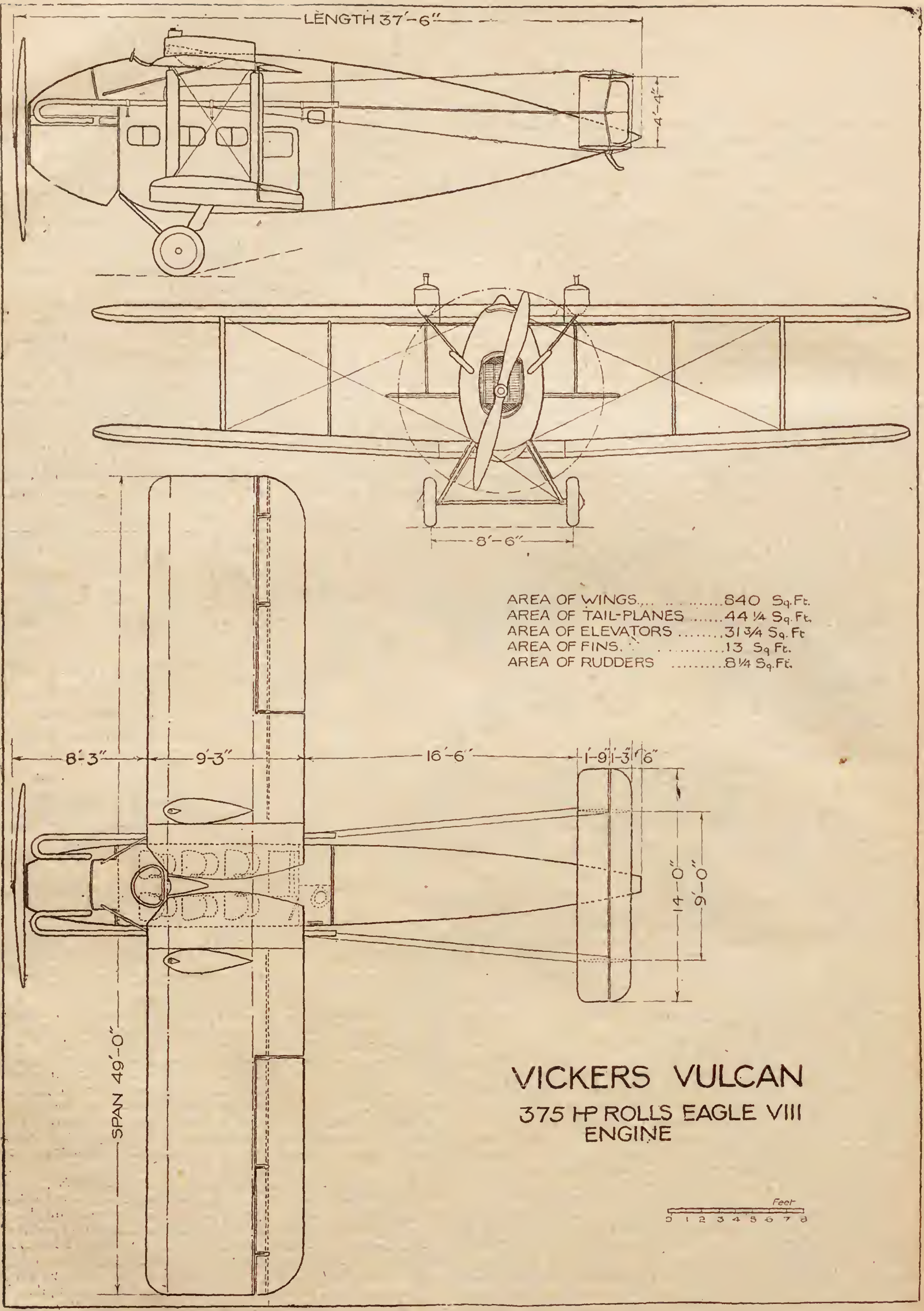
The Vickers "Vulcan": Three-quarter front view of *fuselage* before engine cowl and fabric covering of rear portion are put on.

As regards general design, the "Vulcan" is a relatively low-powered weight-carrying commercial machine, in which economy in manufacture and operation have been given precedence over performance. Every endeavour has been made to make the "Vulcan" a truly commercial machine, and if it is not quite so fast as some modern commercial machines, it possesses other features which, in our opinion, more than outweigh the relatively low cruising speed of 90 m.p.h. To begin with, the machine carries eight passengers on one Rolls-Royce engine of 360 h.p., so that the power expenditure is only 45 h.p. per passenger at full power, and a maximum speed of about 105 m.p.h. This should certainly bring the machine within sight of being able to show a profit without the aid of a Government subsidy. Furthermore, the low landing speed (about 40 m.p.h. on estimated figures) should make for safety, and should also enable the machine to get out of quite small fields. It is also possible that for a machine which lands so slowly, a lower insurance premium might be required, all of which are points in favour of the lightly-loaded and relatively slow commercial aeroplane.

The Fuselage

In the main, the *fuselage* construction is similar to that familiar from such Vickers machines as the Vimy-Commercial Vernon, Victoria, and Virginia. That is to say, the front portion, which forms the cabin, is of *monocoque* construction and elliptical cross-section, while the rear portion of the *fuselage* is a girder of *longerons* and struts, braced with tie rods. The wooden members of this girder are of the typical Vickers type, *i.e.* they are hollow tubes of wood. The manner of building up these tubes is very ingenious, and has been proved in practice to give great strength and resistance to hard wear. Each strut or *longeron* is built up of three pieces, spindled out from rectangular section strips to form a third of a circle. The three pieces are then glued together, with tongues of hardwood, and the whole further strengthened by being bound with tape. At the ends, and, in the case of the *longerons*, where the strut fittings are attached, the three strips composing the tube are left solid, and the triangular space left is filled with a wood plug, making the *longeron* solid. The process of manufacture is, we understand, quite cheap, and, of course, for members which are loaded as struts the tubular section is the most efficient. The *longerons* work out very light, especially as they are of fairly large diameter, and the section thus has a large moment of inertia.

The sheet steel fittings are wrapped around the *longerons*, and in the "Vulcan" an improvement has been incorporated which allows of taking up any slack arising from shrinkage of the *longerons*. This is in the form of an aluminium packing piece on which the bolts are tightened up. If the *longeron* shrinks, as it might do to a certain extent in tropical climates, the bolts are removed and the packing piece replaced by a thinner one. The bolts are then put back and tightened up. The extreme rear portion of the *fuselage* of the "Vulcan" is a steel tube structure carrying the tail skid, and it terminates in a short transverse tube into which a tube or rod can be


LENGTH 37'-6"
4'-4"
8'-6"
AREA OF WINGS.............840 Sq. Ft.
AREA OF TAIL-PLANES ....44 1/4 Sq. Ft.
AREA OF ELEVATORS ....31 3/4 Sq. Ft
AREA OF FINS..............13 Sq. Ft.
AREA OF RUDDERS ....8 1/4 Sq. Ft.
8'-3"
9'-3"
16'-6"
1'-9
1'-3
6"
14'-0"
9'-0"
SPAN 49'-0"
VICKERS VULCAN
375 HP ROLLS EAGLE VIII
ENGINE
Feet
0 1 2 3 4 5 6 7 8

THE VICKERS "VULCAN": General arrangement drawings.

inserted for enabling two or more men to lift the tail when the machine is being moved about on the ground. A fairing in the form of light formers and stringers is built on outside the main *fuselage* structure, to bring it up to an elliptical section.

The cabin portion of the *fuselage* is, as already mentioned, built up as a *monocoque* shell, with formers of rectangular box section, but forming, of course, ellipses conforming to the shape of the *fuselage*. Into these formers are let the longitudinal stringers, or *longerons*, and the whole is covered with three-ply wood, screwed on in relatively small panels. When finished, the entire cabin portion is covered with fabric and doped.

The Wing Structure

It has already been stated that the wings of the "Vulcan" are of thick section, and that therefore the spars are of considerable depth. The spars are of the box type, with top and bottom flanges of spruce, and sides of three-ply wood. As in the case of the *fuselage longerons* and struts, the wing spars are taped and doped, the fabric further strengthening and protecting the wood underneath.

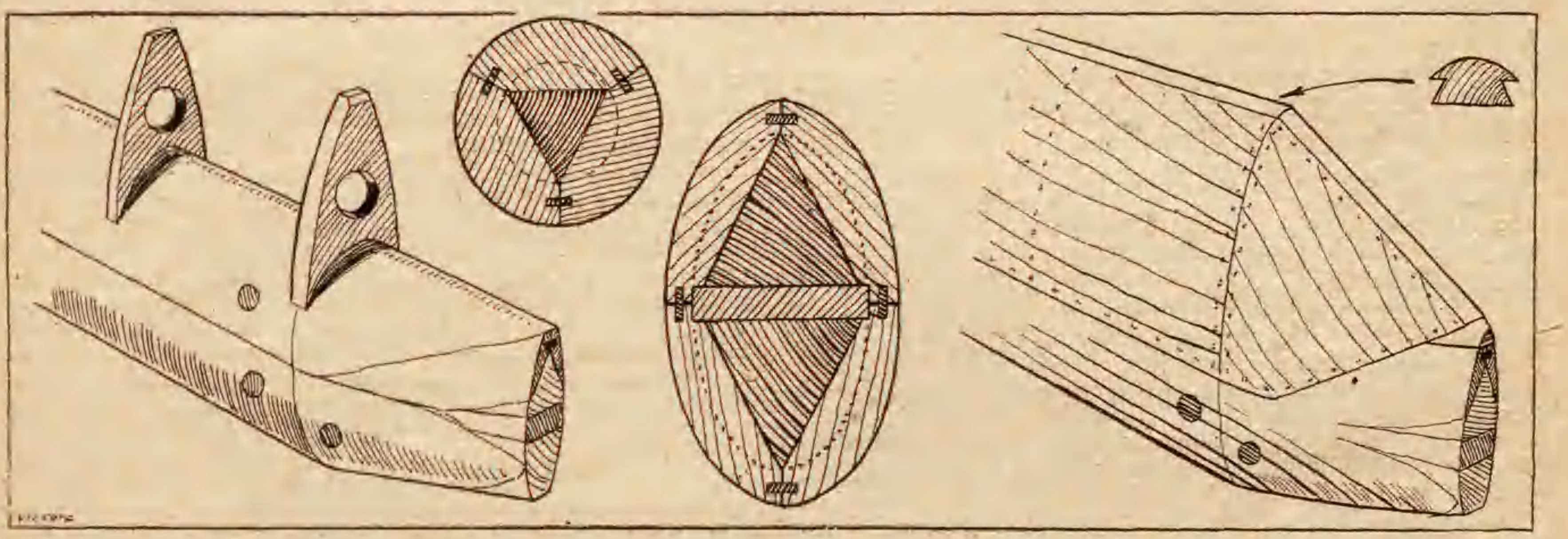
The compression struts between the spars are circular tubes of wood, and constructed similarly to the *longerons* already described. The ribs are of somewhat unusual construction, as shown in one of our sketches, and consist of lattices of spruce, the lattice bars, some of which are single and some double, according to local loads, being attached to the spruce flanges by Vickers Duralumin rivets. This form of rib has been found to be very strong for its weight, and is now employed in all Vickers machines.

chord from the leading edge. This tube is carried in bearings mounted on channel section steel brackets bolted to the rear spar. According to whether the *aileron* is up or down, its leading edge moves below or above the rear spar, and the portion in front of the pivot serves as a balance. This type of *aileron* has the advantage that the twisting stress imposed by a horn balance is avoided, but, on the other hand, the load on the steel brackets, and the resulting twisting stress on the rear spar, is probably considerable. However, owing to the thickness of the wing, it is a fairly easy matter to take care of these loads. Aerodynamically, this form of *aileron* is, we believe, very efficient. At any rate, it appears to be so on the Handley Page W.8 and W.8B. There is no direct control to the *ailerons* of the lower plane, these being operated by *aileron* struts running from lugs on the top *aileron* to similar lugs on the lower ones. It should be observed that these struts are attached to the leading edges, and not, as is more usual, to the trailing portion of the *ailerons*. This is another instance of the amount of thought and attention given to details by Mr. Pierson. By the arrangement adopted, the *aileron* struts are made to work in tension when the greatest loads occur, and only work in compression under relatively small loads. It might be mentioned that the *ailerons* are standardised so that the same spares will do for both top and bottom planes.

The tail is of the biplane type, similar to that of the "Viking," and does not call for any special description.

The Engine Mounting

One of the accompanying sketches shows the mounting of the Rolls-Royce "Eagle." The whole engine mounting structure is composed of tinned steel tubes so arranged as to give perfect, or nearly so, triangulation. The whole engine unit can be detached from the *fuselage* by undoing four bolts and the engine controls and petrol leads. The former are very simple and of short length, owing to the position of the pilot immediately aft of and slightly above the engine. They are all of the pull-and-push rod type, with crank arms where their direction has to be changed. As for the petrol leads, these also are of very simple form, consisting of two pipes, one from each tank, running to a T-piece from which a single pipe runs to the carburettor *via* a B.S.A. filter. This filter, it might be mentioned, is so arranged that the gauze can be removed and cleaned without interfering with the pipes themselves.



THE VICKERS "VULCAN": Some details of the construction of circular and streamline section struts and longerons.

As already mentioned, there is only one pair of interplane struts on each side. The construction of these struts is illustrated in one of the accompanying drawings. The strut proper is built up of four strips, spindled out to form an elliptical section. To this is added a fairing composed of thin three-ply, supported on triangular formers attached to the back of the strut. Both as regards cost of manufacture and strength for weight, these struts have proved very good, and it might be mentioned that a series of loading tests carried out on specimen struts have given the very high loading figure of 1,000 lbs. per lb. weight of the strut. In other words, a strut weighing 28 lbs. supported an end load of 28,000 lbs. This, of course, is extremely good, and indicates the constructional advantages of this form of strut construction. Add to this that the struts are cheap to build, waste but little wood, and are composed of strips so thin that defects can be easily spotted, and it will be seen that the hollow wood strut is difficult to improve upon.

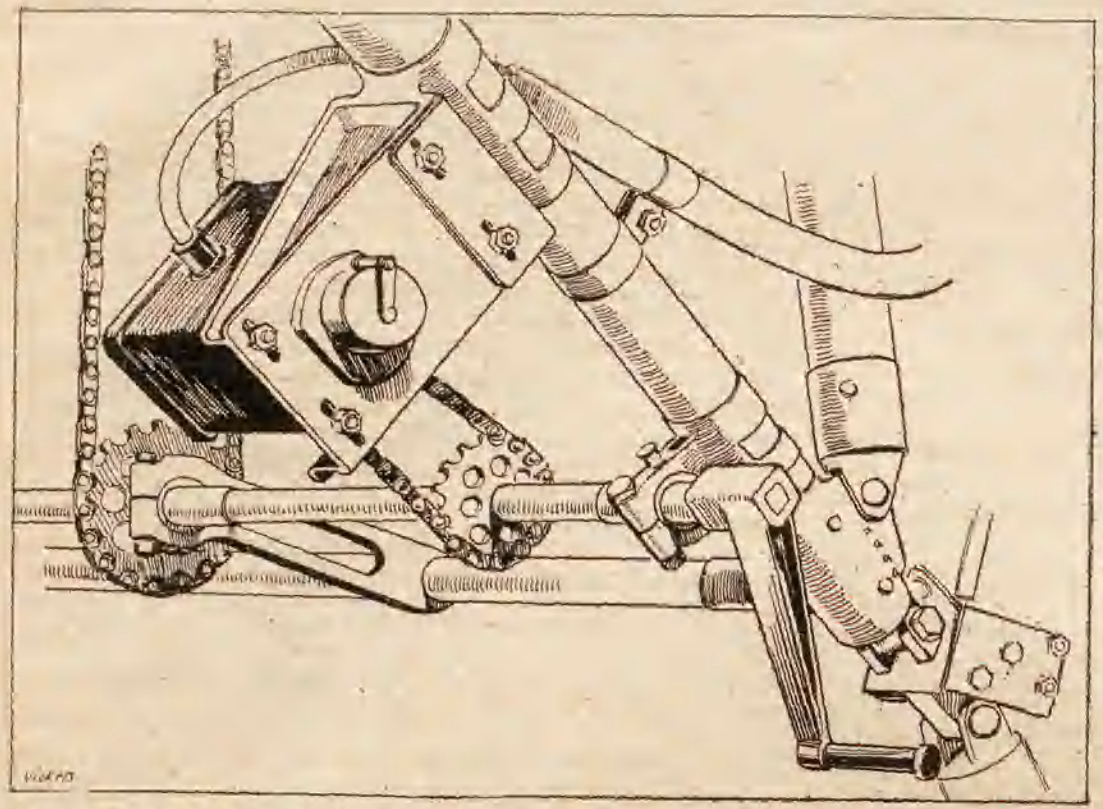
The wing bracing is of straightforward type, with streamline wires attached to wiring lugs of usual type. Owing to the fact that there is only one pair of struts on each side, the bracing has been reduced to a minimum, and probably forms a very good compromise between the usual two-bay braced biplane and the cantilever wing, which works out somewhat heavy.

Constructionally, the *ailerons* are similar to the wings, but the manner of balancing them is somewhat unusual. Instead of being hinged on the rear spar, the *ailerons* have a tube running through them at a distance of about ·28 of their

The starting gear consists of a transverse shaft running across the sloping tubes of the engine mounting, and driving the engine shaft *via* chains. The shaft has a handle at each end, so that, if necessary, two men can turn simultaneously. The starting magneto is mounted on the port side, and is driven by a chain from the same transverse shaft. This does away with the old-fashioned way of having the pilot turn the starting magneto while the engineer turns the engine. In order to take up any slack that might develop in the two chains, the transverse shaft is mounted in eccentric bushes held in split collars, so that a slight turn of the proper bushes, according to whether it is the engine chain or that to the starting magneto, tightens up the chains.

A nose radiator is fitted, mounted on the tubular engine bearers by lugs provided with rubber washers to reduce vibration. The water tank is carried on the front wall of the portion of the pilot's cock-pit which projects forward over the aft portion of the engine.

As shown in our sketches the cowl is not in place. This cowl is a very large one, of beaten aluminium, and gives a very smooth entry for the air. At the bottom the cowl has a large inspection door through which the engineers can get at the bottom of the crank case, oil pump, etc. On top, there are two doors, hinged along the centre line, and lifted up as an ordinary car bonnet. Bonnet fasteners similar to those used on cars are employed, so that it is a matter of a few moments only to get at the engine.



THE VICKERS "VULCAN": Details of the starting gear, showing starting magneto, adjustable eccentric bushes, etc.

Petrol System

One of the features of the Vickers "Vulcan" which should be of particular value is the employment of direct gravity feed. Two petrol tanks are mounted on the top plane, some distance out so as to be clear of the propeller slip stream, and the fuel runs through pipes to a T-piece in the pilot's cockpit, whence a single pipe is taken to the carburettor. The tanks rest on the top of the plane, and have large sumps so arranged that no matter whether the machine is flying level, descending or climbing the petrol can be drained out, to the last drop practically. There are two unions on the tank sumps, one for the feed pipe, and the other for a drain cock. Capacity indicators are incorporated in the tanks themselves, and are so placed that they can be read from the pilot's cockpit. Thus the whole system is about as simple as it is possible to get it, and it will be interesting to see what effect the gravity system will have on the number of forced landings. Many of these have, in the past, been due to trouble somewhere in the petrol system, and with the gravity feed all these should be avoided.

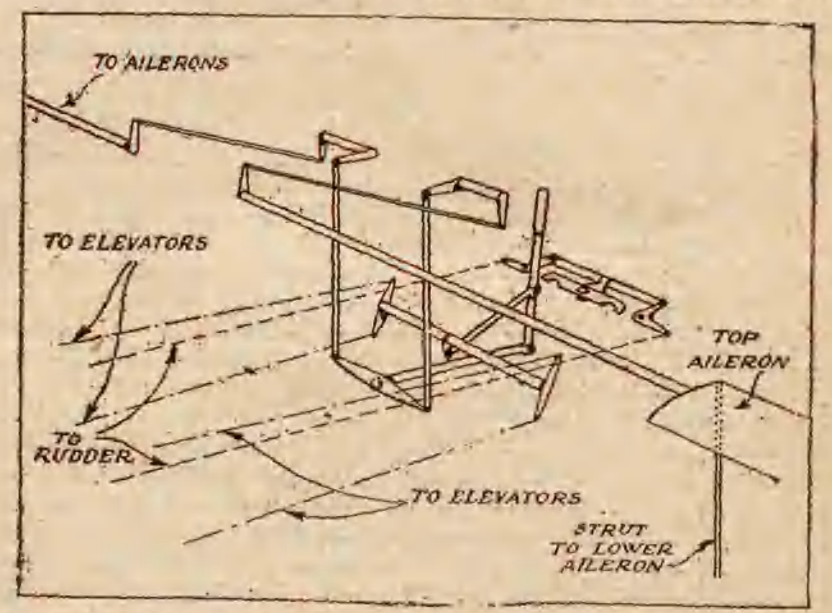
The Undercarriage

After months of experimental work on oleo-pneumatic undercarriages, Messrs. Vickers have evolved a type which actually weighs slightly less (about two pounds per "leg") than the usual type with rubber shock-absorbers. Without going into details, it may be said that the arrangement consists of pumping air into a cylinder and locking it there by means of an oil seal. The shock-absorbing qualities are very good, and bouncing is entirely eliminated. The undercarriage is of simple V-type, with the front "legs" hinged to the *fuselage* and diagonally braced by cable, while the rear legs are telescopic and incorporate the oleo gear. The tail skid is of ash, and is provided with a shoe of manganese steel. This shoe is so hard that it is a matter of some difficulty to drill the holes in it. It should therefore, stand up well to the wear and tear of taxying. It is, however, easily renewable by undoing four bolts.

Controls

The pilot's cockpit, situated in the roof of the *fuselage*, and occupying the front upper corner of the cabin, partly projects over the rear portion of the engine. The view obtained from it is exceptionally good, although, owing to the fact that the pilot's head is practically in line with the propeller tips, this position will probably be somewhat draughty. The engine is placed relatively low, and there is no difficulty in looking over the top of it, even straight ahead. The only feature which might give rise to trouble is the very high position, the pilot's head being approximately 13 ft. above the ground when the machine is horizontal and the wheels on the ground. However, a little experience should familiarise the pilots with this high position, and after that there should be no difficulty. Certainly the view is about as good as it is possible to make it in a single-engined machine. In order to afford some measure of protection to the pilot's head, in case the machine should turn over, there is a tubular stiffener in the fairing behind his head. This stiffener is very strong, and should prevent the fairing from caving in. It will be padded with leather, but, as shown in one of our sketches, this padding has not been put on. It will be noticed that inside the fairing there is a slide with slots in it. This is the entry for the fresh air to the cabin, and it is thought that sufficient will find its way past the pilot's head, where it rests against the stirrup-shaped padded stiffener. On its way to the cabin the air passes through a diffuser box so as to avoid draught.

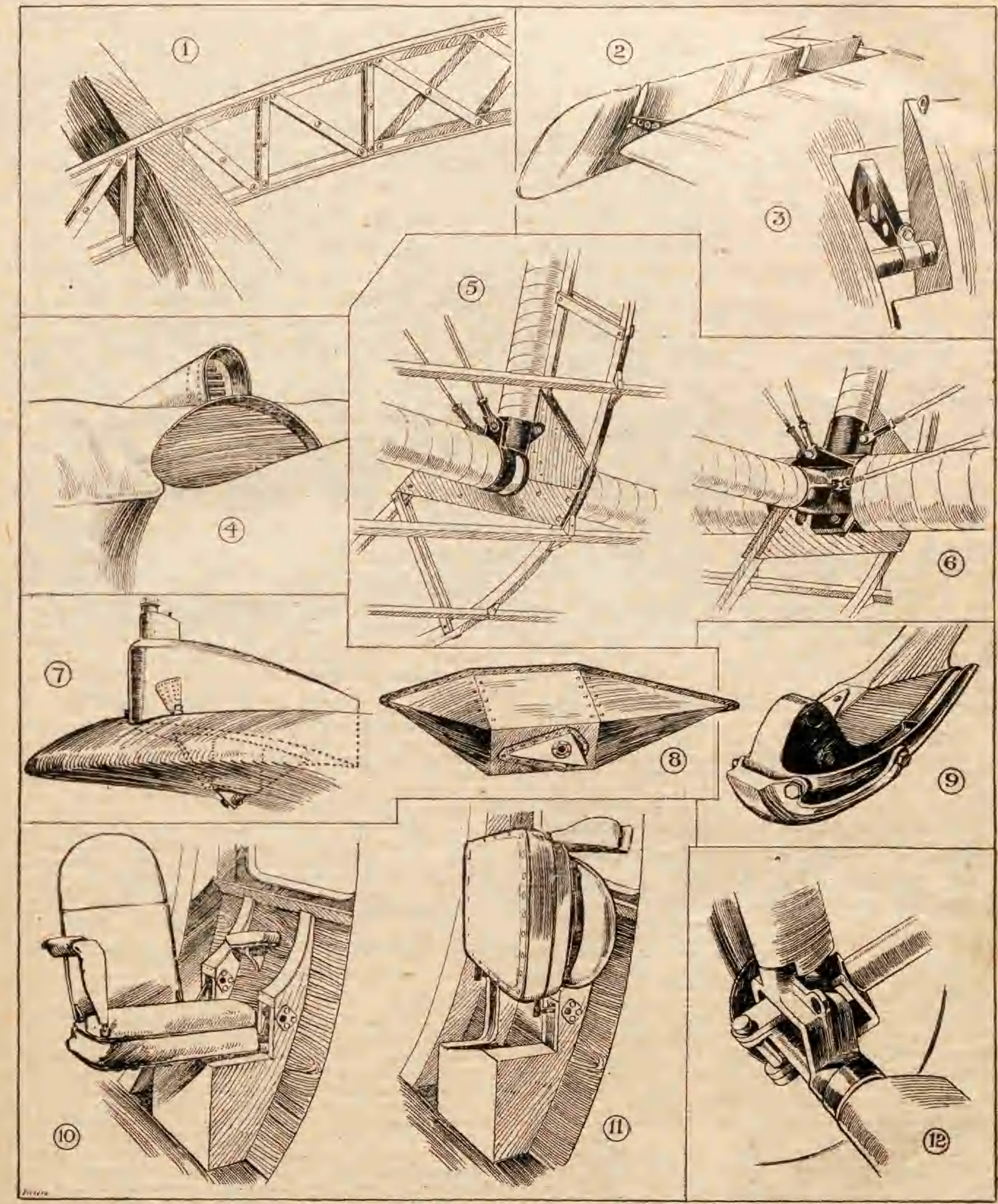
The instrument board is fitted out with all the usual instruments, which are all well in sight and illuminated. The controls are of fairly orthodox arrangement, although certain unusual features are found in one or two places. The "joystick" is mounted on a fork on the front end of a longitudinal rocking shaft carried in bearings under the floor of the cockpit. At its rear end this shaft carries two cranks from which tubes run vertically up to cranks mounted on the inner ends of, and pointing aft from, two transverse tubular shafts resting in the wing roots. These transverse shafts carry on their outer ends cranks pointing downwards, from which tubes run aft and upwards to the cranks on the *aileron* tubes. There are thus no cables, wires or rods anywhere in the *aileron* control system. From the joystick, a tube runs back to a crank on the transverse tubular shaft that carries on its outer ends the elevator cranks. From these latter cables run to the elevators. The rudder bar has a forward projection in its centre engaging with a transverse tube which at each end engages with an elbow crank from whose outer arm cables run to the rudders. The arrangement of the controls will be better understood from a reference to the diagrammatic sketch. The tail is adjustable, but not during flight, and there is an elevator trimming gear similar to that of the "Viking," described and illustrated in FLIGHT of October 6, 1921.



THE VICKERS "VULCAN": Perspective diagram of the control system.

The Cabin

It has already been mentioned that the cabin has seating accommodation for eight passengers. The seats are of a special type designed by Vickers, and when not in use fold



THE VICKERS "VULCAN" : Some constructional details. 1. Lattice rib construction. 2. Balanced aileron. 3. Details of aileron mounting. 4. The fairing behind the pilot's head has a tubular stiffening piece to act as a protection in case the machine turns over. Inside the fairing may be seen the ventilator for the cabin. 5. shows details of the manner of building a light structure on to the main fuselage girder in order to turn it into an elliptical section. 6. One of the fuselage longeron clips. (Note the aluminium packing piece which allows of tightening up the fitting in case of shrinkage of the longeron.) 7. One of the petrol tanks mounted on the top plane. 8 is an underneath view of the sump of the petrol tank. 9 shows the detachable steel shoe on the tail skid. 10 and 11 are views of one of the seats, open and folded. 12. Shows the details of the undercarriage where the struts meet the axle. Note how the bending moment has been kept as small as possible by fitting the struts close to the inner end of the wheel hub.

up against the sides of the cabin. The back rest folds forward on to the seat, and the whole then turns on longitudinal hinges, folding upwards and outwards, as shown in two of our sketches. Should it be desired to use the machine for carrying goods, the seats may be easily removed, each being held in place by two bolts only.

A feature of the cabin is the great amount of head-room, about 8 ft. This results from the *monocoque* construction and the elliptical cross section of the *fuselage*. In front this head-room is somewhat smaller, owing to the projection of the pilot's cockpit into the front part of the cabin. At the rear a smaller portion is cut off by a locker or luggage space in the roof, but there is still plenty of room for even a tall man to stand upright.

In the front wall of the cabin there is a small door on each side, through which the pilot may communicate information to the passengers. Between the two doors is a narrow panel enclosing the two vertical tubes of the *aileron* control. The top of this panel is left open so that the attachment of the tubes to the cranks is always exposed and easily accessible for adjustment. Incidentally, a passenger who knows something about flying may, by watching theses tubes, get an idea of the amount of use being made of the *ailerons*.

Behind the cabin, and separated from it by a transverse bulkhead, is a compartment divided into two. That on the port side is a diminutive lavatory, while on the starboard side is the luggage compartment. The latter is divided into two "stories," the upper of which is reached from the cabin through a door in the rear wall, and evidently meant for "wanted during the journey" luggage. The lower luggage compartment, which has a portion projecting forward under the double seat on the starboard side, is reached through a door in the starboard side of the *fuselage*.

By the time this issue of FLIGHT is distributed, the first of the "Vulcans" should have been in the air on its preliminary tests. It will then, probably, go to Martlesham for type tests, and should be on the London-Paris service (Instone Air Line) in a couple of weeks. The main characteristics of the "Vulcan" are as follows; Engine, Rolls-Royce "Eagle VIII"; length of machine o.a., 37 ft. 6 ins.; height o.a., 14 ft. 3 ins.; span, 49 ft.; chord, 9 ft. 3 ins.; maximum gap, 8 ft.; area of main planes, 840 sq. ft.; wing loading, 7.3 lbs./sq. ft.; power loading, 17 lbs./h.p. weight of machine empty, 3,775 lbs. (pilot, 180 lbs.); 72 gallons of petrol, 510 lbs.; 5 gallons of oil, 45 lbs.; reserve water (2 gallons), 20 lbs.; W/T, 100 lbs.; eight passengers at 160 lbs., 1,280 lbs.; luggage or freight, 240 lbs.; total loaded weight, 6,150 lbs. Maximum speed near ground (estimated) 105 m.p.h. Cruising speed (estimated) 90 m.p.h. Landing speed (estimated) 40 m.p.h. Climb to 6,000 ft. (estimated) 14 mins.

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ROYAL AIR FORCE CADETSHIPS. FORTHCOMING ENTRANCE EXAMINATION

THE Air Ministry announces that an examination for entrance into the Royal Air Force Cadet College, Cranwell, will be held on June 27, 1922, and following days. The number of Cadetships open to competition at this examination will not be less than 20 inclusive of King's Cadets or Honorary King's Cadets, and will include the award of not less than one prize Cadetship.

In addition, one Wakefield Scholarship of the value of £75 per annum is offered for competition among candidates whose parents or guardians are in reduced circumstances, with preference to cases due to the late war.

Candidates must have attained the age of 17½, and not exceeded the age of 19 on July 1, 1922, the only exception being in the case of candidates with previous service prior to January 1, 1920, or service in the Senior Division of the O.T.C. prior to March 1, 1919, in which case the upper limit of age will be 21.

Candidates must apply in writing to the Secretary, Civil Service Commissioners, Burlington Gardens, London, W. 1, for forms of application, and the forms should be completed and returned not later than May 11 next. No application received later than May 25 will be accepted under any circumstances.

The competition will be conducted in accordance with the Regulations for the Royal Air Force (Cadet) College; (Air Publication 121), which may be obtained from His Majesty's Stationery Office, Imperial House, Kingsway, W.C. 2. Price 9*d*.

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ROYAL AERONAUTICAL SOCIETY NOTICES

Lectures.—The following programme of lectures has been arranged for next Session:—

October 5.—Prof. L. Bairstow, Fellow, "The Work of S. P. Langley."

October 19.—Mr. J. D. North, Fellow, "The Metal Construction of Aeroplanes."

November 2.—Major A. R. Low, Fellow, "A Review of Airscrew and Helicopter Theory, with Aeroplane Analogies."

November 16.—Mr. R. McKinnon Wood, Fellow," The Co-relation of Model and Full Scale Work."

December 7.—Prof. C. F. Jenkin, "Fatigue in Metals."

January 4.—(To be announced later).

January 11.—Juvenile Lecture, Mr. R. A. Frazer, "Testing of Model Aeroplanes."

January 18.—(To be announced later).

February 1.—Mr. G. S. Baker, "Ten Years' Testing of Model Seaplanes."

February 15.—Wing-Commander Cave-Browne-Cave, "The Practical Aspects of the Seaplane."

March 1.—Major F. M. Green, "Helicopters."

March 15.—Prof. B. Melvill Jones, "The Control of Aeroplanes at Low Speeds."

Representatives on other bodies.—The following representatives on other bodies have been nominated for the year ending April, 1923:—

Conjoint Board of Scientific Societies.—Lieut.-Col. M. O'Gorman.

Aeronautical Research Committee.—Lieut.-Col. A. Ogilvie.

Advisory Committee on Aeronautical Education.—Prof. C. F. Jenkin.

British Engineering Standards Association Aircraft Committee.—Lieut.-Col. M. O'Gorman.

B.E.S.A. Aircraft Sub-Committee No. 1 (Nomenclature).—Prof. L. Bairstow, Lieut.-Col. M. O'Gorman, Dr. Sutton Pippard, Mr. J. D. North, Major R. V. Southwell, Lieut.-Col. W. Lockwood Marsh.

Civil Aviation Advisory Board.—Lieut.-Col. M. O'Gorman.

International Air Congress, 1923; *Organising Committee.*—Mr. Griffith Brewer, Lieut.-Col. M. O'Gorman, Lieut.-Col. A. Ogilvie, Lieut.-Col. W. Lockwood Marsh (Technical Sec.).

W. LOCKWOOD MARSH,
Secretary

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THE LONDON AERO-MODELS ASSOCIATION

AT the Meeting held on April 27 it was decided that all members must put protectors on their machines. On Thursday, May 4, an important meeting will be held at Headquarters, and members are particularly requested to attend.

Sunday, May 7, R.O.G. Competition on Wimbledon Common (see last week's FLIGHT for full particulars).

On Saturday, May 20, a Smoking Concert will be held at Headquarters at 7.30 p.m., Mr. J. E. Louch most kindly making all arrangements and providing an excellent array of artistes. It is earnestly hoped that members will show their appreciation by attending.

On Sunday last there was a special muster of members on Wanstead Flats to give a flying demonstration. Unfortunately, the wind was of a downward trend, and it was impossible to get models up very high. Mr. Bedford was flying an enclosed model somewhat resembling a Blériot type, getting excellent results from same. Mr. C. Hersom had an enclosed model, the body resembling that of a flying fish. Mr. C. A. Rippon was very prominent with a large spar model. Mr. S. Holton was making excellent progress with a new model. About ten other members were flying models, Mr. Bedford concluding a most enjoyable meeting by demonstrating the flying of his twin pusher hydroplane. Three new members were recruited.

Meetings are held at Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, every Thursday at 7.30 p.m. All interested in model aeronautics are cordially invited.

Hon. Sec., A. E. Jones, 48 Narcissus Road, West Hampstead, N.W. 6.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING

A Meeting of the Committee was held on Wednesday, April 26, 1922, when there were present:—Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., in the Chair, Wing-Commander W. D. Beatty, C.B.E., R.A.F., Maj.-Gen. Sir Sefton Brancker, K.C.B., Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., Lieut.-Col. F. K. McClean, Lieut.-Col. Alec Ogilvie, Lieut.-Col. Mervyn O'Gorman, C.B., and the Secretary.

Election of Chairman.—On the motion of Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., seconded by Lieut.-Col. Alec Ogilvie, Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., was unanimously elected Chairman of the Club for the current year.

On the motion of Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., seconded by Maj. Gen. Sir Sefton Brancker, K.C.B., a unanimous vote of thanks was passed to Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., the retiring Chairman.

Election of Vice-Chairman.—On the motion of Lieut.-Col. Mervyn O'Gorman, C.B., seconded by Maj.-Gen. Sir Sefton Brancker, K.C.B., Lieut.-Col. F. K. McClean was unanimously elected Vice-Chairman of the Club for the current year.

Election of Members.—The following new Members were elected:—

James Rawstron Bracewell.
Harold Chester-Master.
Henry Ronald Godfrey.
Eric Dorrien Kirby.
Charles Edward Lee, J.P.
Sub-Lieut. Alfred James Angus Miller, R.N.
Flight-Cadet Gilbert Edward Nicholetts.
Major John Thorpe Reckitt, R.A.S.C.
Capt. Reginald Herbert Stocken.

Steward of the Club.—The following were elected Stewards of the Club for the current year:—

Brig.-Gen. The Duke of Atholl, K.T., M.V.O., D.S.O.
The Right Hon. Lord Hugh Cecil, M.P.
The Earl of Halsbury.
Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S.
The Lord Kinnaird, K.T., J.P., D.L.
Admiral of the Fleet The Right Hon. Sir Edward Seymour, G.C.B., O.M.

Sub-Committees.—The following Sub-Committees were appointed:—

Sub-Committees, 1922.—Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P. (Chairman), Lieut.-Col. F. K. McClean (Vice-Chairman), Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S. (Members of all Sub-Committees).

Racing Committee.—Maj.-Gen. Sir Sefton Brancker, K.C.B., Lieut.-Col. W. A. Bristow, Lieut.-Col. M. O. Darby, Col. F. Lindsay Lloyd, C.M.G., C.B.E., W. O. Manning, N. C. Neill, Howard T. Wright.

Technical Committee.—Capt. W. G. Aston, Griffith Brewer, Eng.-Commander W. Briggs, R.N., Major R. H. Mayo, Lieut.-Col. A. Ogilvie, C.B.E., Lieut.-Col. Mervyn O'Gorman, C.B., Howard T. Wright.

Joint Standing Committee.—Lieut.-Col. Alec Ogilvie, C.B.E., Rear-Admiral Sir Godfrey M. Paine, K.C.B., M.V.O.

Flying Services Fund Committee.—H.R.H. The Duke of York, K.G., Group-Capt. F. W. Bowhill, C.M.G., D.S.O., Flight-Lieut. L. H. Cockey, Lieut.-Col. Alan Dore, D.S.O., Chester Fox, Wing-Commander T. O. B. Hubbard, M.C., Air-Commodore C. R. Samson, C.M.G., D.S.O.

Finance Committee.—Wing-Commander W. D. Beatty, C.B.E., Ernest C. Bucknall, J. H. Nicholson, Lieut.-Col. Alec Ogilvie, C.B.E.

House Committee.—Major H. Graeme Anderson, Ernest C. Bucknall, Flight-Lieut. L. H. Cockey, Major Herbert J. Corin, D. C. MacLachlan, J. Stewart Mallam, Capt. D. G. Murray, Capt. L. V. Pearkes.

Timekeepers.—The following timekeepers were appointed:—F. T. Bidlake, A. V. Ebblewhite, Major A. H. Loughborough, A. G. Reynolds, Sir Zachariah Wheatley.

BANQUET TO CELEBRATE THE TWENTY-FIRST ANNIVERSARY OF THE FORMATION OF THE CLUB

It was decided to hold a Banquet, probably in June, to celebrate the twenty-first anniversary of the formation of the Club.

The arrangements were left to a Sub-Committee, consisting of Maj.-Gen. Sir W. S. Brancker, K.C.B., Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., Lieut.-Col. F. K. McClean, and Mr. E. C. Bucknall.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN APRIL 23 AND APRIL 29, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying Mails	No. of flights carrying Goods	No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
						h. m.		
Croydon–Paris	46	64	12	30	46	2 32	Breguet F-CMAL (1h. 50m.)	B. (4), Br. (1), D.H. 4 (2), D.H. 18 (2), D.H. 34 (1), G. (5), H.P. (1), Sp. (5).
Paris–Croydon	47	130	7	30	45	2 57	D.H.34 G-EBBS (2h. 15m.)...	B. (3), Br. (1), D.H. 4 (2), D.H 18 (3), D.H. 34 (1), G. (7), H.P (1), Sp. (5).
Croydon–Rotterdam–Amsterdam §	6	1	6	6	6	2 31	—	F. (4).
Amsterdam–Rotterdam–Croydon ‖	7	8	6	6	6	3 34	—	F. (4).
Totals for week ...	106	203	31	72	103		§ 5 to Rotterdam only.	‖ 5 from Rotterdam only.

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E. 5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

SAFETY FUEL TANK: AWARDS

THE Air Ministry announces that the prizes in the Competition for Safety Fuel Tanks for aircraft have been awarded as follows :—

First Prize, £1,400.—The India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd., Silvertown, London, E. 16.

Second Prize, £400.—Imber Anti-Fire Tanks, Ltd., West Road, Tottenham, London, N. 17.

Third Prize, £200.—Comdr. F. L. M. Boothby (R.N. retired), "Overway," Tilford, Surrey.

The Competition was arranged in order to promote the evolution of a reliable type of fuel tank for Service and commercial aircraft, which would reduce the risk of fire, due to crashing or hostile action, to a minimum.

Twenty-six entries were received for the Competition, which was open to the world, and 18 different types of tanks were actually submitted for test.

The judges appointed by the Air Council consider that the Competition has resulted in the achievement of the objects for which it was instituted, and has produced a type of safety fuel tank which, although capable of improvement in several minor respects, is available for immediate introduction on Service and civil aircraft and which, for a slight increase in weight over and above that of the standard Service steel tank, gives almost complete immunity from fire, either in a crash or in action with enemy machines.

All the tanks tested, with a few exceptions, showed marked superiority in almost every respect over the standard Service steel tank now generally in use.

The judges were: Group Capt. E. F. Briggs (Deputy Director of Research), Major B. C. Carter (Directorate of Research), Major J. H. Ledeboer (Directorate of Research), Mr. G. Cockburn (Accidents Investigation Branch), Major J. P. C. Cooper (Accidents Investigation Branch), Mr. H. Grinsted (Royal Aircraft Establishment).

The regulations governing the Competition provided that each entrant had to submit two tanks for preliminary trials and that the three most successful competitors in the first stage should submit four more tanks for final trial.

The principal features of the tanks submitted by the three winning competitors for the preliminary tests are as follows :—

India-Rubber and Gutta-Percha Co., Ltd.

	No. 1.	No. 2.
Weight of tank	78·75 lbs.	81·25 lbs.
Capacity of tank	37·7 galls.	38·2 galls.
Weight per gallon capacity ..	2·08 lbs.	2·15 lbs.
Shape of tank	cubical.	

Each consisted of a welded sheet-steel rectangular tank with no frame or baffles of any sort, but with each side slightly dished inwards, inserted in a detachable rubber case. These tanks were slung in the *fuselage* by means of webbing.

Imber Anti-Fire Tanks, Ltd.

Weight of tank	50 lbs.	51·5 lbs.
Capacity of tank	30 galls.	29·3 galls.
Weight per gallon capacity ..	1·66 lbs.	1·76 lbs.
Shape of tank	elliptical.	—

The tank consisted of a light-gauge tinned-steel shell which was separated from the inside by a framework of aluminium tubing and light-gauge aluminium baffle plates. After assembly the whole of the tank had been covered with india-rubber of a suitable thickness, and all joints vulcanised.

Comdr. Boothby.

Weight of tank	33·23 lbs.	35·75 lbs.
Capacity of tank	56·8 galls.	53·7 galls.
Weight per gallon capacity ..	0·58 lbs.	0·66 lbs.
Shape of tank	cubical.	

The tank consisted of an inner bag of four-ply rubbered fabric capable of containing the petrol with an outer cover of rubbered fabric which was gas-tight. Non-inflammable gas was introduced into the space between the two shells and maintained under slight pressure. A drain pipe was fitted to the outer casing. The tank was fixed to the *fuselage* by rubber shock absorber and stringing and encased in three-ply glued on.

The three competitors qualifying for the final tests were required to submit four tanks of a type fundamentally similar to those entered for the preliminary trials, any minor modifications which it was desired to incorporate being previously submitted for the consideration and approval of the Judges' Committee. Certain modifications, under these conditions, were made to the tanks submitted by each of the three competitors, the details of these modified tanks being as follows :—

India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.

	No. 1.	No. 2.	No. 3.	No. 4.
Weight of tank ..	57 lbs.	54.5 lbs.	57 lbs.	54.5 lbs.
Capacity of tank	29 galls.	29 galls.	29 galls.	28.8 galls.
Weight per gallon capacity ..	1.96 lbs.	1.88 lbs.	1.96 lbs.	1.89 lbs.
Shape of tank ..	cubical.	—	—	—

Imber Anti-Fire Tanks, Ltd.

Weight of tank ..	52.5 lbs.	51.5 lbs.	50.5 lbs.	51.5 lbs.
Capacity of tank	30 galls.	29.7 galls.	29.7 galls.	29.5 galls.
Weight per gallon capacity ..	1.75 lbs.	1.73 lbs.	1.70 lbs.	1.75 lbs.
Shape of tank ..	elliptical.	—	—	—

Comdr. Boothby.

Weight of tank ..	36.5 lbs.	35.5 lbs.	33 lbs.	35.5 lbs.
Capacity of tank	31.5 galls.	31.5 galls.	31.5 galls.	31.5 galls.
Weight per gallon capacity ..	1.16 lbs.	1.13 lbs.	1.05 lbs.	1.13 lbs.
Shape of tank ..	cubical.	—	—	—

The method of testing the tanks in the preliminary trials was as follows :—

Each tank was mounted in a wooden structure similar in construction to the fore part of the ordinary tractor small-type aircraft. The concrete body formed to represent an engine was mounted in front of the tank. The structure containing tank and engine was released down an "I" section girder runway approximately 100 ft. high, so arranged that the body struck the ground at an angle of approximately 45° to the horizontal. It was originally intended to crash the structure on a concrete bed. It was, however, found necessary to modify the conditions, and the bed was covered with a 2 ft. 6 in. depth of sand. The conditions, then, briefly, were those of the typical aircraft crash, the engine partially burying itself, the tanks coming into violent contact with the engine. As, however, the *fuselage* structure at the moment of impact had attained a velocity—allowing for friction and air resistance—of approximately 50 m.p.h., the conditions were more severe than would prevail in a crash from which a human being could hope to escape with his life.

In the final trials the following tests were imposed :—

Two tanks of each type were submitted to acceleration and crashing tests, and the remaining two to firing tests, the acceleration test being arranged to imposed stresses approximately equivalent to four times that due to gravity.

The tanks mounted in the *fuselage* structure were fixed to a pendulum raised to the requisite height and released by a trip gear. A tank of each type submitted to this test was given two swings, and was then placed on one side for 10 to 15 minutes, at the end of which, from outside examination, nothing untoward had occurred.

The crashing tests were carried out in a similar manner to that adopted for the Preliminary tests, with the exception that flints were substituted for sand on the crashing bed.

The tanks submitted to firing test were mounted to their *fuselage* structures and subjected to bursts of five rounds of Vickers machine-gun fire, composed as follows :—one armour piercing, one incendiary, two armour piercing, one incendiary.

A system of judging was adopted whereby each judge was enabled to record an independent opinion on a common basis. For the preliminary tests this system was on the following basis :—

As regards weight, the basis of 100 marks was taken as representing a tank which, complete with fittings, conformed to the specified weight of 1.75 lbs. per gallon capacity.

For each variation of a decimal-point of this weight-capacity ratio, six marks were added or deducted from the 100 marks.

In addition, as a means of correction in the case of tanks whose capacity was outside stipulated limits, the following formula was adopted: $\frac{\text{Marks} \times \text{Required capacity}}{\text{Actual capacity.}}$

Tanks received marks for the attributes in the following proportion :—

(*a*) Crash-proof qualities, 100 marks maximum; (*b*) remaining attributes, 100 marks maximum.

(*b*) was divided up as follows :—

Durability under Service conditions in the absence of accidents	25 marks.
Indifference to extremes of temperature.. ..	25 ,,
Adaptability of design to large capacities ..	10 ,,
Simplicity of construction	10 ,,
Adaptability of design to various shapes ..	10 ,,
Accessibility of fittings	10 ,,
Cost of production	10 ,,

In awarding marks for the various attributes stated above, the ordinary mild-steel Service tank was taken as a standard.

This resulted in the following competitors being placed in the order named at the end of the Preliminary Tests :—1st, Comdr. F. L. M. Boothby; 2nd, Messrs. Imber Anti-Fire Tanks, Ltd.; 3rd, India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.

In the final tests the marking was made on the following basis :—

100 marks maximum for each crash test, 100 marks maximum for each firing test and 100 marks maximum for remaining attributes—a total of 500 marks.

THE FRENCH 2,000,000 FRANCS ENGINE COMPETITION

Extracts from the Regulations

It is now several months since the announcement was first made of the intention of the French Committee for Aeronautical Propaganda to offer a prize of 1,000,000 francs for the "best" aero engine. Not long after this announcement it was stated that the French Under-Secretary of State for Air had decided to add another million francs in the form of two prizes of 300,000 francs each, the remaining 400,000 francs to be devoted to defraying the expenses of the competition. The regulations governing the competition have now been published, and below we give a *résumé* of some of the more important rules and regulations. For full particulars application should be made to *la Commission d'Aviation de l'Aero-Club de France*, 35, *Rue François—I^{er}, Paris.*

The competition will have for its object to encourage the production of an aero engine of "*grande endurance.*" The allocation of the prizes will be as follows:—Two prizes of 300,000 francs each, offered by the Under-Secretary of State for Air, to be awarded according to the national classification (which will be dealt with later). These two prizes are reserved for engines of French design and manufacture. The million francs prize offered by the Committee for Aeronautical Propaganda is to be devoted to purchasing, for the benefit of the French Government, the manufacturing rights of the engine classed first in the competition. This prize is open to the world, the only exception being ex-enemy countries. This engine is to be sold to the French Government for the relatively modest sum of one franc. Competitors will not be permitted to enter more than one engine of any type, nor several engines which are similar except for certain minor parts which, in the opinion of the judges, are accessories only. It will, however, be permissible to enter several engines of *different* types.

Entries must be sent in before December 1, 1922 (to *la Commission d'Aviation de l'Aero-Club de France*), each accompanied by an entrance fee of 20,000 francs in the case of French competitors and 10,000 francs in the case of foreign engines. By paying double fees, competitors may defer entries until December 1, 1923. In the case of foreign competitors the late entrance fee remains at 10,000 francs. Half of the entrance fees will be returned to competitors whose engines have passed the elimination tests. In the case of foreign competitors the entrance fee of 10,000 francs will be refunded to those who withdraw from the tests before March 1, 1924, the opening date of the competition.

Foreign competitors will be required to send in with their entries a written declaration to the effect that, in the event of their engine being classed first, they will hand it over, in running order, to the Committee for Aeronautical Propaganda on receipt of the amount of the prize. The delivery of the winning engine is to include a full set of working drawings, specification of the materials used and their heat treatment. The declaration specifies also that the French Government, or any company approved by the French Government, shall have the right to purchase for France, her colonies and protectorates, manufacturing rights (exclusive) with the following royalties: 8,000 francs per engine for the first 100, 7,000 francs per engine for the next 100 and 6,000 francs per engine for the third 100, and so on, decreasing by 1,000 francs per engine until the 601st engine, from which onwards there will be a fixed royalty of 2,000 francs per engine. If, after a period of two years, the total number of engines manufactured under licence does not amount to at least 200, the competitor has the right to cancel the agreement.

Each engine, in running order, must be delivered at the place where the competition is to be held (to be announced later) before March 1, 1924. It must be delivered in a sealed packing case, and competitors will not be allowed to remove engines from packing cases until just before mounting them on the test bench for acceptance tests.

The judges will number 10, half of whom will be nominated by the Under-Secretary and the other half by the Propaganda Committee. The judges' committee will be presided over by the Commission d'Aviation de l'Aero-Club de France, who will be in charge of the organisation of the competition.

The Tests

Engines entered for the competition must be of the internal combustion type, and their nominal power is to be between 350 and 450 h.p. The weight for this power must not exceed 3.3 kg. (7.26 lbs.) per horse-power. This figure includes the engine and fuel and oil for five hours' flight, but not the weight of fuel and oil tanks. The speed of rotation of the airscrew must be less than $\frac{32{,}000}{\sqrt{\text{h.p.}}}$ r.p.m.

All engines are to be fitted with self-starters so as to avoid propeller swinging and hand starting, and this starter is to be used throughout the tests. By nominal horse-power will be understood the power which can be maintained by the engine at ground level for half an hour at a speed of $\frac{32{,}000}{\sqrt{\text{h.p.}}}$ r.p.m.

Engines will be required to undergo acceptance and eliminating trials, including a five hours' run on the test bench, driving the airscrew type of air brake which will be used in the endurance test, and a two hours' flying test in a machine provided by the competitor. During this test the machine must remain at an altitude of 2,000 metres for at least one hour.

The Endurance Test

The engines which pass the eliminating trials will then be subjected to an endurance test of 240 hours' running in 30 periods of eight hours each. It is stipulated that the period for completing the endurance tests must not exceed 100 days. For the first half-hour of each eight-hour period the engine will be run at the number of revolutions corresponding to its normal power, and for the remaining seven and a half hours it will be throttled down to such power as the competitor considers it will maintain during the test. At the end of each eight-hour run competitors will have access to their engines for one hour. The mean power developed during the seven and a half hours' run will be referred to the power corresponding to a temperature of 15° C. and a pressure of 760 mm., assuming that the power increases in proportion to the pressure, and to the ratio $\frac{515}{500}\,t$ in which t is the temperature in degrees Centigrade. The referred mean power thus found will determine the normal power of the engine during the tests, and should be equal to nine-tenths of the nominal power at least.

Marks will be awarded for certain features, which will be referred to later, and penalties will be imposed for delays, stops and replacements of parts. For a delay in starting each eight-hour run, if less than 15 minutes, a penalty of four points will be imposed; from 15 to 60 minutes' delay, eight points. A delay of more than one hour will result in the cancellation of the test. A stoppage during a test will be penalised by ten points, and further penalties will be imposed according to duration of stoppage, as follows: Less than 15 minutes, four points; 15 minutes to one hour, eight points. If the stop exceeds one hour the test will be cancelled.

The replacement of parts is mulcted according to the character of the part replaced. Thus the renewal of a sparking plug is penalised by four points; of a separate part or joint the replacement or repair of which can be carried out in one hour, and which leaves the engine in a state fit for further runs without tuning up, 10 points; of a part or joint which can be replaced or repaired in more than one hour, and which does not interfere with further running, 20 points.

For the renewal or replacement of a part or joint such that the engine cannot resume its series of eight-hour runs until it has been tuned up or a preliminary run made, 50 points will be put against an engine. The renewal of such parts as magneto, carburettor, ignition distributor, distributor or motor of self-starter, fuel or water pumps, etc., will be penalised by 75 points; while the replacement of such units as oil pump, complete cylinder, bank or group of cylinders, connecting rod complete with bushes, reduction gear, crankshaft or camshaft, crank-case, etc., will be penalised by 100 points. These penalties will also apply to replacements and repairs carried out during the hour preceding and that following an eight-hour run.

For parts or units replaced or repaired more than once the penalties will have a cumulative effect, the points given above being multiplied by the number of times the part or unit has been repaired or replaced. This does not, however, apply to sparking-plugs or valves, for which each fresh replacement will only be penalised at the unit rate—4 for the plugs and 10 or 20, according to whether the replacement takes less or more than one hour, for the valves.

It should be added that the cancellation of an eight-hour run will be penalised by 100 points, and that the cancellation of the endurance test altogether will follow as a result of: 10 eight-hour tests having been cancelled; of a number of replacements of those parts which were penalised by 100 points, as stated above, equalling or exceeding half the number of these components in each engine; of an interval of more than 30 days between two eight-hour runs; of the duration of the endurance tests exceeding 100 days. An engine which has been withdrawn from the endurance tests for any of these reasons will be permitted another attempt, but will be penalised 500 points for so doing. The time limit for the second attempt will be 80 days, and not 100 days.

The fuel efficiency of an engine will be determined according to a formula, and five marks will be awarded for each gramme of petrol consumed per horse-power less than the 3 kg. allowed, while a penalty of five points per gramme more than the 3 kg. will be imposed. The use of a fuel with a flash-point above 35° C. will be awarded by 1,000 marks.

Penalties will be imposed for head resistance. The area of the convex contour into which the engine will fit, measured in square decimetres, will be taken (at right angles to the propeller axis), and the figure thus obtained will be multiplied by $\frac{400.}{\text{h.p.}}$ The result will determine the penalty.

The classification of the engines will be based upon the sum of all penalties incurred, less any marks awarded for low weight per horse-power, with five hours' fuel and oil.

The two prizes of 300,000 francs each, reserved for French engines, will be awarded as follows: One for the engine which shows up best in the summing-up of penalties and awards, and one for the engine which is adjudged best from the point of view of low weight and low air resistance.

LONDON TERMINAL AERODROME

London, Monday evening, May 1.

New machines are now arriving at the air-station to augment the fleets of the various British companies in anticipation of the rush of summer traffic. On Friday, the second of the D.H.34's for the Instone Air Line arrived. This has the registration number G—EBBT, and conforms to the usual high standard of De Havilland finish. The first of the Instone D.H.34's is, by the way, still at Stag Lane undergoing modification.

On Saturday, the third of the Daimler Airway "34's" arrived. Mr. Herne, who piloted it over from Stag Lane, says that this machine cruises comfortably at 110 mile an hour, and is quite nice to handle. Each of these new "expressos" seems, in fact, to be a slight improvement on the last. Small folding tables are provided in front of each seat, so that the uniformed Daimler stewards can serve light refreshments during the air journey.

The Daimler Airways are now operating daily in each direction between London and Paris. This company have provided a complete installation for the rapid handling of engine repairs, and also for the changing of engines. This plant is, in fact, the first real attempt to keep machines constantly in the air, and to put into practice the theory that instead of ringing the changes on machines, the most practical way is to change engines.

A Scheme with Far-reaching Possibilities

This engine-changing idea, if successful, will, it is hoped, put a completely new aspect on the question of long-distance airways, the same machine with its cargo undisturbed running for thousands of miles with a change of engines at various stages along the route, in a similar manner to railway practice on long distance journeys.

The plant has been erected in the temporary hangars, and is certainly the most costly piece of apparatus yet installed by any of the air-lines. A large four-legged derrick has been erected in the middle of the far end of one of the hangars in such a way that the nose of the machine can be run right under it, and have the engine lifted out by the derrick crane. The engine is then lowered to a truck which runs on a rail-track out of the hangar into the engine repair shop, the track continuing into the shed where the dynamometer for testing the engines has been erected. This means that the engine, after overhaul, can be tested before being placed in the machine, and then run straight to the derrick to be lifted into its place in the nose of one of the "34's."

Meanwhile, while the engine is being repaired, a spare engine is run under the derrick and lifted into place in the machine. The whole operation of changing the engine on a D.H.34, the engine installation of which was, of course, designed with this object in view, will, it is claimed, be completed in an almost incredibly short period of time.

Instance of the Value of "Keep to the Right"

The new regulations that the pilots' committee have recommended have now been put into operation tentatively, and in "dud" weather, pilots are sticking to the routes mapped out and keeping to the right of them. As an example of this, Mr. MacIntosh, while flying from Paris to London on Friday, in weather which was alternately good and bad owing to storms, passed no fewer than five "air expresses," British and foreign, travelling in the opposite direction, and all hugging the right of the scheduled routes.

While at times there have been more passengers than has been possible to accommodate, bookings have not, on the whole, been coming along as well as could be expected. In fact, it is doubtful if, on the month, the number of passengers carried has been up to last year's total for April. The French companies are the chief sufferers, and are attempting to build up their goods' services. There is going to be fierce competition this summer, when all the new flying stock is put on the services, and an intensive working of the various "air expresses" commences. Even the most optimistic estimates of passengers to be expected this season will fall far short of anything approaching full loads for every machine scheduled.

The Grands Express have had a consignment of 3½ tons of steel plates to carry by air from London to Paris, and are putting about half-a-ton on each of their outward-bound Goliaths. Another large consignment, obtained by the Grands Express, consisted of bales of knitting wool.

The Schoolboys' Paris-London "Joy-Ride"

Nineteen boys from the New College, Harrogate, who have been spending their Easter vacation in an organised tour of the continent, flew from Paris to London on Tuesday last. The first ten arrived in a Handley-Page 0—400, piloted by Mr. MacIntosh, and had a long journey owing to the strong headwind. They were, however, delighted with the trip, and said it was all too short. The remaining nine travelled over in two D.H.18's, of the Instone Air Line.

The new Dutch pilots on the K.L.M. Amsterdam-London service have been piloting the monoplanes this week, and have managed to maintain the regularity of this service. The wind has been favourable for quick trips from London to Amsterdam practically throughout the week, and at the same time, has not made the return journey too long. In the cargo of one of these machines, en route for Holland, were several pairs of boxing-gloves, while there is a regular consignment of margarine from Holland.

A Petrol Tankage of 27,000 Gallons

The Shell-Mex people are putting in another two tanks, each with a capacity of 3,000 gallons, and erecting two more filling pumps. This addition will bring the total petrol storage on the aerodrome up to 27,000 gallons, while there will be eleven filling points. Six of these filling points are to be worked from a central pumping station, where an electric motor will work the pumps. This motor can be started and stopped from any one of the filling points.

Mr. MacIntosh had an exciting experience while approaching the air-station from Paris on the Napier-Bristol on Friday. Part of the engine cowling came loose and was flapping in the wind, and Mr. MacIntosh had to indulge in all sorts of gyrations in order to keep it reasonably close to the side of the machine. He had, in fact, great difficulty in landing.

1,000 Miles in a Day on Paris "Airway"

To-day (Monday), the Daimler Airways are inaugurating their early morning service and apparently intend to commence their two journeys a day with each machine. Capt. Herne left on one of the D.H.34's at 6.55 a.m. and was back at the Air Station at 11.54 a.m. After lunch, he left at 12.45 p.m. on his second journey with the same machine, and arrived back at 5.40 p.m., having flown approximately 1,000 miles in the day, and having been actually piloting for 8 hours 52 minutes.

The Grands Express have altered the time of the departure of their service from London from 11.30 a.m. to 2 p.m. The time of the service from Paris remains unaltered.

Capt. Muir, of the Surrey Flying Services, tells me that his firm have now arranged with Basil Foster, Ltd., to rent an office in that company's building, but that Basil Foster, Ltd., will still act as booking agents for the Flying Services.

Mr. Uwins was at the aerodrome over the week-end to test the Bristol ten-seater, which Handley-Page pilots have, apparently, had some trouble in getting "unstuck" when carrying full load. Mr. Uwins, however, took the machine off in 175 yards with full petrol, 9 passengers, and a mechanic, in addition to 350 pounds of goods. All new types of machines require practice before they can be got off with ease with full load, but after a little experience, the airway pilots have no difficulty in taking the load specified by the makers.

The Royal Aero Club Avros have been in great demand this week, and two of them went to Henley on Sunday, returning to Croydon after dark, and landing with the aid of the night-lighting equipment.

THE ROYAL AIR FORCE

London Gazette, April 21, 1922

General Duties Branch.

Flight-Lieut. A. H. Wann is placed on half-pay, Scale A; April 13.

London Gazette, April 25, 1922

General Duties Branch

The following are restored to full pay from half pay: Flight-Lieut. H. G. Bowen; April 17. Flying Officer E. Burton; April 1.

Wing Commander G. T. Brierley, C.M.G., D.S.O. (Lieut.-Col. R. A.), relinquishes his temp. commn. on return to Army duty; April 1. The short service commission of Pilot Officer A. T. Chapman is terminated on cessation of duty; April 26. Flight-Lieut. E. M. Pizey relinquishes his short service commission on account of ill-health contracted in the Service, and is permitted to retain the rank of Capt.; April 25.

Stores Branch

F. M. Gingold is granted a short service commission for three years on the active list as a Flying Officer, with effect from, and with seniority of, April 1. Flying Officer A. H. Scaife is granted a permanent commission, in the rank stated, with effect from September 12, 1919, and is transferred to the Stores Branch for Accountant duties, with effect from November 1, 1921 (*Gazette* September 12, 1919, appointing him to a short service commission, is cancelled). R. W. L. Glenn is granted a permanent commission as a Pilot Officer for Accountant duties; April 14, 1921 (substituted for *Gazette*, May 3, 1921).

The following are granted short service commissions, in the ranks stated, for Accountant duties, with effect from the dates indicated (substituted for *Gazettes* of dates indicated in brackets):—

Flight-Lieut.—E. W. Gregory, April 11, 1921 (May 3, 1921).

Flying Officers.—F. W. Arthurton, March 5, 1921, (March 15, 1921); J. R., Bond, March 5, 1921 (March 15, 1921); R. C. Clayton, May 9, 1921 (May 31, 1921); W. W. Deane, April 11, 1921 (May 3, 1921); J. F. R. Eales, White May 10, 1921 (May 31, 1921); S. C. Gibbs, April, 11, 1921 (May 3, 1921) O. K. Griffin, March 5, 1921 (March 15, 1921); A. B. Holt, January 15, 1921 (February 4, 1921); E. W. Horncastle, April 11, 1921 (May 3, 1921); E.V. Humphrey, January 15, 1921 (February 4, 1921); E. C. M. Knott, January 15, 1921 (February 4, 1921); L. de L. Leder, April 11, 1921 (May 3, 1921); K. R. Money, O.B.E., April 11, 1921 (May 3, 1921); A. L. Palmer, April 11, 1921 (May 3, 1921); C. G. Prior, March 5, 1921 (March 15, 1921); R. D. Robbins, April 11, 1921 (May 3, 1921); C. W. Rogers, March 5, 1921 (March 15, 1921); R. E. Steggall, M.B.E., March 5, 1921 (March 22, 1921); E. J. Stokoe, May 9, 1921 (May 31, 1921); A. D. Stonehouse, January 15, 1921 (February 4, 1921); C. E. Treadgold, January 15, 1921 (February 4, 1921); W. A. Wadley, March 5, 1921 (March 15, 1921); F. H. Wakeford, March 5, 1921 (March 15, 1921).

Pilot Officers (since promoted).—B. L. Blofeld, April 11, 1921 (May 3, 1921); J. W. Gray, January 15, 1921 (February 4, 1921); F. O. Hall, January 15, 1921 (February 4, 1921); H. A. Murton, April 11, 1921 (May 3, 1921); B. C. Powell, January 15, 1921 (February 4, 1921).

The following Pilot Officers on probation are confirmed in rank and promoted Flying Officers (December 22, 1921):—M. H. Luker, C. W. Price, A. C. Pritchard, D. J. Sherlock; Pilot Officer B. L. Bloefeld to be Flying Officer; December 22, 1921.

The following are confirmed in rank; December 22, 1921.

Flight Lieuts.—W. H. Hoile, M.B.E., R. D. Ward-James, I. L. Wincer.

Flyng Officers.—J. L. Armstrong, S. H. Atherley, J. C. Brice, H. W. Capener, J. H. B. Carson, P. D. Chisholm-Taylor, J. C. Christian, M.C., R. G. Dyer, E. K.Greenhow, M.C., D. C. Gribble, W. J. Heneghan, G. W. Lynn, J. J. T. Rose, F. J. S. Short, F. L. Wood.

The seniority of officers granted commissions in the Stores Branch for Accountant dutes is provisional only. The final seniority of all such officers will be promulgated when the establishment is completed.

The short service commission of Flying Officer E. G. Jolliffe is terminated on cessation of duty; April 7.

Medical Service

Flying Officer J. A. Perdrau, M.D., to be Flight-Lieut.; April 1. Flight-Lieut. H. C. E. Quin, D.P.H., relinquishes his temp. commission, and is permitted to retain rank of Capt.; April 8.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Group Captains.—C. S. Burnett, C.B.E., D.S.O., from No. 29 Group Headquarters (Coastal Area) to command R.A.F. Base, Leuchars (Coastal Area) on disbandment of No. 29 Group Headquarters. 1.4.22. E. F. Briggs, D.S.O., O.B.E., from Air Ministry (Director General of Supply and Research) to R.A.F. Depôt (Inland Area) (Supernumerary). Pending embarkation overseas. 22.5.22. R. Gordon, C.B., C.M.G., D.S.O., from Headquarters, R.A.F., Middle East, to command R.A.F., Trans-Jordania Headquarters. 1.4.22. N. J. Roche, O.B.E., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Iraq, as Principal Medical Officer. 13.4.22.

Wing Commanders.—H. M. Cave-Browne-Cave, D.S.O., D.F.C., from No. 1 School of Technical Training (Boys) (Halton) to Air Ministry (Director General of Supply and Research). For Technical Staff duties *vice* Group Captain E. F. Briggs, D.S.O., O.B.E. 22.5.22. H. A. Williamson, C.M.G., A.F.C., from R.A.F. Depôt (Inland Area) to Half-pay List. 3.4.22. R. G. D. Small, from Half-pay List to R.A.F. Depôt (Inland Area). 14.3.22. And to No. 10 Group Headquarters (Coastal Area). 1.5.22. S. Grant-Dalton, D.S.O., A.F.C., from No. 29 Group Headquarters (Coastal Area) to R.A.F. Base, Leuchars (Coastal Area) (Supernumerary). 1.4.22. And to Air Ministry (Director of Personnel). 1.5.22. R. H. Verney, O.B.E., from Boys' Wing, Cranwell, to No. 1 School of Technical Training (Boys) (Halton). 1.5.22. H. R. Nicholl, O.B.E., from Headquarters (Inland Area) to No. 7 Group Headquarters (Inland Area). 10.4.22. A. T. Whitelock from R.A.F. Depôt (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). 1.5.22. W. L. Welsh, D.S.C., A.F.C., from R.A.F. Depôt (Inland Area) to No. 1 Group Headquarters (Inland Area). 1.6.22. H. L. Reilly, D.S.O., from School of Technical Training (Men) (Inland Area) to No. 7 Group Headquarters (Inland Area). 15.4.22. D. L. Allen, A.F.C., from No. 8 Squadron (Iraq Group) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.2.22. T. O'Brien Hubbard, M.C., A.F.C., from No. 4 Flying Training School (Middle East) to R.A.F., Trans-Jordania Headquarters (Middle East). 10.4.22. M. G. Christie, C.M.G., D.S.O., M.C., from Air Ministry (Director of Operations and Intelligence) to British Embassy, Washington, as Air Attaché. 15.4.22. G. I. Carmichael, D.S.O., A.F.C., from Palestine Group Headquarters (Middle East), to Command Palestine Wing Headquarters (Middle East). 1.4.22.

Squadron Leaders—E. L. Conran, M.C., from Half-pay List to No. 7 Group Headquarters (Inland Area). 13.4.22. A. B. Gaskell, D.S.C., from No. 29 Group Headquarters (Coastal Area) to R.A.F. Base, Leuchars (Coastal Area) (Supernumerary). 1.4.22. N. M. Martin, C.B.E., from No. 29 Group Headquarters (Coastal Area) to Care and Maintenance Party, Donibristle (Coastal Area) (Supernumerary). 1.4.22. L. D. D. McKean, from No. 203 Squadron (Coastal Area) to R.A.F. Base, Gosport (Development Flight) (Coastal Area). 25.4.22. W. B. Cushion from No. 29 Group Headquarters (Coastal Area) to Care and Maintenance Party, Donibristle (Coastal Area) (Supernumerary). 1.4.22. E. J. Sayer, M.C., from Headquarters, R.A.F., India, to R.A.F. Depôt (Inland Area) (Supernumerary). 11.3.22. E. J. Sayer, M.C., from R.A.F. Depôt (Inland Area) to command the Packing Depôt (Inland Area). 8.5.22. W. R. Read, M.C., D.F.C., A.F.C., from R.A.F. Depôt (Inland Area) to R.A.F. Cadet College (Flying Wing), (Cranwell). 24.4.22. Hon. L. J. E. Twisleton-Wykeham-Fiennes, from Palestine Group Headquarters (Middle East), to Palestine Wing Headquarters (Middle East). 1.4.22. W. Thomas, M.C., from Central Flying School (Inland Area), to Boys' Wing (Cranwell). 28.4.22.

Flight Lieutenants.—(A. Sqr. Ldr.) F.C. Kempson, M.B., B.A., from No. 29 Group Headquarters (Coastal Area) to Care and Maintenance Party, Donibristle (Coastal Area) (Supernumerary). 1.4.22. A. N. Gallehawk, A.F.C., from No. 203 Squadron (Coastal Area) to R.A.F. Base, Leuchars (Coastal Area). 1.4.22. H. O. Barnaby, M.B.E., from No. 29 Group Headquarters (Coastal Area) to Care and Maintenance Party, Donibristle (Coastal Area) (Supernumerary). 1.4.22. S. E. Toomer, D.F.C., from Inspector of Recruiting) (Birmingham) (Coastal Area) to No. 4 Squadron (Inland Area). 19.4.22. J. S. Goggin, from No. 29 Group Headquarters (Coastal Area) to R.A.F. Base, Leuchars (Supernumerary). 1.4.22. W. Sutherland, M.B.E., from No. 29 Group Headquarters (Coastal Area) to Care and Maintenance Party, Donibristle (Coastal Area) (Supernumerary). 1.4.22. T. Hinshelwood, D.S.C., D.F.C., from No. 1 Squadron (Iraq Group) to R.A.F. Depôt (Inland Area) (Supernumerary). 25.2.22. W. H. L. O'Neill, M.C., from No. 5 Squadron (India) to R.A.F. Depôt (Inland Area) (Supernumerary). 9.3.22. R. A. Young from Aircraft Depôt (India) to R.A.F. Depôt (Inland Area) (Supernumerary). 9.3.22. L. F. P. Bawn, from No. 1 Group Headquarters (Inland Area) to Inland Area Aircraft Depôt (Inland Area). 1.5.22. P. B. Hunter from Aircraft Depôt, Egypt (Middle East Area) to No. 208 Squadron (Middle East Area). 18.3.22. M. H. Butler, D.F.C., from Inland Area Aircraft Depôt (Inland Area) to No. 11 Wing Headquarters (Inland Area) (Supernumerary). 13.4.22. N. R. Fuller, from Aircraft Park (India) to R.A.F. Depôt (Inland Area) (Supernumerary). 11.3.22. J. C. T. Fiddes, M.B., from R.A.F. Depôt (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). 10.4.22. R. H. Wace, from Research Laboratory and Medical Officers School of Instruction (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). 10.4.22. T. C. Thomson, from School of Photography (Inland Area) to Central Flying School (Inland Area) (Supernumerary). 18.4.22. A. H. Wann, from Headquarters, Coastal Area, to Half-pay List. 13.4.22. A. L. Lingard, from Aircraft Depôt, Egypt (Middle East Area) to R.A.F. Depôt (Inland Area) (Supernumerary). 30.3.22. D. Le Bas, from R.A.F. Depôt (Inland Area) to Central Flying School (Inland Area). 10.4.22. A. J. M. Ross, M.B.E., from No. 4 Flying Training School (Middle East) to Stores Depôt. Egypt. 10.4.22. A. C. Collier, from Inter-Allied Aeronautical Commission of Control (Hungary), to R.A.F. Depôt (Inland Area), (Supernumerary) on disbandment of I.A.A.C. of Control (Hungary). 21.4.22. R. Graham, D.S.O., D.S.C., D.F.C., from No. 60 Squadron (India) to Staff College, Quetta. 20.2.22. J. C. M. Hay, from Aeroplane Experimental Establishment (Coastal Area) to No. 216 Squadron (Middle East). 11.4.22. J. L. Vachell, M.C., from No. 27 Squadron (India) to Staff College, Quetta. 20.2.22. C. H. Awcock, O.B.E., from R.A.F. Depôt (Inland Area) to Electrical and Wireless School (Inland Area), (Supernumerary). 24.4.22. K. B. Lloyd, A. F. C., from No. 70 Squadron (Iraq Group) to Headquarters, Middle East Area (Supernumerary). 1.3.22. W. B. Higgins, to R.A.F. Depôt (Inland Area), (Supernumerary) on appointment to Short Service Commission for duty with Armoured Car Company (on formation). 18.4.22. W. J. King, D.C.M., from No. 1 Stores Depôt to Aircraft Park (India). 6.4.22. H. G. Bowen, from Half-pay List to R.A.F. Depôt (Inland Area), (Supernumerary). 17.4.22. H. O. Barnaby, M.B.E., from Care and Maintenance Party, Donibristle (Coastal Area) to R.A.F. Depôt (Inland Area, (Supernumerary). 15.5.22. C. Shoppee, D.S.C., from No. 10 Group, Headquarters (Coastal Area), to School of Naval Co-operation and Aerial Navigation (Coastal Area). (Supernumerary). 4.5.22. A. J. Nightingale, from Care and Maintenance Party, Donibristle (Coastal Area) to No. 10 Group, Headquarters (Coastal Area). 1.5.22. V. J. B. Jacobs, from Headquarters (Coastal Area) to Air Ministry (Directorate of Equipment). 15.6.22. A. H. Comfort, from Air Ministry (Directorate of Equipment) to R.A.F. Depôt (Inland Area), (Supernumerary). 15.6.22. A. B. Wiggin, from No. 1 Stores Depôt, to Air Ministry (Directorate of Equipment). 15.6.22. N. Keeble, D.S.C., D.F.C., from No. 6 Flying Training School (Inland Area), to School of Technical Training (Men), (Inland Area), (Supernumerary). 1.4.22. (*Note.*—Previous notice posting this officer to R.AF.. Depôt (Inland Area) on the same date is cancelled.) J. R. Howett, from No. 207 Squadron (Inland Area), to R.A.F. Depôt (Inland Area) (Supernumerary). 1.5.22. C. E. W. Lockyer, from R.A.F. Depôt (Inland Area), to No. 207 Squadron (Inland Area). 26.4.22. J. H. Simpson, from Palestine Group Headquarters (Middle East), to Palestine Wing Headquarters (Middle East) (Supernumerary). 1.4.22. K. H. Riversdale-Elliot, from Palestine Group Headquarters (Middle East), to Palestine Wing Headquarters (Middle East). (Supernumerary). Pending posting to No. 208 Squadron. 1.4.22. A. S. C. Maclaren, O.B.E., M.C., A.F.C., from No. 208 Squadron (Middle East), to command Aden Flight (Middle East). 1.4.22. S. N. Cole, from Palestine Group Headquarters (Middle East), to Palestine Wing Headquarters (Middle East) (Supernumerary). Pending embarkation to Iraq. 1.4.22. V. R. Gibbs, D.S.C., from Palestine Group Headquarters (Middle East), to Palestine Wing Headquarters (Middle East). 1.4.22. Wm. Burkinshaw, from Palestine Group Headquarters (Middle East), to Palestine Wing Headquarters (Middle East). 1.4.22.

IN PARLIAMENT

Civil Aviation

MR. L'ESTRANGE MALONE, on April 27, asked the Secretary of State for Air whether he can make a statement in regard to the appointment of a Controller-General for civil aviation?

Capt. Guest: When introducing the Air Estimates on March 21, I said that it was my intention to re-organise the Department of Civil Aviation as a directorate. I am afraid I am not yet in a position to announce the name of the new Director.

Mr. Malone: Is the right hon. and gallant gentleman aware of the strong feeling, both in this country and the House, that enough is not being done for civil aviation; and can he say whether a day will be given for the discussion of this important matter?

Capt. Guest: That rests in the hands of the House.

Commander Bellairs: When the proposed re-organisation takes place, will care be taken that civil aviation is not made subordinate to the military aviation side?

Capt. Guest: Most certainly.

Mr. Raper: When the remaining Votes are taken, shall we be allowed a wide discussion upon them?

Mr. Malone: Is the right hon. and gallant gentleman aware that when the Air Estimates were discussed before, civil aviation was ruled out, and all discussion was precluded?

Capt. Guest: That was done intentionally, so that certain Votes might still be left for discussion.

⁂ ⁂ ⁂ ⁂

28th Squadron, R.F.C. and R.A.F.

THE half-annual function arranged by the 28th Squadron Old Boys' Association, was held at Eustace Miles' Restaurant, Chandos Street, on April 29. In accordance with precedent, ladies attended in good force, and the total muster was something in excess of 70, several of the Vice-Presidents who attended appearing to enjoy themselves. As is inevitable when old comrades meet, general greetings resulted in slight delay before the organised business could be opened; but the whist tables were in full working order soon after 7 o'clock. The short whist drive finished soon after 8 o'clock, and many willing hands cleared the floor so that the band (under the direction of two of the Association members), opened with a flourish and the first dance served as a fitting prelude to the refreshments interval. Internally refreshed, the company settled heartily down to the remaining part of the programme, dances being interspersed with concert items. Several prizes, presented by one of the Vice-Presidents, were awarded during the evening. The band and the Committee worked like Trojans, well earning the eulogies freely expressed. The usual Annual Reunion will be held in the autumn, and details will be circulated in the usual way. Meanwhile, past or present members of the 28th, who have not been in touch with the Secretary (Mr. C. T. Hodges) are requested to write to him at 102, Camden Street, N.W. 1.

Guynemer Memorial

LAST WEEK the Memorial tablet to Capt. Guynemer, the famous French "ace", was formally inaugurated in the Paris Pantheon, M. Poincaré making an eloquent speech upon the occasion.

Holland and Aviation Subsidy

ON April 28 a Bill was introduced into the Second Chamber to grant the Royal Dutch Air Service an extra subsidy of 22,000 florins for 1921, and 420,000 florins for 1922. It is stated that it is practically certain that the subsidies will be voted in order to keep the air service alive, as without these subsidies it will be impossible for the company to continue after the spring.

Seaplane Floating Dock Ready

IT is announced that the seaplane floating dock, previously referred to in FLIGHT, which has been under construction at Sheerness Dockyard to the orders of the Air Ministry, has now been delivered as ready for service. For the present, the craft has been berthed in the Medway, near Port Victoria. The dock, which has an overall length of 143 ft., and a lifting capacity of 200 tons, will accommodate two large modern seaplanes, has thirteen buoyancy compartments, each flooded direct from the sea and emptied by blowing with compressed air. The power for the air compressors is supplied by two oil-driven dynamos, which also provide the current for lighting and power for workshop machinery, capstans, winches, and pumps. An interesting feature is the supply of petrol to seaplanes from a large storage tank on the deck by means of the Bywater hydraulic system.

Franco-Roumanian Extension

THE Franco-Roumanian Air Navigation Co., which has been running an air service from Paris to Prague and Warsaw, is now about to inaugurate an extension of their service from Prague to Vienna and Buda Pest. The new service is to run three times a week, and the time taken will be two hours from Prague to Vienna and about 1¾ hours from Vienna to Buda Pest.

PUBLICATIONS RECEIVED

Problems et Exercices d'Electricite Generale. By P. Janet. Paris: Gauthier-Villars et Cie., 55, Quai des Grands-Augustins.

"*Bristol*" Gas Starter. The Bristol Aeroplane Co., Ltd., Filton, Bristol.

British Standard Aircraft Specifications:—3 W.2, Flexible Steel Wire Rope; D.33, Dope and Varnish Removers; 2 D.103, Air Ministry Nitro Dope Coverings and Identification Colours; 2 L.4, Hard Aluminium Sheets; 2 L.16, Half-Hard Aluminium Sheets; 2 L.17, Soft Aluminium Sheets; L.25, Wrought Light Aluminium Alloy Bar ("Y" Alloy); L.26, Wrought Light Aluminium Alloy Sheets ("Y" Alloy). British Engineering Standards Association, 28, Victoria Street, London, S.W. 1.

⁂ ⁂ ⁂ ⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published April 20, 1922

27,281. J. N. CHRISSOVELONI. Aerial machines. (177,186.)
35,913. N. F. JOHNSTON. Rotary engines. (177,248.)
35,916. B. A. DUNCAN. Connecting means for aircraft framework. (177,249.)
35,928. B. A. DUNCAN. Control surfaces of aircraft. (177,250.)

Published April 27, 1922

33,323. B. G. TEXTILWERKE GES., W. E. DORR and W. MULLER. Rigid airships. (154,225.)

Published May 4, 1922

30,994. W. H. BARLING. Aircraft *fuselages*, etc. (154,576.)
34,571. SOC. DES MOTEURS GNOME ET RHONE. I.C. engines. (156,578.)

APPLIED FOR IN 1921

Published April 20, 1922

1,445. J. B. WOOD. Rotary engines. (177,286.)
4,583. G. FORNACA. Propulsion of aircraft. (177,340.)
9,310. SOC. ANON. DES AEROPLANES G. VOISIN. Lubrication of I.C. engines. (161,940.)

Published April 27, 1922

4,732. ARMSTRONG-SIDDELEY MOTORS, LTD., and F. M. GREEN. Rudder control mechanism for twin-engined aeroplanes, etc. (177,659.)
9,008. R. A. PEGLAR. Flying-machines. (177,702.)
9,244. A. H. HARRIS. Rotary I.C. engines. (177,705.)
17,252. R. ESNAULT-PELTERIE. Means for synchronising moving parts of direct-acting fluid-pressure motors and pumps. (167,746.)

Published May 4, 1922

2,595. G. W. DUCHEMIN. Aeroplane propeller making machines. (177,905.)
3,897. I. HATANO. Pilot seats for aeroplanes. (177,922.)

Secret Patents re-Assigned to the Inventor.

Published April 27, 1922

APPLIED FOR IN 1916

3,229. H. E. WIMPERIS. Director apparatus for aircraft. (177,548.)

APPLIED FOR IN 1918

4,482. H. E. WIMPERIS. Sighting-devices for use on aircraft. (177,549.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(Continued from p. xiv.)

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15.
Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 29a, Highbury Grove, N. 5.
Dalston 1893.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.

PROPELLERS—

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19.
Hornsey 910 & 2472.

Lang Propeller, Ltd., Weybridge, Surrey.
520-521, Weybridge; "Aerosticks," Weybridge.

PUTTEES.

Fox Bros. & Co., Ltd. (Dept. R), Wellington, Somerset.

RADIATORS AND RADIATOR REPAIRS—

Serck Radiators, Ltd., Warwick Road, Greet, Birmingham.
Victoria 331 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

SPARKING PLUGS—

Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15.
Putney 2132, 2133.
"Kaalgee," Phone, London.

SPRAYING PLANT—

Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1.
Holborn 2011; "Aerography," London.

STABILIZERS—

Auto Controls, Ltd., 10, Regent Street, Piccadilly Circus, London, S.W. 1.
Regent 3649.

TAPES AND WEBBING—

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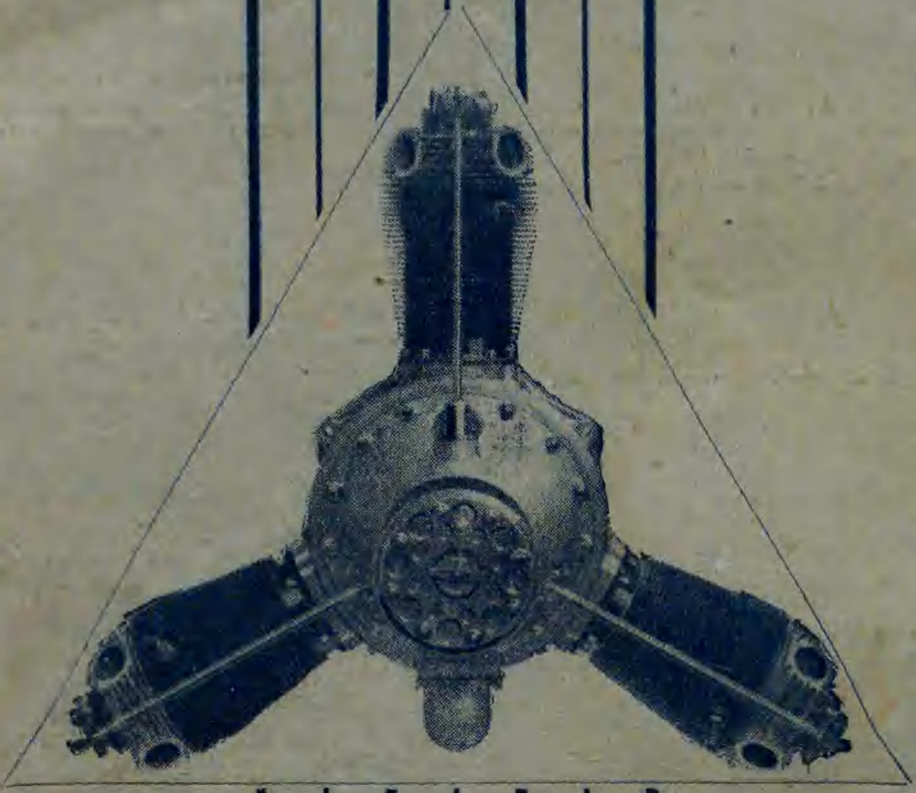

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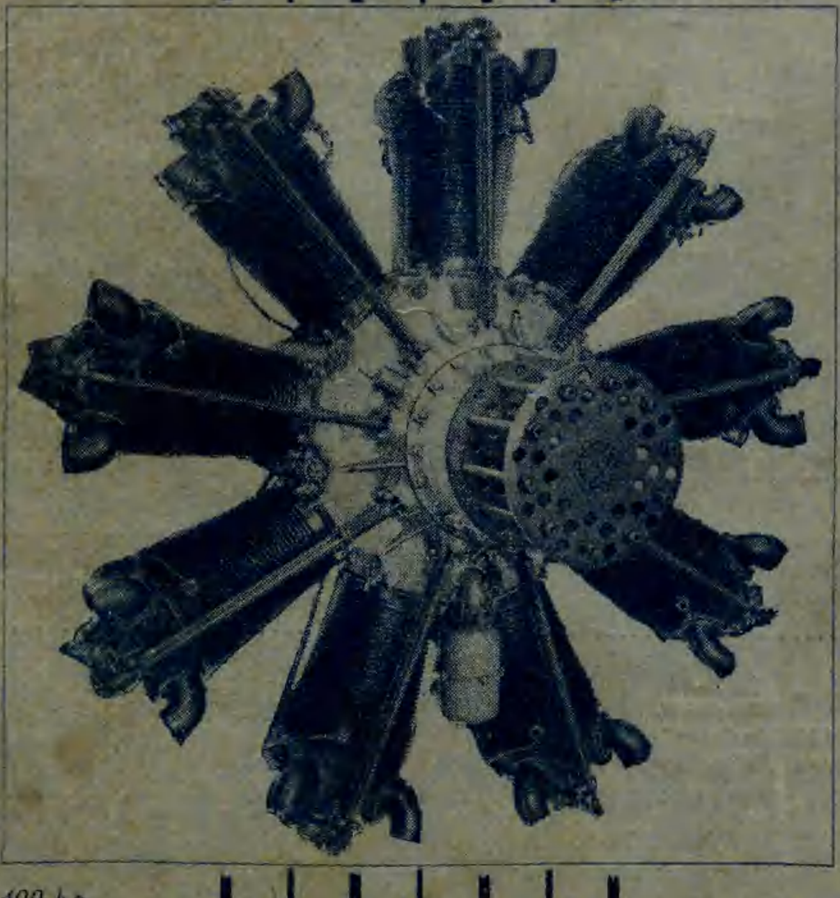

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
June 1	**Entries close for Schneider Cup Race**
June 5	**R.Ae.C. Whitsun Race Meeting, at Waddon**
June 23–25	**International Competition for Touring Aeroplanes, Brussels**
Aug. 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT.

Air Mails in Parliament

In making his statement on the Post Office Vote in the House on May 4, the Postmaster-General referred, among other things, to the Air Mail and the success which had attended its use, stating that the progress made during last year was greater than any other period since man conquered the art of flight. Mr. Kellaway pointed out again that the greatest benefit had been secured in the parcels post, that to Paris effecting a saving of from five to six days, owing to the greater Customs facilities. Of the air mail services Mr. Kellaway thought that that between Cairo and Baghdad had been the most successful, effecting a saving of 16 to 18 days, and he visualised the time when similar savings would be made by the use of air mails throughout the Empire.

So far as getting official confirmation of the value which the air mail can and does afford, the statements of the P.M.G. are highly satisfactory, showing as they do that he is alive to the possibilities of this mode of mail-carrying. But that seems to be as far as we have got. With the exception of the London–Brussels service, which has not actually started yet, we still stick to the comparatively insignificant service between London and Paris, which does not really give any great advantage over existing mail services. In order to obtain full advantage of the air mail, longer distances are necessary, and it would appear to be well past the time we seriously thought of linking up the Mother-country with India and Australia by air mail.

The saving made on the Cairo-Baghdad route is excellent, but a far greater saving could be effected by supplementing that by an air service between London and Cairo. It appears that we are so busy thinking of the competition with fast trains that we forget the very much easier competition with steamers

We have shown that between London and Paris, one of the best-served routes in existence, we can more than hold our own in actual point of time—although not by much. But suppose we were to start an air mail service between, for the sake of argument, Marseilles and Cairo. There we should be competing, not with express trains, but with relatively slow steamers. In other words, instead of competing against 60 m.p.h. we should be competing against 20 m.p.h. Allowing for the fact that, at present at any rate, it is not practicable to run day and night, we should double the steamer speed to arrive at the average speed at which we should have to fly in order to make as good time as the steamer. That figure would only be 40 m.p.h. Flying by day only, we should need to fly for 12 hours at 40 m.p.h. in order to obtain the same average speed as the steamer. On account of the delays at the terminal aerodromes, we have to fly at approximately 90 m.p.h. on the London–Paris route. It will at once be seen what an enormous advantage it is to have to compete against steamships instead of trains. And yet no attempt whatever has been made so far to experiment with a seaplane mail service. Why is this? We have the machines capable of doing good service as mail-carriers, and we have the pilots (at least we have at present, although if something is not done quickly we shall not have them long) with sufficient experience of seaplane flying to make such a service a success. Why not use them before it is too late? In a very short time we shall have to begin very seriously the training of specialists in seaplane flying, and as the seaplane is the ideal craft for linking up our Empire, why not begin at once to make use of it? There should be no difficulty in arranging with the French to be allowed to have a seaplane terminus (purely commercial, of course) at Marseilles or some other Mediterranean port, and the journey to Cairo, with stops at Corsica or Sardinia, Malta and Crete, for instance, should be well within the capacity of existing British seaplanes. Mr. Kellaway stated that the recently formed Civil Aviation Advisory Board were directing their attention to the Baghdad–Bombay section of a possible Imperial air route. We would suggest that, before going so far afield, greater opportunities exist much nearer home.

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The New Attempt on Round-the-World Flight Elsewhere in this issue of FLIGHT will be found a brief outline of the plans of Maj. Wilfred Blake and Capt. Norman Macmillan for their attempt to make the flight around the world. The Aircraft Disposal Company has, with commendable sporting spirit, placed four machines at their disposal, and the project appears to give fair promise of success. The machines to be used, although not of new types, have stood the test of time, and, given reasonable luck, the aviators should have a very good chance of getting through. Although as a sporting effort the use of a single machine for the entire flight would have been more spectacular, the employment of four machines, of three different types, will be a much closer representation of the actual conditions which will obtain when we come to run really long-distance services, and from that point of view is, perhaps, of even greater practical value. The Rolls-Royce and Siddeley "Puma" engines have both proved themselves thoroughly reliable on many long-distance flights, and the de Havilland and Fairey machines are equally famed for their excellent qualities. We must confess that, personally, we should have liked to see a different machine than the F-type flying boat for the last stage, as there are several which would, in our opinion, be more suitable for the work. Time does not, however, allow of getting a new machine built in time, unless the Air Ministry could be persuaded to lend one, and the F boat is the nearest approach to the ideal machine wanted. Except for unforeseen accidents the venture should succeed, and we wish everybody concerned the very best of luck.

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Opening of London–Brussels Air Service On Monday, May 7, the first of the D.H.34 machines belonging to the Instone Air Line made the inaugural flight from London to Brussels and back. This service, it will be remembered, is to be operated by the Instone Air Line, and this flight was the first to be made over the route by a British "approved" company. Last year the service was operated by the S.N.E.T.A., but it is gratifying to see a British firm taking it up. The actual regular service is to be started on May 15, and the London–Brussels line may well prove in the future one of the most important radiating from London, linking up, as it does, this country with northern and central Europe. There can be no doubt that in years to come the connection with these countries will be one of great importance, and one may even look far enough ahead to visualise the time when the London–Brussels line is the first stage of a route to Germany and the Far East. We therefore congratulate the Instone Air Line on being the first to open the new line, and trust their bold enterprise will receive well-merited reward.

◆ ◆ ◆

The French Gliding Competition Encouraged by the successes attained in the German soaring and gliding tests in the Rhön mountains last year, the French Aerial Association and the Aero Club of Auvergne are organising a somewhat similar competition at Puy de Combegrasse, near Clermont-Ferrand, Auvergne, between August 6 and August 20. The rules for the competition and the allocation of prizes are dealt with in another column of this issue of FLIGHT. From these it will be seen that a total amount of prizes of 100,000 francs is to be awarded. At the present rate of exchange this amounts to approximately £2,200. As the machines need cost very little—certainly it should be possible to build a glider for £50 to £60—the prizes should be ample for more than covering expenses, and we trust to see this country represented at Clermont-Ferrand. At present there are several amateurs interested in gliding, but no actual flights have, so far as we are aware, been yet made. The French competition should afford a good opportunity for constructing a glider with at least a sporting chance of covering its cost by winning a few prizes. For this reason we welcome the French competition, and it may well prove the beginning of an active interest in this form of flying being taken in this country also. Next year the Royal Aero Club might do worse than organise a similar competition at home. There will then be both the French and German experience to draw upon for data. We are not among those who think that experiments of this sort will lead to motorless commercial flying, but quite a lot may be learned, at comparatively low cost, about aerodynamic efficiency, which could be incorporated in commercial machines with considerable gain in economy.

THE 100 H.P. BRISTOL "LUCIFER" PASSES ITS TYPE-TESTS

Fine Performance of Air-Cooled Engine

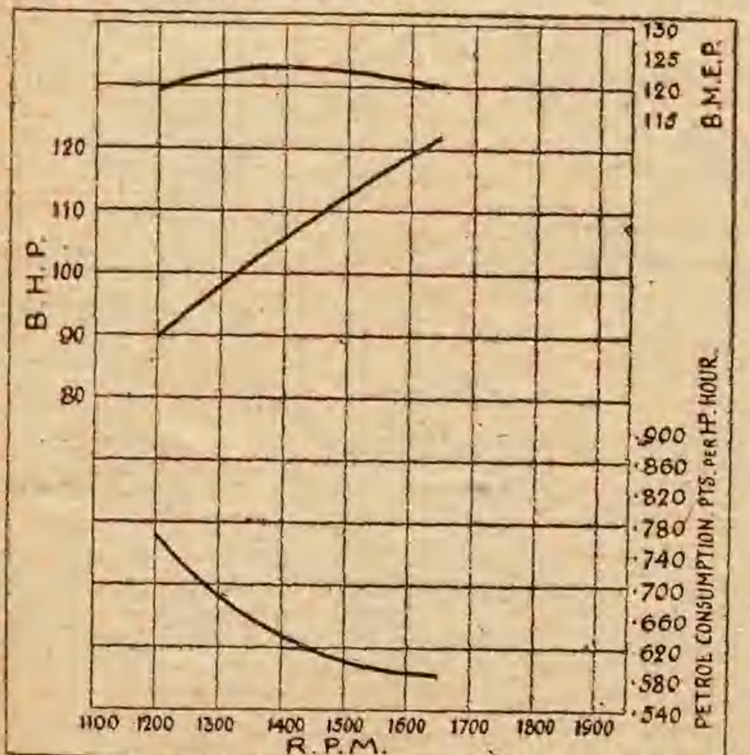
IN our report on the Easter Monday Race Meeting at Waddon, reference was made to the Bristol "Lucifer" engine mounted in the little Bristol monoplane flown by Uwins, and mention was made of its smooth running, considering that it has only three cylinders. We now learn that the "Lucifer" has successfully passed its type-tests in accordance with British Air Ministry Type-Test Schedule of May, 1920. This is an achievement of which the makers may well be proud, as the tests are very severe. It will be remembered that the 400 h.p. Bristol "Jupiter," also an air-cooled radial, passed its type-tests some months ago, and the fact that the "Lucifer" has now also passed these tests is further proof, if such were needed, of the high qualities of Bristol design and workmanship. In connection with the "Lucifer," it is not without interest to note that the engine used for the tests, No. 301, was one of the first two experimental engines of this type, and was fitted with "K" type, Mark II, cylinders. Previous to the commencement of the tests the engine had run for 155 hours 14 minutes, on various experimental tests, and on flight tests in an "Avro" biplane. The engine was not, therefore, one specially produced for the type-tests, and we understand that it was standard in every respect.

As regards the tests themselves, 30 hours of the 90 per cent. endurance test, high-speed, and high-power tests were carried out on a Heenan and Froude dynamometer, while 20 hours of the endurance test were run in the hangar, driving a propeller. The fuel used was an 80 per cent. aviation spirit and 20 per cent. benzole mixture. The slow running and acceleration tests were carried out on the Heenan and Froude dynamometer. From the following tables it will be noted that two non-stop runs of ten hours each were made, one on the Heenan and Froude, and one in the hangar.

On January 25, 1922, before commencing the endurance test, a run of 43 minutes was made, giving the results shown in Table 1.

Considerations of space do not allow of publishing in full the details of the 50 hours' endurance tests, but the synopsis in Table 2 will give a very fair idea of the results obtained.

On February 4, 1922, the engine was put through a half-hour slow-running test, when it developed 11·4 (actual) b.h.p. at a speed of 740 r.p.m. On February 6 the high-speed and high-power tests were completed. In the former the engine ran for one hour at 1,822 r.p.m., developing 57·1 b.h.p., the oil pressure being 51 lbs./sq. in. and the oil temperature 61° C. The oil consumption was 4·125 pints per hour, and the petrol consumption was 47 pints per hour, or ·823 pint/h.p./hr. In the high-power test, also lasting one hour, the engine ran at a speed of 1,655 r.p.m., developing 120·5 b.h.p. The oil pressure was 58 lbs./sq. in., and the oil temperature 51° C. The oil consumption was 3·75 pints/hr., or ·0311 pint/h.p./hr., and the petrol consumption 74 pints/hour (·613 pint/h.p./hr.).



Power Curve, etc., of Bristol "Lucifer," taken at end of 50 hours' run.

On February 6, at the end of the endurance test, the "Lucifer" was given a 50-minutes' run, and the data obtained are given in Table 3.

TABLE 1

Power Test before Commencement of Endurance Test

R.P.M.	Load on brake, lbs.	H.P. Actual.	H.P. Cor-rected	Fuel. Pts. per hour.	Fuel. Pts./h.p./hr. Actual.	Fuel. Pts./h.p./hr. Cor-rected.	B.M.E.P. on actual h.p. lbs. per sq. in.
1,200	84½	84·5	86·3	61½	·728	·713	117
1,300	88	95·4	97·4	70	·734	·719	122
1,400	85½	99·8	102·0	85	·853	·833	118
1,400	87½	102	104·1	90	·883	·865	120
1,500	86	107·5	110	79	·735	·720	119
1,600	84	112	114·5	63	·562	·560	116
1,650	82½	113·5	116	63	·555	·544	114
1,600	84½	112·7	115	63	·558	·548	116
1,500	85½	107	109·2	67½	·630	·618	118
1,400	87	101·5	103·8	68	·670	·656	120
1 300	88	95·4	97·4	74½	·780	·765	122
1,205	85	85·3	87·0	68	·796	·781	117
1,300	88	95·4	97·4	76	·796	·781	122
1,400	88	102·5	104·8	69	·673	·659	121
1,500	86	107·6	110·0	65	·604	·590	119
1,605	84	112·4	115·0	62½	·555	·545	116
1,650	83	114·2	116·8	63	·552	·540	115

Barometer, 29·3; weather, fine.

TABLE 2

Synopsis of 50-hrs. Endurance Test

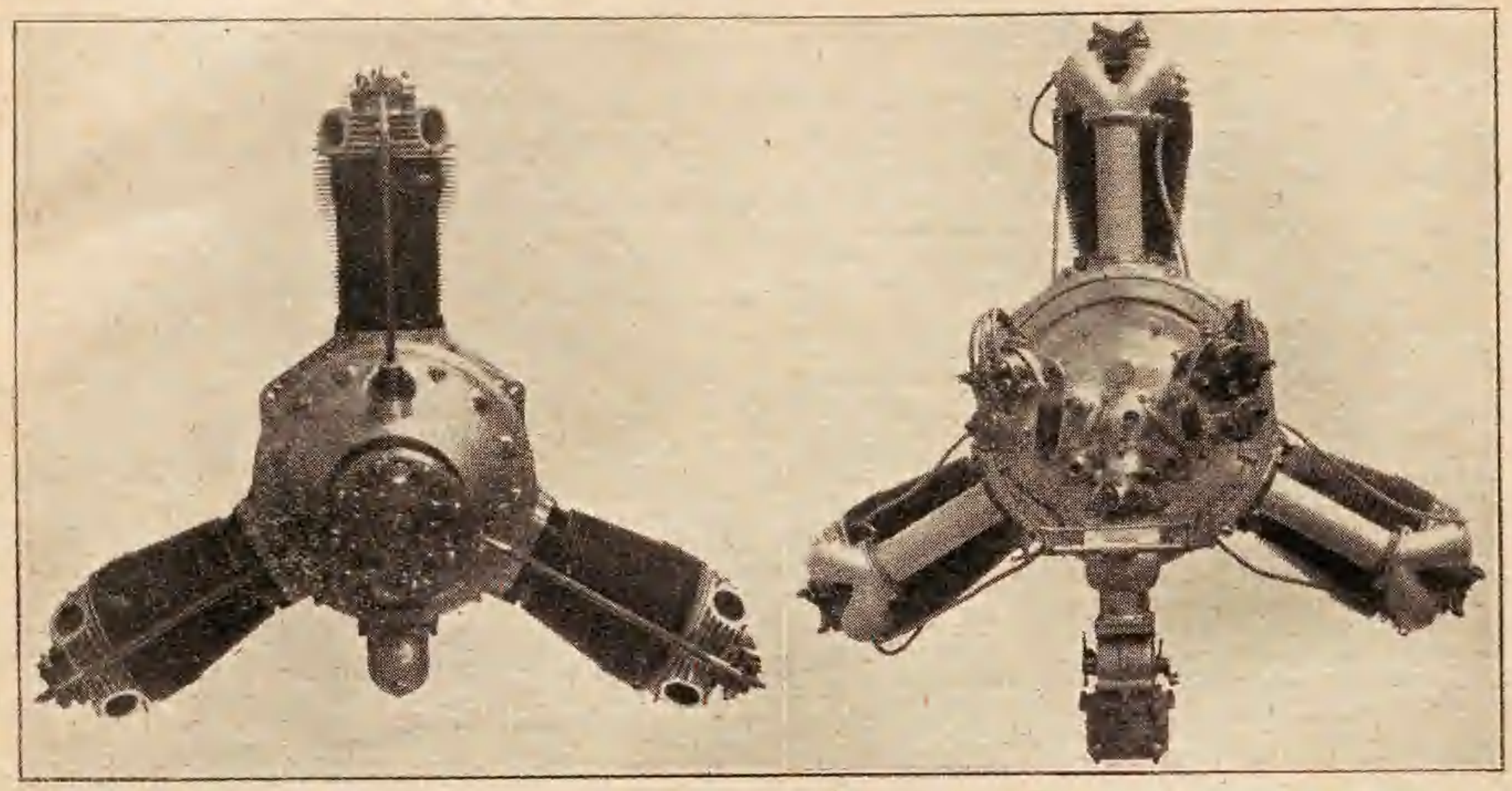
Date. 1922.	Non-stop runs.	R.P.M.	B.H.P. corrected	Oil press. lbs./sq. in.	Oil consumed, Pts./h.p./hr.	Petrol. Pts./hr.	Petrol. Pts./h.p./hr.
H. & F.—	h. m.						
25·1	1 30	1,602	92	56	·0241	52·6	·582
25·1	3 55	1,604	92·7	50	·0302	54·25	·597
31·1	4 45	1,600	91·8	55	·0295	52·75	·586
1·2	10 00	1,600	91·8	51	·0336	54·00	·595
Hangar—							
2·2	10 00	1,600	91·0	50	—	53·26	—
2·2 to	6 00	1,600	91·0	52	—	52·6	—
3·2	4 00	1,600	91·0	52	—	52·6	—
H. & F.—							
3·2 to 4·2	9 00	1,614	92·5	54	·0345	55·1	·606
4·2	1 00	1,609	102·4	50	·0348	62·1	·618

TABLE 3

Power Test at Completion of Endurance Test

R.P.M.	Load on brake, lbs.	H.P. Actual.	H.P. Cor-rected.	Fuel. Pts. per hour.	Fuel. Pts./h.p./hr.	B.M.E.P. on actual h.p. lbs. per sq. in.
1,650	88	121	121	73	·602	119
1,605	89	119·2	119·2	71	·595	121
1,500	90	112·8	112·8	68	·604	122
1,405	90	105·7	105·7	66	·625	122
1,305	90	98·0	98·0	67	·684	122
1,210	88½	89·3	89·3	67	·750	120
1,300	90½	98·0	98·0	66	·674	123
1,400	91	106·2	106·2	66	·622	123
1,500	90½	113·2	113·2	69	·611	122
1,600	89½	119·6	119·6	71	·594	121
1,650	88	121·2	121·2	73	·602	119
1,600	89	119	119	71½	·600	121
1,510	90	113·5	113·5	69	·608	122
1,420	90½	107·2	107·2	66	·615	123
1,295	90	97·2	97·2	66	·679	122
1,205	87	87·5	87·5	67	·765	118

Barometer, 30′. Weather, fine.



Front and rear views of the Bristol "Lucifer" Aero engine.

The average petrol consumption during the endurance test was ·610 pint/h.p./hr. and the oil consumption ·036 pint/h.p./hr. At the conclusion of the 50 hours' test the engine was dismantled, and its condition was found to be excellent. One exhaust valve had to be replaced, but this was traced to faulty material. After being re-erected the engine did two tests of one hour each, one at full throttle and one at high speed. During the former the engine was run at 1,760 r.p.m. and developed 118 b.h.p., the m.e.p. being 109 lbs. per sq. in. and the fuel consumption ·602 pint per h.p. per hour. In the high-speed test the engine was run at 1,850 r.p.m. and developed 50 h.p., the m.e.p. being 44 lbs./sq. in and the petrol consumption ·9 pint/h.p./hr.

The general appearance of the Bristol "Lucifer" will be seen from the accompanying photographs. It is a three-cylinder, air-cooled radial, with cylinders similar to those of the nine-cylinder 400 h.p. Bristol "Jupiter." The bore and stroke are 5¾ ins. and 6¼ ins. respectively, and the total stroke volume of the engine 486·936 cubic ins. The compression ratio is 4·8 to 1, and the normal brake h.p. is 100 h.p. at 1,600 r.p.m. and at ground level. The average fuel consumption in the air is 61 pints per hour, and the oil consumption 3·6 pints per hour, or 55 lbs. and 4·22 lbs. per hour, respectively. The weight of the engine complete, including propeller hub, carburettor and heater box, is 324 lbs.

For economical and reliable machines of small size, such as two or three seater touring machines, small military machines, and school machines, both land and seaplanes, the "Lucifer" should be a very attractive proposition. In this connection it may be mentioned that already the Bristol company has standardised their little monoplane with this engine, and are also constructing a comfortable three-seater touring aeroplane to take it. A good deal should therefore be heard of the "Lucifer" in the near future, and we have no doubt that the engine will soon establish a reputation. The fact of having passed the Air Ministry type-tests is in itself an excellent beginning.

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CALTHROP PARACHUTE TESTS AT CROYDON

SOME interesting experiments were carried out at Croydon last Saturday with "Guardian Angel" parachutes. Unfortunately time did not permit of the carrying out of the full programme of the tests, but further tests are to be made later.

The first drop made was of a dummy man with the "H" type "Guardian Angel" parachute with standard 28-ft. silk body. The dummy man was carried in the new frontal-suspension harness, fitted with instant connector and quick release, the life-line attaching the dummy man to this parachute being fitted with a small resistance parachute to show the advantage of providing additional resistance to speed up the disconnection of a "dropping" type parachute in a nose dive. A description of the "H" type parachute appeared in FLIGHT for March 23, 1922.

The test showed that the small resistance parachute, which was only 4 ft. in diameter, perceptibly speeded up the extraction of the parachute and pulled the dummy man considerably to the rear of the normal path usually taken.

In order to avoid any possibility of accident to a pilot or aeroplane, it is always preferable to test a new invention of this kind by a series of small advances without accident than to risk damage to the pilot and his machine by making too big advances at a time.

Although the resistance parachute opened instantly, Capt. Muir reported that no shock whatever was felt on his machine, so that on the next occasion it will be safe to employ a resistance parachute of much greater area, in which the effect would be much more marked.

In the second flight the dummy man was dropped with an "H" type parachute, fitted with a newly-invented "Calthrop" body, provided with three annular rings of air pockets, the object of which is to produce enhanced cantilever effect of the compressed air passing under the periphery of the body, and thus giving additional resistance. Again, in order to proceed with caution for the sake of safety to the pilot and the machine, the air pockets were contracted to about one-tenth of their full extension.

The opening of the body was extraordinarily quick, but perfectly elastic; and again Capt. Muir reported that there was no shock whatever to his machine. The result of the experiment was to show that the rate of descent was appreciably slower.

On the next occasion this body will be tested with its pockets fully extended, the result being probably a much slower drop.

In this same flight a small teddy-bear was carried on the lower wing to test, in model form, the action of "soaring" type parachutes. This was fitted with a pilot and intermediate parachute. It acted perfectly, and the pilot, intermediate and main parachutes all came down in a perfectly straight line without any kind of wobbling, which has been previously experienced with parachutes, in tandem and chain, so that this difficulty has apparently been got over.

Time did not permit of the dropping of the mail-dropping parachutes, but in the third flight Mr. Reed, Mr. Newell's assistant, made a first drop in a "Guardian Angel" parachute, and was delighted with his experience.

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS

WHITSUNTIDE AIR RACES AT WADDON AERODROME, CROYDON, ON SATURDAY, JUNE 3, 1922,

Starting at 3 p.m.

1. **Third Club Handicap.**—The entrant of the winner will receive £20. Open to all types of machines with a speed not exceeding 120 m.p.h.

The race is over a distance of approximately 16 miles, comprising two circuits of the course.

2. **First Sprint Handicap.**—The entrant of the winner will receive £20. Open to all types of machines with a speed of over 120 m.p.h.

The race is over a distance of approximately 16 miles, comprising two circuits of the course.

3. **First Whitsuntide Handicap.**—The entrant of the winner will receive £50. If five starters the second will receive £20. Open to all types of machines with a speed of over 100 m.p.h.

The race is over a distance of approximately 24 miles, comprising three circuits of the course.

4. **Surrey Open Handicap.**—The entrant of the winner will receive £30. If five starters the second will receive £10. Open to all types of machines.

The race is over a distance of approximately 16 miles, comprising two circuits of the course.

Entries.—The entry fee for each event is £1. This fee, together with the entry form, must be received by the Royal Aero Club, 3, Clifford Street, London, W. 1, not later than 5 p.m. on Monday, May 29, 1922.

Balloon Sniping Competition.—The Royal Aero Club Avro machines will be used for this competition. No charge will be made for the machines.

The entrant of the winner will receive a prize value £10. The entry fee for this event is £1.

The Aircraft Disposal Company, Ltd., have certain machines available for the races, and they will be prepared to consider applications for the hire of these from qualified pilots. Applications should be made direct to the Company at Waddon Aerodrome, Croydon.

The following Royal Aero Club machines will also be available:—

Avro (2-seater) 110 h.p. Le Rhone.
Avro (2-seater) 110 h.p. Le Rhone.
Avro (2-seater) 110 h.p. Le Rhone.

Qualified pilots wishing to take part in the races may hire any of these machines from the Club at £3 for each event, which will include cost of petrol, oil and insurance of machine. Applications for these machines should be made direct to the Club.

Further particulars of the races may be obtained from the Club.

RACING COMMITTEE

The Racing Committee met at Waddon Aerodrome, Croydon, on Saturday, May 6, 1922.

Present: Major-Gen. Sir Sefton Brancker, K.C.B.; Lieut.-Col. M. O. Darby; Lieut.-Col. F. K. McClean, A.F.C.; Mr. W. O. Manning, and the Secretary.

Chairman.—Major-Gen. Sir Sefton Brancker, K.C.B., was elected Chairman of the Racing Committee for the year.

Whitsuntide Race Meeting.—It was decided to hold the Race Meeting on Saturday, June 3, 1922.

A new course for future races was selected, and list of events for the Whitsuntide Meeting was drawn up.

Aerial Derby, 1922.—It was decided to hold the Aerial Derby on Saturday, July 29, 1922, starting and finishing at Waddon Aerodrome, Croydon. The same course as in previous years, with the exception of Epsom, was selected.

Oxford and Cambridge Race, 1922.—The arrangements for this year's race were discussed. The Universities had suggested a relay race, and it was hoped to hold the contest on the same date as the Aerial Derby.

JACQUES SCHNEIDER CUP

Intending competitors are reminded that the entries for the Jacques Schneider Cup close on May 15, 1922. Entries should be made to the Royal Aero Club, 3, Clifford Street, W. 1, accompanied by a remittance of £10 to cover the entry fee.

The Aero Club of Italy, the present holders of the Cup, have decided to hold the race at Naples in the last fortnight of August.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN APRIL 30 AND MAY 6, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys complete †‡	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	49	70	14	31	46	2 42	D.H.34 G-EBBS (1h. 52m.)	B. (4), Br. (1), D.H. 4 (2), D.H. 9 (1), D.H. 18 (3), D.H. 34 (2), G. (8), H.P. (2), Sp. (4).
Paris–Croydon	51	149	8	33	41	2 59	D.H.34 G-EBBS (2h. 13m.)...	B. (4), Br. (1), D.H. 4 (2), D.H. 9 (1), D.H. 18 (3), D.H. 34 (1), G. (7), H.P. (2), Sp. (4).
Croydon–Rotterdam–Amsterdam.§	6	7	6	6	6	2 33	Fokker H-NABM (2 h. 10m.)	F. (5).
Amsterdam–Rotterdam–Croydon.§	6	2	6	6	5	3 27	Fokker H-NABM (3 h. 0 m.)	F. (5).
Totals for week ...	112	228	34	76	98			

§ to and from Rotterdam only.

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijke Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

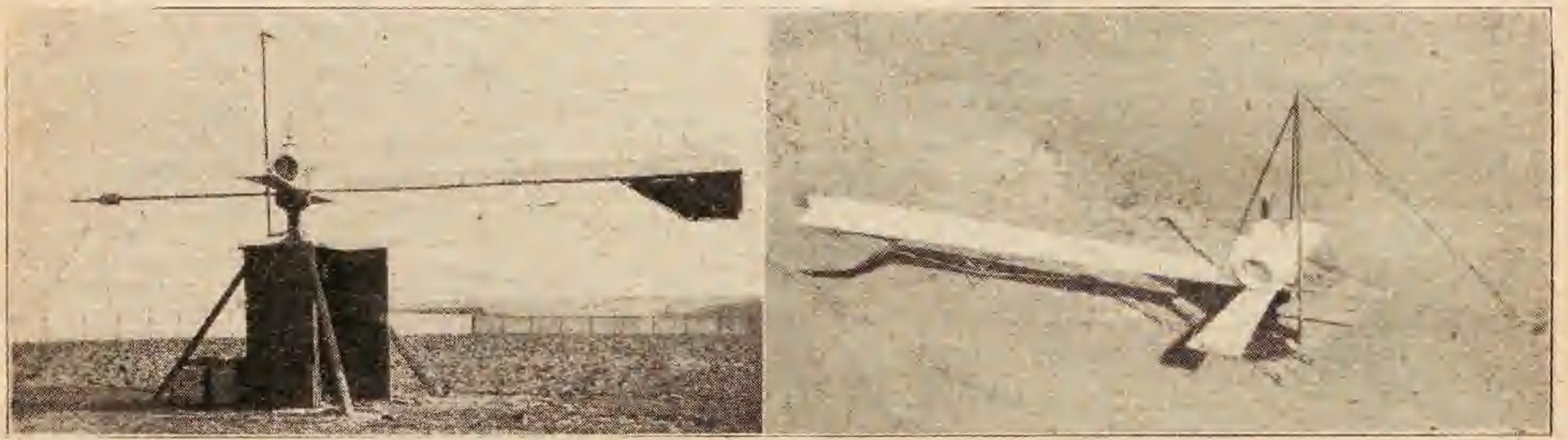
Incidental Flying.—During the week Capt. Stocken had a busy time testing machines for the Aircraft Disposal Co. These included seven D.H. 9's, two Avros, and a Bristol Fighter.

On Saturday Major Foot took one of the A.D.C. Bristol Fighters over to Brussels.

THE "A.G.A." AUTOMATIC WIND INDICATOR AND GROUND SIGN

REFERENCE was made recently in these pages to an emergency landing-ground light, which automatically indicated the direction of the wind. This week we are able to give a few particulars, together with illustrations, of one of these lights, which is now undergoing tests at Croydon Aerodrome. This apparatus has been designed by the Gas Accumulator Co. (U.K.), Ltd., of Brentford—the well-known marine lighthouse designers and makers of the automatic aerial lighthouses—and is arranged to act as a signal to aviators both by day and night.

It is primarily intended for use on emergency or intermediate landing grounds where, in the former case, no personnel are available for giving daily attention to the ordinary landing lights and signs. Thus the whole unit is designed so as to be quite automatic in operation, and when installed in its permanent position it will be equipped to operate without human attention of any kind for periods of six months or one year.



THE "A.G.A." AUTOMATIC WIND INDICATOR AND GROUND SIGN : Two views of the apparatus now being tested at Croydon Aerodrome.

As will be seen from the accompanying illustrations—which show the sign upon its temporary mounting—it consists of a framework built up in the form of the letter T, and very nearly approximates the form internationally agreed upon to indicate landing zones. The long arm of the T measures about 20 ft. in length, and the cross pieces are about 10 ft. across. These vanes are mounted in such a manner as to receive upon their upper surfaces beams of light projected through dioptric lenses arranged around the light source located at the junction of the long arm and the cross pieces. The vanes, together with the light source, are also mounted so as to rotate at will about a vertical axis, and by the employment of a suitably designed rudder, or fin, at the end of the T, the sign is made to swing and remain with the head of the T to the wind.

It is understood that the light power projected upon each of the vanes is 27,000 candle-power, and provision is made whereby the light will give a pre-arranged flashing signal, thus indicating any particular locality. The illuminant used is dissolved acetylene gas, stored in portable steel cylinders, and the "A.G.A." automatic mantle-changing gear, gas-operated mechanism, and Sun Valve lighting and extinguishing device, which were described in FLIGHT for April 21, 1921, are employed in the operation of this sign.

As a day sign it is stated that it can be observed, at normal flying height, from about five miles, whilst at night, as a flashing light without definite shape, it can be seen from about 12 miles, or its shape and bearing can clearly be established from a distance of two or three miles. We believe that provision can also be made for indicating, automatically, the velocity of the wind by means of coloured lights.

This apparatus certainly appears to possess great possibilities, and we watch its development with considerable interest.

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LONDON–BRUSSELS SERVICE INAUGURATED

MONDAY last saw the inauguration of the new aerial passenger and goods service between Croydon and Brussels, which is being run by the Instone Air Line, under the Government subsidy. The first machine, D.H. 34 G-EBBT "City of New York," piloted by Mr. Barnard, and with passengers, left the terminal aerodrome at Croydon shortly after 10.30 a.m., the departure being witnessed by the Hon. Capt. Guest, Minister for Air, Major-Gen. Sir Frederick Sykes and many other well-wishers of commercial aviation.

This flight was only in the nature of a preliminary trip, a regular daily service being arranged to start on Monday next. It is of interest to note, however, that permission to fly over the Royal Yacht, on its way across the Channel, in connection with the Royal visit to Belgium, had been granted by the King. The machine arrived safely at Brussels at 12.50, having taken two hours two minutes to complete the journey—quite good going. The return trip to Croydon was made later on the same day ; photographs for the Press of the Royal visit in Belgium forming an important item carried on the machine.

Owing to the engineers' strike, delivery of new machines has been considerably delayed, but it is hoped that before long the Instone fleet will comprise ten passenger machines and two specially built cargo machines, when a regular and frequent service to and from Brussels will be run without in any way interfering with the London-Paris service. Arrangements are being made to book through passengers *via* Brussels to all parts of the East by air. Passengers will be able to go to Brussels by air, spend a few hours, and return to London the same day—which should be a great boon, not only to tourists, but to commercial and business people. It is also the intention of the Instone Air line to run a service to Ostend during the summer months, whilst negotiations are taking place with the diamond merchants to run a "special" once a week to Antwerp, returning the same day.

The London-Brussels route will, we think, prove to be an extremely useful one, for Brussels, as we remark elsewhere, would form an important junction for the various lines to Northern and Central Europe, and we take this opportunity of wishing this new service every success.

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Rio de Janeiro and Porto Alegre Air Service

THE Brazilian Government has been authorised to establish two aerial routes and aircraft services between the cities of Rio de Janeiro and Porto Alegre, an overland route for aeroplanes and a seaplane route along the coast. Both of these routes will, it is proposed, be ready by September, 1922. Although the routes are intended primarily for use by the military and naval forces, and will be organised and controlled by the Ministry of War and the Ministry of Marine, respectively, the facilities they afford will be available for civil purposes, subject to the consent of the Government being obtained, and the payment of a fee and charges for material used.

The Decree authorises the Government to borrow, up to a maximum of 4,000,000 milreis (about £120,000) to cover the cost of the scheme.

NOTICES TO AIRMEN

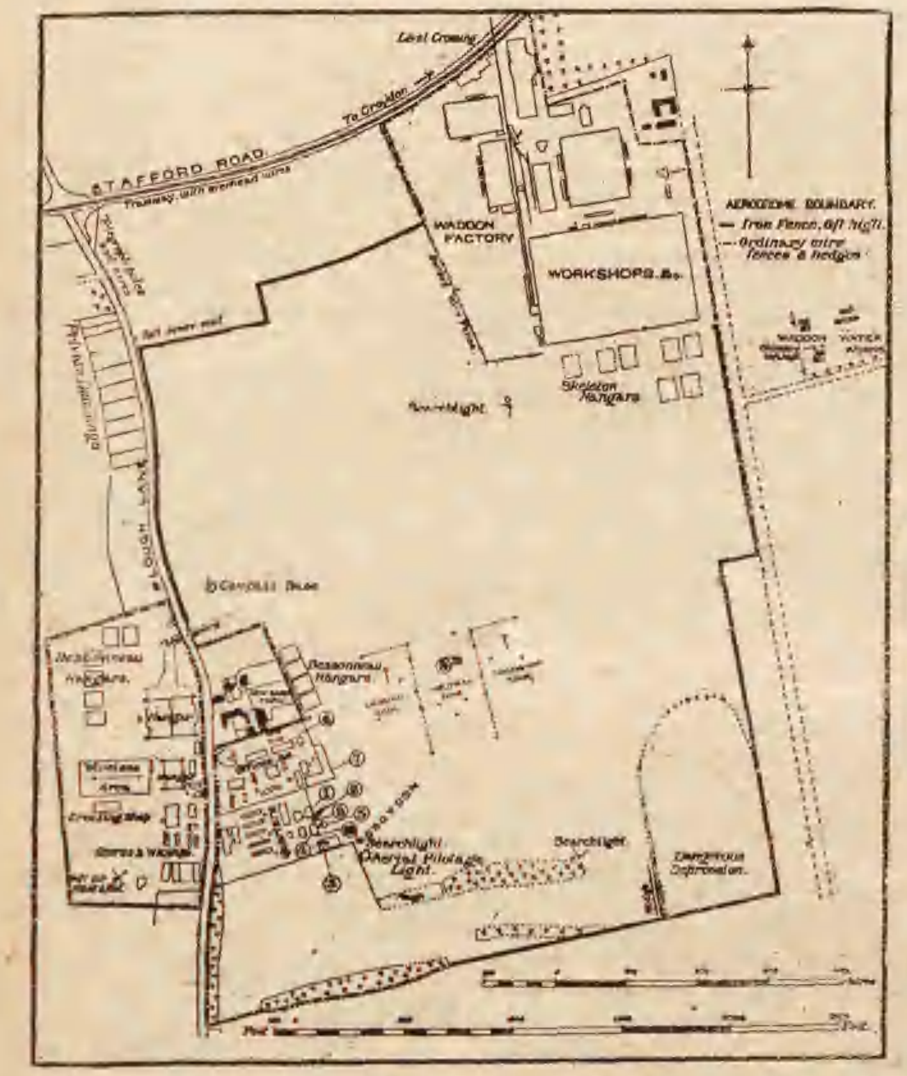
Croydon Aerodrome: Boundaries and Obstructions; Night Lighting System

1. The appended plan of Croydon aerodrome shows the general disposition of the present boundaries, buildings and other obstructions, and the arrangement of the night lighting system.

The lights mentioned in the following paragraphs are lit when required, between sunset and sunrise, on notice being given to the Civil Aviation Traffic Officer.

2. *Boundaries.*

A galvanised iron fence, 6 ft. in height, has been erected along portions of the north, east, south and west sides of the aerodrome, as shown on the plan.



Plan of Croydon Aerodrome: 1. Customs. 2. Wind indicator. 3. Circuit flag. 4. Traffic offices (C.A.T.O.). 5. Meteorological hut. 6. Garage. 7. Public enclosure. 8. Control Tower. 9. Automatic night landing sign (lights flush with ground). 10. Anemometer mast.

3. *Obstruction Lights.*

When the direction of the wind is such that the approach to or take-off from the aerodrome *by night* is over the iron boundary fence, red hurricane lights will be placed thereon in line with the illuminated double L (see para. 4 below), on both the windward and leeward sides. The remaining principal obstructions, such as buildings and W/T masts, will also be marked by red lights.

4. *Automatic Night Landing Sign.*

This sign (No. 9 on the plan) is a system of electric lamps beneath dome glass covers, sunk flush with the ground, and so arranged as to show a double L capable of orientation, according to the direction of the wind, to eight fixed points of the compass, *i.e.* at intervals of every forty-five degrees, commencing with Magnetic North.

This double L divides the landing area into three zones, in accordance with Clause 46, Annex D, of the International Air Convention.

The neutral zone is in the middle. Machines should land with the neutral zone on their right and take-off with the neutral zone on their left. The direction of landing is parallel to the long arm of the L, and *towards* the short arm.

A typical double L showing the three zones for a wind from Magnetic North is shown in dotted lines on the plan.

5. *Aerial Pilotage Light.*

Details of the Aerial Pilotage Light were given in Notice to Airmen No. 64 of 1921.

NOTE.—The illuminated wind indicator notified in Notice to Airmen No. 29 of 1922, not being a permanent installation, is not shown on the plan.

6. *Cancellation.*

Notices to Airmen Nos. 38 and 109 of 1921 are cancelled.

(*No.* 38 *of* 1922.)

Wireless Telegraphy Stations in Operation in Connection with Civil Air Routes

NOTICE to Airmen No. 9 of 1922 is cancelled, and a new list has now been issued (No. 43, of 1922):—

The wireless stations operating in connection with civil air routes are classified as follows:—

Class "A":—Stations directly concerned with flying operations whose routine is primarily intended for aircraft.

Class "B":—Stations indirectly concerned with flying operations whose routine is not primarily intended for aircraft.

Aerodromes for Civil Use: Amendments

NOTICE to Airmen No. 35 of 1922 (Consolidated List of Aerodromes) is amended as follows:—

List C.—Licensed Civil Aerodromes.

The following should be added:—Aberdeen, West Seaton Farm; Abergavenny, Llanfoist; Bridlington, Sands Lane; Carmarthen, Johnstown; Elgin, Muir of Linksfield; Forfar, Heatherstacks Farm; Haverfordwest, Old Race Course; Huntly, Affleck Farm; Inverurie, Howford Bridge; Llandovery, Maes-y-Coed; Llanwrtyd Wells, Abernant Hotel; Lossiemouth, Kinnedar; Nairn, Auldearn; Newport, Rogerstone; Portskewett, Ifton Court; Udny Station, Thistly Hill.

The following should be deleted:—Leicester, Aylestone Lane.

(No. 45 of 1922.)

NOTICE TO GROUND ENGINEERS

Avro 504K Type Aircraft: Lift Wire Fittings.

1. The attention of ground engineers is directed to the necessity of ensuring that the wiring plate and socket (Joint H, item 1.F.103) taking the duplicate lift wires at the upper end of the outer rear interplane struts (port and starboard) on Avro 504K aircraft are of standard pattern.

2. The standard fitting is made up of 14 S.W.G. plate, the lower part, which carries the socket and wiring lugs, being reinforced on its upper face by the addition of a plate of similar thickness (item 18F.80), joined by edge welding, but cases have come to notice in which this part of the fitting has consisted of a single plate only.

3. All licensed Avro 504K aircraft should be examined forthwith, and any single plate fittings found should be replaced by standard fittings.

4. No Certificate of Airworthiness will be issued or existing Certificate of Airworthiness renewed in respect of any aircraft of this type unless the standard fittings are incorporated.

(No. 5 of 1922.)

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PERSONALS

Married

Wing-Comdr. STANLEY JAMES GOBLE, D.S.O., O.B.E., D.S.C., was married at St. Martin-in-the-Fields on April 25, to KATHLEEN, daughter of Lieut.-Col. F. W. WODEHOUSE, C.I.E., and the late Mrs. F. W. Wodehouse.

ANTHONY CONNING KILBURN, late R.A.F., youngest son of Mr. and Mrs. C. Conning Kilburn, of Broadstone, Dorset, was married on April 27 to MAUD ISABELLA, eldest daughter of Mr. and Mrs. CHARLES TOPPIN, of the College, Malvern.

ERROLL D. SHEARN (late Hamp. Regt. and Capt., R.A.F.), of Kuala Lumpur, F.M.S., and Sidcup, Kent, was married on May 4 at Singapore, to DOROTHY MABEL, only daughter of C. W. S. PITTAR, I.C.S. (retired), and Mrs. Pittar, "Elmdene," 348, Banbury Road, Oxford.

GEORGE FREDERICK MACKAY, R.A.F., was married on April 29 at St. Mary Magdalen's, Brighton, to SONIA MARY, daughter of Mr. and Mrs. GEORGE GOODCHILD, 26, Vernon Terrace, Brighton.

To be Married

The engagement is announced between Flight-Lieut. ALBERT WILLIAM FLETCHER, D.F.C., A.F.C., R.A.F., youngest son of the late Mr. C. Fletcher and Mrs. Fletcher, of Child's Hill, N.W., and MARJORIE ELLIOT HAY, only daughter of Dr. and Mrs. Walter Hay, of Thame, Oxon.

LONDON TERMINAL AERODROME

Monday evening, May 9, 1922.

SEVERAL of the new machines that the various British companies have been anxiously awaiting were put on the service during the week. The first of the Handley Page W.8 b's returned from Martlesham Heath, where it had been undergoing type tests, and made its maiden trip to Paris—with Mr. Wilcockson as pilot—on Thursday. At Martlesham the machine lifted 300 lbs. above its stated load with ease.

The Instone D.H. 34, which has been to Martlesham undergoing type-tests, was also delivered at the aerodrome this week.

The Instone Air Line are experimenting with a three-blader Leitner metal propeller on one of their D.H. 34's. When first fitted, this propeller caused too much vibration, but slight adjustments in the pitch remedied this, and perfectly smooth running was obtained. Mr. Barnard took the "34" up for a trial flight, and expressed himself as being satisfied with the machine's performance, and it now remains to be seen by actual trial how this propeller will stand up under ordinary airway usage. The present "prop" was hand-made, but it is expected that when there is a reasonable expectation of good orders dies will be made and a much-improved "prop" produced.

Mr. Powell took one of the Instone 34's to Paris on Saturday morning, and made quite a good take-off, while several of the Instone pilots have been getting their hands in on this new machine during the week-end.

The Daimler Airways have been running two services in each direction daily with one machine. The second of the D.H. 34's, although delivered, is not yet on the service, and all the work last week fell on one machine—G-EBBS. On Wednesday, however, the service was suspended while the engine of this machine was changed, this process taking all day, owing to the fact that the new engine-changing arrangements are not yet completed. As they had a couple of passengers on this day for Paris, a De Havilland air-taxi, with Mr. Cobham as pilot, was hired from Stag Lane. Much comment was caused by this, as it is the usual thing on the aerodrome for a company which for some reason is unable to carry passengers they have booked to transfer them to another air-line which has room in a departing machine.

Activity with the Early-Morning Services

THE competition between the early morning 'planes is becoming keener. Three machines now leave in the early hours, the Messageries newspaper machine being scheduled out of Croydon as early as 5 a.m. The Instone newspaper air express leaves at 6 a.m., and the Daimler Airways send a machine at 6.45 a.m. The other morning the pilot of the Messageries machine, M. Denneulin, overslept himself in the Trust House, and had to be fetched from his bedroom when the machine was loaded and ready to get away. The keenness amongst the pilots may be gauged from the fact that M. Denneulin, rather than delay the machine while he dressed, flew off to Paris in his pyjamas.

Mr. Larry Carter had an unusual experience while flying the 10-seater Bristol from Paris to London on Wednesday. Just as he rose from the ground at Le Bourget one of the joints of his under-carriage became loose, and a portion of the under-carriage was left hanging down. This was quite unnoticed by Mr. Carter, but the officials at Le Bourget saw what had happened and wirelessed to Croydon a full description of the occurrence. The wireless operators at Croydon, as soon as Mr. Carter came within speaking range, "rang him up" and told him what had happened. Mr. Carter, being thus warned of what difficulties were in store for him when the time came for him to land, was able so to manœuvre his machine that, after a landing which excited the admiration of all the pilots on the aerodrome, only the tip of one wing was damaged. Had he not been made aware of the breakage in the under-carriage it is highly probable that a serious crash would have resulted.

A Queer Mishap on the Aerodrome

ANOTHER accident occurred on Thursday while the Grands Express Goliath, which had just flown from France, was being taxied into the shed. Just as the big machine was about to enter the shed, there being only a few feet clearance between the wing-tips and the walls, the mechanic who was taxying the machine inadvertently put his engines full on, with the result that the machine ran into the wall of the shed, knocking a hole through it. The front of the projecting cabin was completely smashed by its contact with the wall, but neither of the "props" was touched. As the Goliath swung into the wall one wing caught a Breguet which was standing near and twisted its *fuselage*. A mechanic sustained slight injuries.

The first consignments of strawberries are now arriving from France by air, and the Customs House has had a pleasant aroma these last few days, which, combined with the sudden arrival of fine weather, led one pilot to suggest to Captain Leverton that it was about time the cream arrived by air from Holland.

One of the regular pastimes now for pilots flying between London and Paris on the British machines equipped with wireless is to ring one another up and have a chat in the air.

On Saturday further tests, this time successful, were carried out with the new parachute which is designed to lift a pilot out of a machine falling out of control. This time the tests were made with a triple parachute, a very small one being first released, which pulls out a slightly larger one, which, in turn, exerts sufficient pull to release the large man-carrying parachute that finally lifts the pilot out of his seat. An ordinary parachute descent was also made.

Friday morning was particularly rough from a weather point of view, the wind being very gusty and uneven. Mr. Pyll, one of the new Dutch pilots of the K.L.M., had a strenuous time getting the monoplane away at 10 a.m. These machines are very awkward to handle in a wind, as the wings are difficult to get at, but now Mr. Leverton has had some hooks fitted on the end of a long pole, so that two mechanics, one on each wing can hold the machine comfortably. Mr. Leverton went down to Lympne during the week with a pair of these hooks, so that a monoplane force-landing there in a wind will be in no danger of being blown over.

Fokker Monoplanes with Rolls-Royce Engines

I UNDERSTAND that two Fokker monoplanes of the F.3 type, but fitted with Rolls-Royce 360 horse-power engines instead of 240 Pumas, are to be put on the London-Amsterdam service. These machines, while retaining the same passenger capacity (five), will have another compartment added for goods and luggage. They are intended to do the double trip in one day, and Messrs. Hofstra and Geysendorfer will be the pilots for the first month or so.

On Sunday the third of the D.H. 34's delivered to the Daimler Airways was put on the service, and on Monday morning, piloted by Mr. Herne, this machine did the double trip to Paris, taking two hours only in each direction.

Monday saw the opening of the Instone Air Lines service to Brussels. Captain Guest was down at the air-station to send the first machine away. Piloted by Mr. Barnard, it left at 10.48 a.m. It was Mr. Barnard's intention to fly over and photograph the royal yacht with the King and Queen on board, while over the middle of the Channel. At the same time Mr. Cobham left for Brussels, with a newspaper photographer, both he and Mr. Barnard intending to return late the same night with photographs of the arrival of the King and Queen in Brussels.

Captain Cockerill flew the first Vickers "Vulcan" over from Brooklands on Monday. Captain Cockerill tells me that the machine cruises at about 85 miles an hour, and it certainly lands at a very safe speed, while it gets off with its load after a comparatively short run. After the Brussels machine had left, and the distinguished visitors had departed for town, Captain Cockerill flew the "Vulcan" back to Brooklands to have the finishing touches added.

Recent Improvements

THE last of the new offices, that of the Marconi Co., is now nearly completed. Half of this is to be occupied by Messrs. Ogilvie and Partners, while the other portion is divided into an inner office and a store for flying helmets equipped with wireless 'phones. Mr. Strother, who has been associated with the aerodrome since its earliest days, is to be in charge of this office.

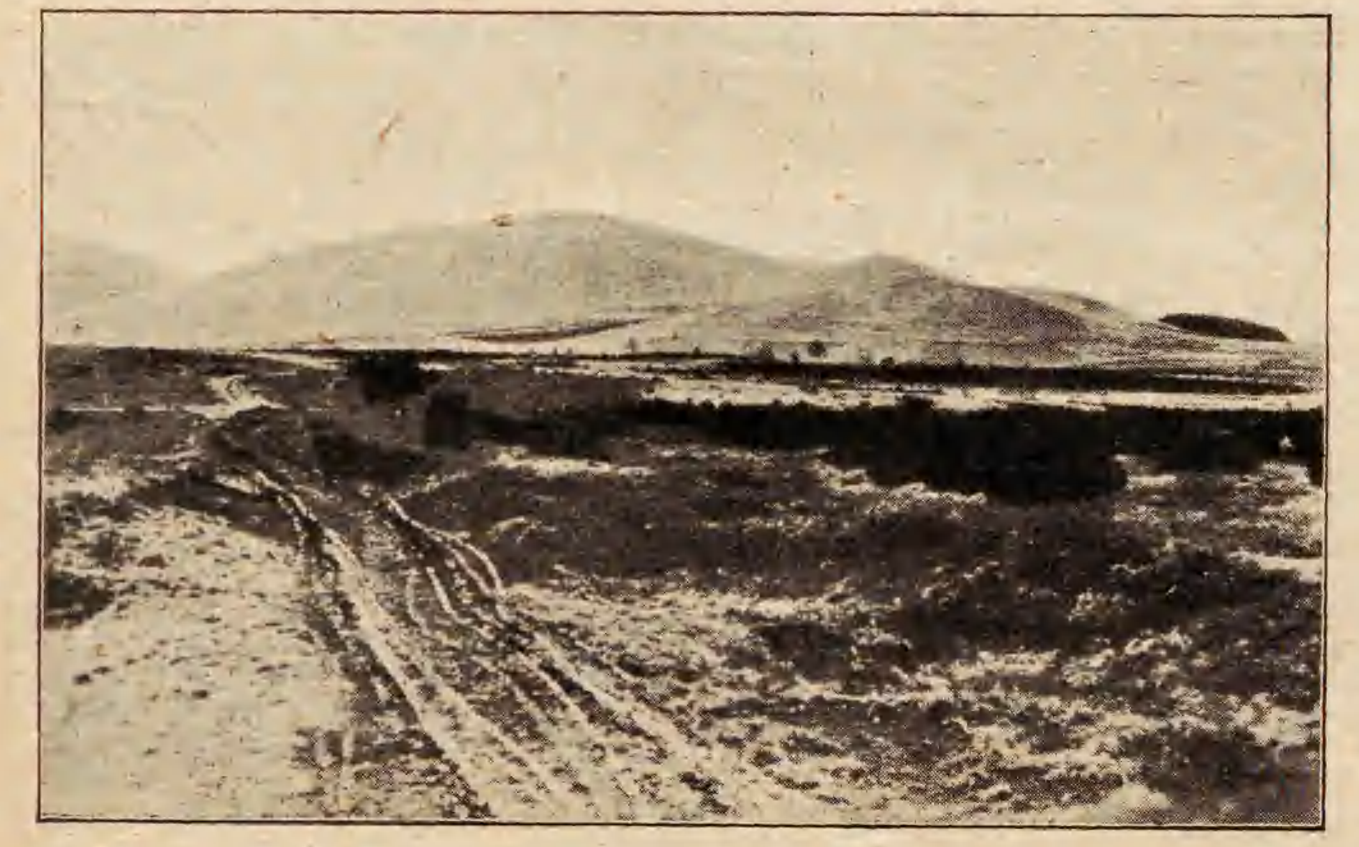
The small enclosure, where the traffic movement board and the weather reports are on view, has proved such a great attraction to the general public that it has had to be railed off. Although there has been a large sign with the words "No admittance" prominently exhibited, nobody appears to have taken any notice of it, and at times pilots have been unable to get near the weather reports for the crowd of interested spectators—which, just now, is composed largely of schoolboys on holiday.

Some of the little obstruction flags that besprinkle the aerodrome so plentifully at the present time, mark the spot where the electricians are busily renewing the glass covers over the electric landing lights. The mortality among these covers is, I am informed, remarkably high, the tail skids of the aeroplanes—especially the new heavy types—causing considerable damage.

THE "FIRST EXPERIMENTAL CONGRESS FOR MOTORLESS FLIGHT"

French Soaring and Gliding Competition

ONE result of the German soaring and gliding competitions in the Rhön mountains has been the arousing of a general interest in this form of flying all over the world. Last year's Rhön flights demonstrated that it is possible to remain aloft for considerable periods without the aid of any power plant, and that during such flights it is occasionally possible for a machine to reach altitudes considerably greater than that of the starting point. For this year a very extensive competition has been planned, and in order not to be outdone by Germany in this phase of flying, France has decided to organise a meeting for motorless aircraft in the vicinity of Clermont-Ferrand, Auvergne. The actual scene of the competition will be Puy de Combegrasse, south-west of Clermont-Ferrand. The meeting, which is to extend over a period of 14 days—from August 6 to August 20—is to be organised by the French Aerial Association and the Aero Club of Auvergne, and is under the patronage of the French Under-Secretary of State for Air, M. Laurent-Eynac. Prizes to a total amount of 100,000 francs will be awarded, and the competition is open to French as well as Allied and neutral pilots and machines.



Puy de Combegrasse, near Clermont-Ferrand, the scene of the forthcoming "First Experimental Congress of Motorless Flight." This meeting, which will be under the patronage of M. Laurent - Eynac, French Under-Secretary of State for Air, is to be held from August 6 to August 20, and prizes amounting to 100,000 francs will be awarded.

The machines must be of the heavier-than-air type, and must not be provided with any form of power plant. The pilot may, however, use his muscular power to assist his machine, so that a combination of glider and "Aviette" will not be barred. Entries should be sent to the Secretary, *Association Française Aérienne, 17, Boulevard des Batignolles, Paris, 8^{e}.* The entrance fee is 50 francs per machine for entries which reach the Secretary before May 31, 100 francs for entries between June 1 and July 15, the closing date for entering. Entrance fees will be returned to competitors whose machines are at the scene of the competition on the opening day. Accompanying the entrance form a side view and a description of the machine should be sent in, so as to enable the organisers to make provision for proper garaging. Machines will be examined by competent judges, and must satisfy them as to structural strength and general aerodynamic qualities. Pilots, before being allowed to compete, will be required to give a demonstration of their skill by remaining aloft for at least 10 seconds.

Competitors may commence practice flights and preliminary tests from August 1. During the actual competitions machines must carry sealed barographs, provided by the National Meteorological Office, and a representative of that institution will be present to instruct competitors in the reading of graphs.

The Competitions

The meeting at Clermont-Ferrand will be devoted to various competitions, or, as the official programme modestly terms them, experiments.

Duration Flights.—Four prizes, of 5,000 francs, 3,000 francs, 1,500 francs and 1,000 francs, will be awarded in this section, in which competitors must start from the Puy de Combegrasse, but may fly in any desired direction and alight at any point. The machines must remain in the air for more than three minutes in order to qualify for these prizes.

Prizes will also be awarded for aggregate duration, all flights made, in whatever section, counting towards this, so long as they are of more than 30 seconds duration. The prizes are 5,000 francs, 3,000 francs, 2,000 francs, 1,000 francs and 500 francs.

Distance Flights.—Two prizes are to be awarded in this section, one of 10,000 francs and one of 5,000 francs. The distance between starting and alighting points will be measured by a straight line joining the two points on the map. Competitors will normally start from the Puy de Combegrasse, but under special conditions the judges may permit competitors to start from the Puy de Dôme. The minimum distances required are 2 kilometres and 5 kilometres respectively.

Minimum Rate of Descent.—M. Louis Breguet has placed 10,000 francs at the disposal of the organisers for the purpose of encouraging machines with a slow rate of descent. The amounts are to be divided as follows:—First, 5,000 francs; second, 2,500; third, 1,500; and fourth, 1,000 francs. In order to qualify in this section, competitors must indicate before the start the point at which they intend to alight, and must then make a landing within 200 metres of this point.

The time in the air must be more than two minutes, and the rate of descent be less than 1.50 metres (4.9 ft.) per second. If L is the difference in height (in metres) between starting and alighting point, and t the duration in seconds of the flight, the mean rate of descent will be $\frac{L}{t}$ in metres per second. L must therefore be less than 1.5, or t greater than $\frac{L}{1.5}$.

Altitude Flights.—Three prizes, of 5,000 francs, 3,000 francs and 1,500 francs, are to be awarded for reaching altitudes greater than that of the starting point. Competitors must start from the Combegrasse, but may alight anywhere. For ascertaining the altitudes reached, use will be made of the barographs carried on the machines, or of any other method which the judges may select.

Alighting at Predetermined Point.—One series of tests will comprise alighting at a predetermined spot, the judges selecting each day three different points, according to the wind direction, situated at least 500 metres from the Puy de Combegrasse. Competitors must state beforehand at which of the three points they intend to alight, and then attempt to alight as near as possible to the selected point. In judging the performance, account will be taken of the distance flown and duration of the flights. The prizes in this section are 2,000 francs, 1,000 francs and 500 francs.

Horizontal Flight.—Prizes of 3,000 francs and 2,000 francs will be awarded for the longest horizontal flights. This does not mean that the machines must proceed in a straight horizontal line, but may soar or glide along an undulating flight path, the points of which fall alternately above and below the horizontal line through the starting point. The duration of these flights will be determined by the barograph chart, which will show when the machine dropped below the horizontal line for the last time.

Other Prizes

In addition to the competitions and prizes indicated, fifteen "free prizes" of 1,000 francs each will be awarded to competitors whose machines have shown points of special interest. If any one machine appears to the judges to possess exceptional merits, they may award more than one of the prizes to one competitor.

The "Union for Safety in Aeroplanes" is offering 10,000 francs for features which tend to increase the safety of flying, and may award the money in one single prize, or divide it into several smaller ones. In addition there is to be a Réné Quinton prize of 10,000 francs, but the conditions for this have not yet been decided upon. They will, however, be announced later.

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THE FLIGHT AROUND THE WORLD

Major Blake's and Captain Macmillan's Attempt

At the time of the very regrettable accident to Sir Ross Smith and Lieut. Bennett we expressed the hope that the attempt to fly around the world might still be made by a British crew on a British machine. That wish now promises to be fulfilled, thanks to the sporting offer of the Aircraft Disposal Co. to provide not one but four machines for the flight on which Major Wilfred Blake and Captain Norman Macmillan hope to start within the next month or so. In a way, one might have preferred to see the flight carried out on one machine, although from a practical point of view the use of four machines, of three different types, is probably at least as good a proposition. It should also be borne in mind that, when we come to circle the globe regularly, the journey will certainly not be made in one, but in many machines, certain types being used on certain routes for which they are best fitted.

As regards the machines to be used, these, as already mentioned, will be provided by the Aircraft Disposal Co., who are now busily engaged on the work of getting them tuned up ready for the flight. Two of the machines will be D.H. 9's (three-seaters) with Siddeley "Puma" engines. One will be a Fairey twin-float seaplane of the famous F. III type, which has a Rolls-Royce "Eagle" engine, and the fourth will be a flying boat of the F type. It has not, at the moment of writing, been definitely decided whether the F.3 or F.5 will be used.

In the main, the route to be followed by Major Blake and Captain Macmillan will be the same as that planned by Sir Ross Smith (a map of which was published in our issue of April 13, 1922). The last "leg" however, will be different from that planned by Sir Ross Smith, who, it will be remembered, had intended to make the Atlantic crossing direct from Newfoundland to Ireland if possible, or, as an alternative, fly from Newfoundland to London *via* the Azores and Portugal. Major Blake and Captain Macmillan intend to follow the northern route *via* Greenland, Iceland, the Faroe Islands and Scotland, which will considerably shorten the non-stop stages that have to be negotiated. At the time of year when it is expected to cover this part of the flight the weather in the northern latitudes should be favourable, except for local fogs, and by taking this route the strain on the engines should be considerably reduced.

The manner in which it is intended to use the various machines is as follows: One of the D.H. 9's will be used for the journey from London to Calcutta. Here the aviators will change over to the Fairey F. III seaplane, which will take them around the coast up to Kamchatka and across to Alaska. Here another D.H. 9 will await them, on which the flight across Canada and America to New York will be accomplished. From New York or Newfoundland the last stage, across the northern part of the Atlantic, will be attempted in the F. boat.

This, in very brief outline, is the plan of Major Blake and Captain Macmillan, and, barring unforeseen accidents, the scheme promises success. That difficulties will be met and obstacles have to be overcome goes without saying, but there is certainly a very good chance of getting through. All the machines to be used, although of fairly old type, have been proved by years of flying under all sorts of conditions, and should be capable of the stages on which each is being used. The engines also have proved themselves in numerous long-distance flights, and may be expected to uphold the reputation already established. Captain Macmillan is one of our best pilots and has had experience of a number of different types of machines. We understand that Major Blake is to act as navigator, and presumably he will go through a short course at Biggin Hill, as did Sir Keith Smith in order to make his navigation as certain as it was possible to make it. We believe it is intended to carry a third man, but so far as we are informed no selection has been made yet.

Altogether, the scheme looks promising, and we wish the gallant aviators every success in their very sporting attempt to uphold once more the prestige of British pilots, machines and engines.

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The P.M.G. on Air Mail Services

During his speech in the House of Commons on May 4 upon the Post Office Vote, Mr. Kellaway, the Postmaster-General, said that a branch of the service which was of great interest and, indeed, of fascination, was that of the carriage of mails by air. The progress made not only in this country, but in most other countries, had not realised anything like the sanguine expectations that some of them held a few years ago, but he thought that last year had shown greater progress than in any other period since man conquered the art of flight. There would be between England and the Continent three services to Paris by three British companies, and mails would be sent by whichever of these services was most convenient. Two air mails a day would be leaving Croydon Aerodrome, one at 10 a.m. and one at 12.15. A service to Brussels would start on May 15, and to Holland after May 15. There would be two outward services, at 10 a.m. and 2 p.m. The greatest benefit of these long-distance air services had been secured in the parcels post. The parcels post to Paris carried by air effected a saving of from five to six days. That was due not to the increased rapidity with which the parcels were carried, but to the fact that the Customs facilities were much greater in dealing with air parcels than with parcels sent in the ordinary way. The saving of time, however, was very considerable, and he was surprised that greater use was not being made of the air parcels service. As a result of tenders which the Post Office had accepted, the cost of carrying these parcels would be greatly reduced this year. The charges would be up to 2 lbs., 1*s.* 9*d.*; up to 5 lbs., 3*s.*; up to 8 lbs., 3*s.* 9*d.*; and up to 11 lbs., 4*s.* 3*d.* He thought the House would agree that these charges compared very favourably with the charges for parcels sent to Paris in the ordinary way. The most successful of all the air mail services with which this country was associated was that from Cairo to Baghdad. A letter sent from London to Baghdad in the ordinary way took from 28 to 30 days. Sent by air service it took only 12 days. The fee charged was only 6*d.* per ounce, the ordinary fee being 3*d.* Ten per cent. of the whole Baghdad letter mail was now being sent by air, and the efficiency and reliability which the Air Ministry had reached in this service would, he thought, assure in the future that there should be a great expansion in the use of the air mail in that district.

He visualised the time when throughout the Empire we should be able to provide air services which would make just as great a saving in time as that which the Air Ministry had succeeded in making between Cairo and Baghdad. No man could put any limitation to the possibilities of this service, and the fact that accidents had happened, that the percentage of reliability had not so far been very great, was no proof that the Air Ministry and those companies which had, with great audacity, invested their capital in these services, would not succeed in doing for the whole of the Empire what the Air Ministry had succeeded in doing between Cairo and Baghdad. A Civil Aviation Advisory Board had been formed by the Air Ministry with a representative of the Post Office upon it, and its first business was "To consider the cost and the practicability of setting up an Imperial Air Mail Service."

THE ROYAL AIR FORCE

London Gazette, April 28, 1922.

General Duties Branch

Flight Lieut. T. R. Hackman is transferred to the Res., Cl. A.; April 30. Wing Comdr. A. V. Bettington, C.M.G., is placed on half-pay, Scale A; May 1.

London Gazette, May 2, 1922

General Duties Branch

The follg. are granted permanent commns., with effect from the dates indicated, retaining their present substantive ranks and seny. *Gazettes* of dates indicated, appointing them to short service commns., are cancelled :—

Flight Lieuts.—H. G. Bowen, M. Thomas, A.F.C., T. F. W. Thompson; Oct. 24, 1919.

Flying Officers.—A. L. Fiddament; Sept. 16, 1919. B. R. Harris; Dec. 12, 1919. L. G. Harvey; Sept. 12, 1919. G. L. Ormerod; Sept. 12, 1919. S. L. G. Pope; Oct. 24, 1919.

Flying Offr. C. R. Smythe is granted a permanent commn., with effect from Sept. 16, 1920, retaining his present substantive rank and seny. *Gazette* Oct. 1, 1920, appointing him to a short service commn., is cancelled. W. B. Higgins is granted a short service commn. as Flight Lieut. for three years on the active list, with effect from, and with seny. of, April 18. Flight Lieut. T. Hinshelwood, D.S.C., D.F.C., relinquishes his short service commn. on account of physical unfitness for full flying duties, and is granted rank of Maj.; April 11. Flying Offr. C. F. P. Haslegrave relinquishes his short service commn. on account of physical unfitness for full flying duties, and is permitted to retain rank of Lieut.; May. 3. Flying Offr. R. E. Brown, Lieut., R.G.A., relinquishes his temp. commn. on return to Army duty; April 20.

Stores Branch

Pilot Offr. R. T. Rich is granted a perm. commn. as Flying Offr., with effect from, and with seny. of, Dec. 12, 1919, and is transferred to Stores Branch, with effect from Jan. 19. *Gazette* Dec. 12, 1919, appointing him to short service commn., is cancelled. G. W. Longstaff is granted a short service commn. as Flying Offr. on probation, wth effect from, and with seny. of, April 25.

Memoranda

The follg. are granted temp. commns. in the ranks stated for duty with the Works and Buildings Service, with effect from dates indicated, and relinquish these commns. on ceasing to be employed, with effect from dates indicated: Squadron Leader M. C. Rousseau, May 1, 1921; April 1. Flying Offr. A. E. Davies, Nov. 1, 1920; March 1. The follg. relinquish their temp. commns. on ceasing to be employed :—Flying Offr. C. W. Grey, Flying Offr. (Hon. Flight Lieut.) G. M. Cox; April 1.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified :—

Squadron Leaders.—T. W. Elsdon, from R.A.F. Depôt (Inland Area) to Egyptian Group Headquarters (Middle East). 25.4.22. W. C. Hicks, A.F.C., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Iraq (Supernumerary). 21.4.22. D. Harries, A.F.C., from Headquarters Coastal Area to Headquarters R.A.F., Iraq (Supernumerary) to command Armoured Car Company (on formation). 21.4.22. R. E. Manning, M.C., from No. 2 Flying Training School (Inland Area) to command No. 6 Squadron (Iraq). 21.4.22. L. Auker, O.B.E., from The Packing Depôt to command The Stores Depôt (Iraq). 21.4.22. P. C. Sherren, M.C., from No. 60 Squadron (India) to R.A.F. Depôt (Inland Area) (Supernumerary). 28.3.22.

Flight Lieutenants.—W. A. K. Dalzell, from No. 1 Flying Training School (Inland Area) to No. 4 Flying Training School (Middle East). 25.4.22. A. C. Ransford, from R.A.F. Depôt (Inland Area) to School of Technical Training (Men) (Inland Area). 6.4.22. D. O. Mulholland, A.F.C., from No. 100 Squadron (Inland Area) to Headquarters R.A.F. Iraq. 21.4.22. H. G. Bowen, from R.A.F. Depôt (Inland Area) to Headquarters R.A.F., Iraq. 21.4.22. E. F. Turner, A.F.C., from School of Technical Training (Men) (Inland Area) to No. 70 Squadron (Iraq). 21.4.22. H. A. J. Wilson, O.B.E., from Record Office (Inland Area) to Headquarters R.A.F., Iraq. 21.4.22. F. J. Cooke, from No. 1 Stores Depôt, to Headquarters R.A.F., Iraq. 21.4.22. T. Henderson, M.C., A.F.C., from School of Technical Training (Men) (Inland Area) to No. 100 Squadron (Inland Area). 1.5.22. G. T. Richardson from R.A.F. Depôt (Inland Area) to No. 100 Squadron (Inland Area). 1.5.22. A. W. Smith, from No. 4 Stores Depôt to No. 5 Flying Training School (Inland Area). 15.5.22. A. E. Barr-Sim, M.B., from School of Technical Training (Men) (Inland Area) to Headquarters R.A.F. (India). 21.4.22.

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Honours

In the *London Gazette* of April 28 the Air Ministry announces that H.M. the King has granted unrestricted permission for the wearing of the following decorations conferred by H.M. the King of Italy on the following officers for valuable services in connection with the War :—

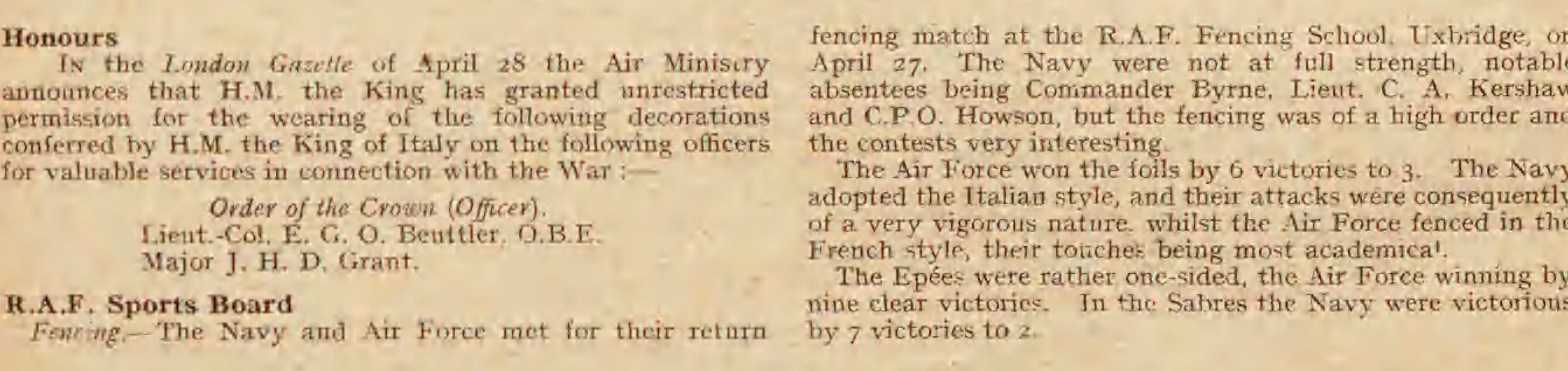
Order of the Crown (*Officer*).
Lieut.-Col. E. G. O. Beuttler, O.B.E.
Major J. H. D. Grant.

R.A.F. Sports Board

Fencing.—The Navy and Air Force met for their return fencing match at the R.A.F. Fencing School, Uxbridge, on April 27. The Navy were not at full strength, notable absentees being Commander Byrne, Lieut. C. A. Kershaw and C.P.O. Howson, but the fencing was of a high order and the contests very interesting.

The Air Force won the foils by 6 victories to 3. The Navy adopted the Italian style, and their attacks were consequently of a very vigorous nature, whilst the Air Force fenced in the French style, their touches being most academical.

The Epées were rather one-sided, the Air Force winning by nine clear victories. In the Sabres the Navy were victorious by 7 victories to 2.



RUSSO-GERMAN AIR MAIL SERVICE : Our photograph shows two of the Fokker monoplanes to be used on the Königsberg-Moscow service, which was inaugurated on May 1. At first the service will be bi-weekly, the machines leaving Königsberg at 9 a.m., arriving at Smolensk at 4.15 p.m., leaving Smolensk at 4.45 p.m., and arriving at Moscow 7.45 p.m. In the opposite direction the times are as follows : Moscow 6.30 a.m., Smolensk 9.30, leave Smolensk 10, arrive Königsberg 3.15 p.m. Machines will leave Königsberg on Sundays and Thursdays, and Moscow Sundays and Wednesdays. The railway journey between Berlin and Königsberg occupies 12½ hours, and the flight between Königsberg and Moscow 9 hours, giving a total of 22 hours, as compared with more than five days by train. The air mail fees are to be 8 marks for post cards and 8 marks for every 20 grammes in the case of letters.

CORRESPONDENCE

[*The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.*]

UNEMPLOYED GROUND ENGINEERS AND PILOTS

[2055.] I have been a constant reader of your valuable journal since the first issue, and am very keen on all matters appertaining to Aviation.

Having read, with much interest, the article in your issue of April 13, 1922, page 213, "What can we do with our sons?" I quite agree that the scheme of apprenticeship is quite good, but there is one big fact that most people overlook, viz.: "The present urgent need to absorb all the *unemployed qualified Air Ministry Ground Engineers and Pilots,*" before going to the expense and trouble of training fresh men who will, in all probability, go to add to the present long waiting lists.

I might add that I served and completed my apprenticeship to the Aviation industry with Messrs. A. V. Roe and Co., Ltd., Aeronautical Engineers, Manchester, London and Southampton, some eight years ago. In all I have had over ten years' Aviation experience, and am a fully qualified Air Ministry Ground Engineer, in Sections A, B, C and D, No. 40. Since April 16, 1921, I have been unable to obtain suitable employment.

"ONE OF THE SONS"

THE POSITION OF THE K.M.A.A. CUPS

[2056] After a somewhat protracted correspondence and an assiduous endeavour to ensure that the cups donated by such eminent gentlemen as Sir Chas. Wakefield, Messrs. A. W. Gamage, Grahame-White, E. C. Trollope, Percival Marshall (to mention but a few of those who presented cups and trophies to the now defunct K.M.A.A.) were put to the use for which they were intended, it would appear that at present they are in the custody of Mr. W. H. Akehurst (the Secretary of the K.M.A.A.), who claims that, before handing them over, a debt of a few pounds owing to him shall be paid.

I submit that it is high time those who gave cups were made cognisant of this pass. If a secretary of an association sees fit to settle accounts out of his own pocket, is it a legal position that he should hold the association's cups to ransom? I suggest that the donors concerned should appoint some other body to be responsible for them.

Until this is done there seems no possibility of model aeronautical enthusiasts taking advantage of what has already been given to further interest in this subject.

The present position cannot go on indefinitely.

J. J. CAMM

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PUBLICATIONS RECEIVED

Lektrik Lighting Connections. 7th Edition. A. P. Lundberg and Sons, 477-489, Liverpool Road, Holloway, N. 7. Price 1*s.* net.

Royal Air Force Memorial Fund: Second Report, January 1 to December 31, 1921. Royal Air Force Memorial Fund, 7, Iddesleigh House, Caxton Street, Westminster, S.W. 1.

Catalogue of the Collections in the Science Museum, South Kensington. Aeronautics. London: H.M. Stationery Office. Price 1*s.* 6*d.* net.

Atmospheric Pollution. Advisory Committee Report M.O. 249. Meteorological Office, Air Ministry. London: H.M. Stationery Office. Price 2*s.* net.

Proceedings of the Second Air Conference, held on February 7 *and* 8, 1922. London: H.M. Stationery Office. Price 3*s.* net.

Pictorial Calendar, April, 1922, *to April,* 1924. Handley Page Transport, Ltd., London Terminal Aerodrome, Croydon, Surrey.

Aeronautics: Catalogue of the Collection in the Science Museum, South Kensington, 1922. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 1*s.* 6*d.* net.

Verslagen en Verhandelingen van den Rijks-Studiedienst voor de Luchtvaart, Vol. I, 1921. Rijks-Studiedienst voor de Luchtvaart, Amsterdam, Holland.

Scientific Papers of the Bureau of Standards. No. 428. *The Radio Direction Finder and Its Application to Navigation.* Department of Commerce, Bureau of Standards, Washington, D.C., U.S.A.

Report No. 138. *The Drag of C Class Airship Hull with Varying Length of Cylindric Midships.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

THE LONDON AERO-MODELS ASSOCIATION

THE competition organised for the prize presented by Messrs. W. G. Evans and Sons, was held on Sunday, the 7th inst., at Wimbledon Common. Weather conditions were favourable, with the exception of a rather gusty wind.

The majority of the competitors failed to get off ground, partly owing to the rather rough ground and partly because of the wind, most models being tractors of the enclosed type. Mr. Herson and Mr. Bedford, however, accomplished good flights; Mr. Levy, who was flying an enclosed canard model, also getting away on one occasion. Results will be announced later.

A very good exhibition was given at the end of the competition before a large number of interested spectators.

L. G. H. HATFULL,
Assistant Secretary.

* * *

IN PARLIAMENT

R.A.F. Experimental and Reconditioning Work

MR. RAPER, on May 4, asked the Secretary of State for Air how many men are being employed at the Royal Aircraft Establishment on experimental work, and how many on reconditioning machines?

Captain Guest: The answer to the first question is, approximately, 606; to the second, none at present, but four or five will be shortly employed on reconditioning two of the machines used for experimental purposes.

Mr. Raper: Is it not a fact that this work of reconditioning machines could be carried out much better by civil aviation firms, and that it would be far more economical and would help to keep these firms going?

Captain Guest: If the hon. member will study the reply he will see that 606 men are employed on experimental work, and not on reconditioning, and that only four or five mechanics are to be employed on reconditioning two experimental machines. Reconditioning is being done by the trade.

* * *

Jules Verne Up-to-Date

MANY of the inventions imagined by Jules Verne—both aircraft and submarines—have already been realised, so who shall say that the design for a jet-propelled monoplane seaplane described by M. Maurice Armende in our French contemporary, *Les Ailes,* of May 4, will not materialise—some day? This machine is a cantilever monoplane with crescent-shaped wings and circular hull. The material of which this wonderful monoplane is built is stated to be a new composition called Neocellulose, into which is embedded structural members of metallic alloy. The wings are to be flexible, both vertically for dihedral and in a fore-and-aft direction for shifting the c.p. They are to be held in any position by being filled with gas under high pressure. A series of stepped jets at the tail end of the fuselage are to take the place of airscrews, and evidently their efficiency is expected to be fairly good, as the machine is expected to have a maximum speed of 560 m.p.h., the maximum horse-power being 10,600 h.p. The machine will only come down every few thousand miles, a flying tender taking passengers down to the ground or bringing them up from the various ports of call. The wing-span is to be 250 ft., and the wing area 5,400 sq. ft. *Some bird!*

NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

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The Aircraft Engineer and Airships

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xvi.)

INSULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent. London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

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OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
June 1	**Entries close for Schneider Cup Race**
June 3	**R.Ae.C. Whitsun Race Meeting, at Waddon**
June 23–25	**International Competition for Touring Aeroplanes, Brussels**
July 29 ..	**Aerial Derby, starting at Waddon**
Aug. 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT.

AS foreshadowed by Capt. Guest in his Budget Speech, with the resignation of Sir Frederick Sykes from the post of Controller-General of Civil Aviation that office has ceased to exist, and in its stead a new appointment is being established, to be known as the Directorate of Civil Aviation. Whatever may be one's opinion regarding the wisdom of this decision, few will quarrel with the selection of Maj.-Gen. Sir W. Sefton Brancker, K.C.B., A.F.C., for the post of Director of Civil Aviation. Sir Sefton Brancker is well known to all interested in aviation, and he carries to his new post qualities which should be of the greatest value during the difficult times that are in front of us. We say difficult because, with the growing realisation of the importance of aviation from a defence point of view, the day cannot be far distant when we *must* establish that "national striking force" upon which our safety depends, and whose necessity has been so well advocated by General Groves in *The Times* lately. As such a force can only be established by developing civil aviation, to Gen. Sir Sefton Brancker will fall the task of co-operating with the leaders of the R.A.F. in the planning of the separate yet interdependent civil and military air organisations which shall ensure the necessary liaison.

The New Director of Civil Aviation

Sir Sefton Brancker's appointment will be welcomed because he is intensely enthusiastic about the future of aviation ; because he has sufficient common sense not to be misled or hoodwinked ; and because he was never afraid of speaking his mind, no matter to whom he was addressing his remarks. The fact that his position will not be quite on the same plane as that of a C.G.C.A. will not matter greatly to Sir Sefton Brancker. He will not, presumably, have a seat on the Air Council, but he is not the man to be discouraged by such a handicap, and it may be taken for granted that he will see to it that his views and recommendations are conveyed to the right quarters, and forcibly brought before the authorities. The onus of acting upon such advice will then rest upon the Government, and as we have little doubt that the new D. of C.A. will have a very large body of public opinion behind him, we look forward to his term of office with every confidence.

At the same time, if Sir Sefton Brancker is to do for aviation and for the Empire what we are sure he is determined to do, he must be given every assistance, and, as he himself said in a letter to the Air League of the British Empire, expenditure can only be justified when supported by a strong body of public opinion. We in FLIGHT have always done our best to impress upon the public the vital importance to the Empire of air power. There are signs that the daily press is also beginning to realise the fact, and hence we are hopeful of the future. Once let the man in the street realise how really urgent is the need for aerial preparedness, and public opinion will be so strong that no Government would dare to oppose it. As D. of C.A. Sir Sefton Brancker will do his share. It is up to the general public to see that the Government ceases to fool upon our national security.

◆ ◆ ◆

South African Ratification of International Air Convention

In the Union of South Africa Government *Gazette* of February 1, 1922, we are pleased to see that a Bill was included "to enable effect to be given to the International Convention for regulating air navigation, and to make provision for the control, regulation and encouragement of flying within the Union, and for other purposes identical thereto." The Aviation Act, 1922, as the new Act may be cited "for all purposes," provides for the ratification on behalf of the Union of South Africa, by His Majesty the King, of the International Air Convention signed in Paris on October 13, 1919.

The Bill confers upon the Governor-General powers to ratify any amendments of or additions to the Convention, to make regulations relating to the licensing, inspection, etc., of aircraft and aerodromes, the issue of certificates, and, in short, to act in the general interests of the Union, always in conformity with, as far as they affect it, the International Air Convention. According to the Bill, the Governor-General may appoint a civil air board consisting of not more than seven persons, to act in an advisory capacity and advise as to regulations made under the Act, matters arising out of the application to the Union of the rules made under the Convention, the encouragement of flying, and proposals for establishment of air services.

The Bill provides that in case of emergency the Governor-General may declare the Union or parts thereof to be restricted area and issue orders and instructions in respect of such restricted areas, as well as taking possession of and using for purposes of defence any aircraft or aerodrome in the Union, subject to payment of compensation. The Bill also requires all public aerodromes to be licensed or approved by a duly prescribed authority.

The investigation of accidents has been given due attention, and the Act prescribes that the Minister (presumably of Posts and Telegraphs, who introduced the Bill) may appoint one or more persons as a board of enquiry to make investigations into accidents. The accident enquiry board is to be given power to examine witnesses on oath and to call for the production of log books, licences, etc.

We might quote from the Bill a number of other provisions made for various contingencies, but suffice it to say that, taken as a whole, the Bill appears to be modelled on very sensible lines, and should go a long way towards establishing aviation in South Africa on sound lines as regards legislation. It is to be hoped that the introduction of this Bill will mark the beginning of a vigorous policy on the part of the Union Government, so that South Africa may take the place in the world's aviation to which her importance and geographical conditions entitle her.

◆ ◆ ◆

The Airship Scheme

The airship scheme submitted to the Air Ministry some weeks ago by Commander Burney, and in which Messrs. Vickers, Ltd., and the "Shell" group were to interest themselves, was at first turned down, it may be remembered, the reason given being that, in the view of the Government, the financial guarantees asked for were too large. A modified scheme was then submitted in which the company, if the scheme was accepted, undertook to refund to the Government certain moneys after a period of years. The latest proposal has now been considered by the Air Council, and the following reply has been made by the Air Ministry :—

> The Air Council have had under further consideration your latest proposals for the establishment of a commercial line of airships to India and to Australia, and I am directed to inform you that, in the opinion of the Air Council, the scheme as now put forward by you constitutes a notable advance upon any other scheme for the utilisation of airships in connection with Imperial communications which has previously been submitted to the Air Council.
>
> They further consider that, with certain additions, given below, the scheme offers a reasonable prospect of being able to operate ships satisfactorily between India and this country, subject to definite recognition of the fact that any undertaking involving the regular use of airships as a means of communication must necessarily be of a highly speculative nature, especially from the commercial point of view.
>
> (1) The number of airships to be provided to be increased from five to six.
>
> (2) An airship base, complete with airship shed, and the necessary plant, to be erected in India.
>
> The Air Council are at this stage unable to make any statement regarding the financial aspect of the scheme.

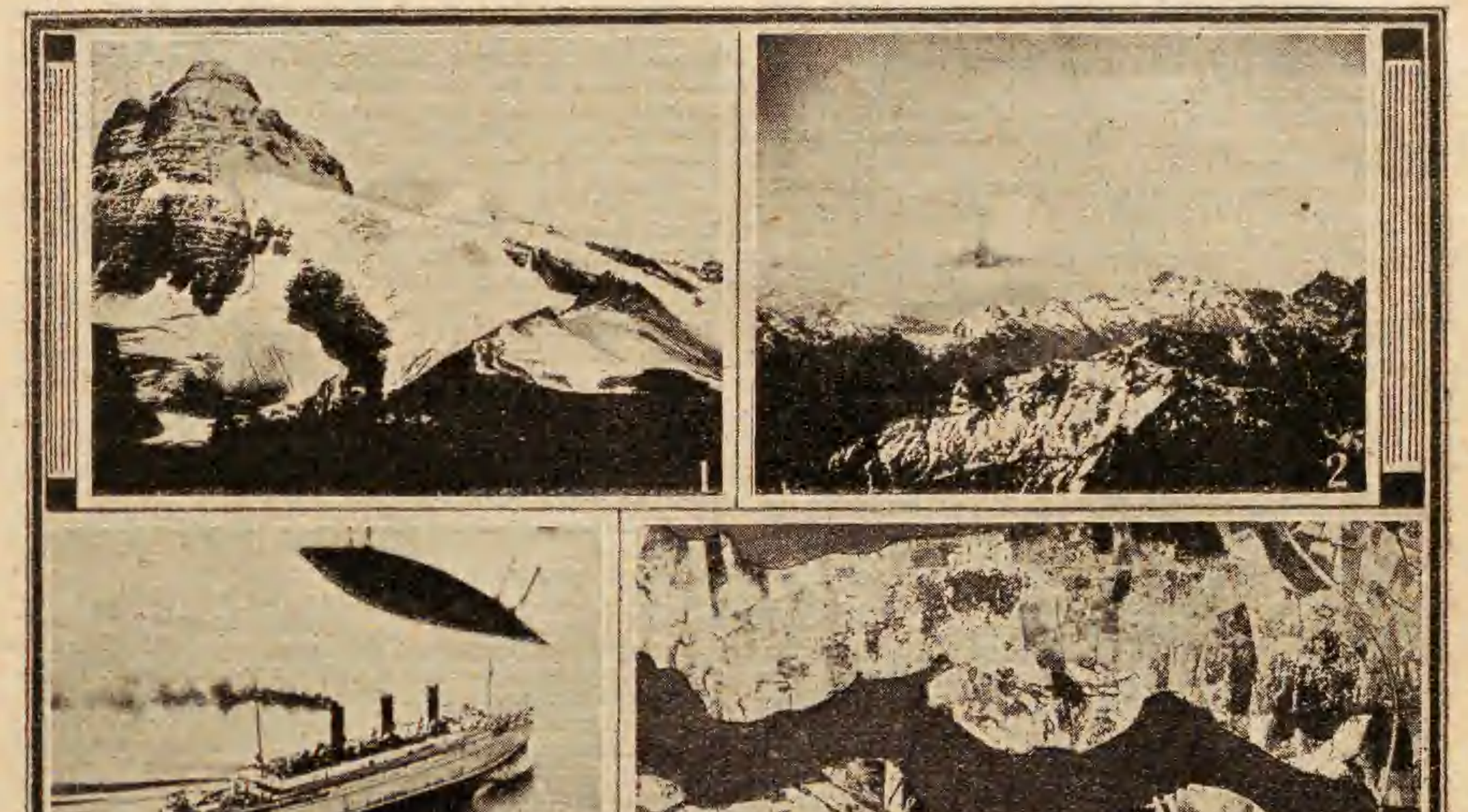
So far as it goes, this reply from the Air Ministry is satisfactory. There still remains the financial aspect, to be studied by the Air Ministry and the Treasury. The reply, following the deliberations of these two bodies, may be less favourable. We say may, although we do not necessarily think it will be. For one thing, it seems possible that, if the scheme is turned down on financial grounds by the Air Ministry, the Admiralty may interest itself in it. It is well known that the Admiralty "turned down" airships on financial grounds, and if this scheme could be so worked as to give the Admiralty a certain interest in the undertaking at relatively low cost, some arrangement might be reached whereby the Admiralty would sponsor the scheme, or a somewhat similar one.

It is, however, unlikely that the Air Ministry would like the Admiralty to come forward and take up the "fathering" of the proposed scheme, and this fact may, conceivably, influence the Air Ministry to the extent of causing the suggestions of Commander Burney to be accepted. At any rate, the prospects for airships are, we think, brighter than they have been for a long time.

CANADA'S USE OF SEAPLANES

A Lesson to the "Old Country"

It has repeatedly been pointed out in FLIGHT that for some unknown and inexplicable reason the seaplane, the type of aircraft which one would naturally expect to have received a maximum of development, has been very stepmotherly treated in this country. Separated as the parts of our Empire are by leagues of ocean, it might have been taken for granted that aircraft making the sea its "aerodrome" would be the first type to come to mind in speculating on the possibilities of linking up the Mother Country with the Colonies and Dominions. Yet, as we have already remarked, the seaplane, for lack of encouragement, is at the stage of development where land machines were five or six years ago. But



AERIAL PHOTOGRAPHS ILLUSTRATING ACTIVITIES OF CANADIAN FLYING OPERATIONS BRANCH DURING SUMMER SEASON OF 1921 : 1. Unnamed peak, Maligne Lake, Jasper Park, Alta. 2. Cascade Mountains, near Vancouver, B.C., illustrating reconnaissance flight for Primary Triangulation Scheme, Geodetic Survey Branch. 3. "Empress of Russia" escorted into Vancouver, B.C., illustrating Customs Patrols for prevention of drug smuggling. 4. "Mosaic" of St. Lawrence River and Canal, Cornwall, Ont. 5. St. Lawrence River and Canal System, Valleyfield, P.Q., illustrates photographic reconnaissance of international deep waterways system for Great Lakes ocean-going traffic scheme. 6. Hudson Bay fort at Norway House, L. Winnipeg, illustrates forest reconnaissance and fire protection, and survey of Northern Areas for Land Drainage and Reclamation Projects.

for the enthusiasm and far-sightedness of a very few firms with confidence in the ultimate importance of the seaplanes, we might have been in a position even worse than that which actually obtains.

Although there are signs that the gospel preached by Flight is beginning to bear fruit, progress is far less rapid than it ought to be, and the following notes, dealing with the use of seaplanes in Canada, are therefore published with a view to furnishing an example of what can be done, even with relatively antiquated machines. It does not require a great deal of imagination to picture other uses for really modern seaplanes, not to mention the things of which the seaplane of the near future will be capable. In these remarks about seaplanes we include its most recent development the amphibian, which is, of course, a seaplane provided with some form of wheel undercarriage which allows the machine to alight on land as easily as it alights on the sea.

The following notes are extracts from and comments on some of the activities of the Flying Operations Branch of the Canadian Government Civil Aviation. It should be pointed out that these notes include a small portion only of the work done, many other operations no less useful having been carried out by land machines.

During August and September of 1921 routine patrols were carried out from the Air Station at Vancouver. The work included weekly inspection trips covering the Provincial Government's forests and the Dominion Forest Belt. Also transportation to inaccessible regions for the Geodetic Survey Branch of the Department of Marine and Fisheries, inspection trips for the Fisheries Branch, and preventative patrols for the Department of Customs and Inland Revenue. The machines used were one F. 3 and three H.S. 2 L. flying boats.

At Victoria Beach, Man., two F. 3 and one H.S. 2 L. flying boats were used during August and September, and patrols were carried out on behalf of the Forestry Branch, valuable results being obtained in locating and fighting forest fires, in the transportation of survey parties to inaccessible regions, and in inspection trips for district inspectors, fire rangers, and other officers of the Government, which would occupy too much time if undertaken by canoe route. A weekly patrol was flown from Victoria Beach to Norway House at the head of Lake Winnipeg, and return *via* Lake Winnipegosis and Lake Manitoba. This patrol covered over 800 miles, and was accomplished in from ten to twelve hours' flying.

Also during August and September, 1921, the Northern Ontario Mobile Unit did a lot of very useful work for the Government of Ontario, in the nature mostly of forest reconnaissance and timber cruising over certain blocks of land north of the Trans-Continental railway. The forest types and extent of growth were sketched-in from the air, and landings were made at frequent intervals in order to send men in on foot to check the details secured from the air. The official report states that "These cruises on foot have indicated in every case that the types sketched-in from the air are correct, and that, therefore, the aerial cruise, occupying as it does so little time, is very valuable." Although fire protection was not the primary purpose of the Mobile Unit, forest fires were reported, and on occasion fire rangers have been flown to the scene of the fires. The machines used were three H.S. 2 L. flying boats.

The Air Station at Ottawa, Ontario, is equipped with both land machines and seaplanes. Of the activities of the latter, which include one H.S. 2 L. flying boat and one Avro seaplane, mention may be made of photographic survey work, including a photographic survey of the St. Lawrence River and Canal system. Vertical and oblique photographs were secured of points where works are proposed. A photographic survey of the Welland Canal, showing the old canal and the work done on the new canal, was also completed, and certain photographic survey work of the Gatineau Valley was carried out for the Geodetic Survey Branch.

The Air Station at Roberval, Lake St. John, P.Q., carried out forest fire patrols and timber sketching on behalf of the Government of Quebec, the machines on several occasions being within a few miles of Lake Mistassini. Petrol has been "cached" at distant points so that operations further afield may be undertaken this year. The machines used by this station were three H.S. 2 L. flying boats.

Operations of Special Interest

In the foregoing notes only the merest outline has been given of the work undertaken. Certain special flights and operations deserve, however, more detailed reference, and in the following we shall endeavour to give, within the space at our disposal, more specific instances of the manner in which the various classes of work were undertaken and the results obtained, as well as the considered opinions of the various officials (outside the Canadian Air Force) for whom the work was undertaken. As these officials are not in any way prejudiced in favour of doing their work by the aid of aircraft, but are merely concerned with the most efficient way of doing that work, their opinions carry a good deal more weight than that of C.A.F. officers, who might be accused of being too enthusiastic and of looking upon the possibilities of aircraft in an optimistic light.

A 1,000 Miles Demonstration Flight.—Early in August, 1921, a 1,000 miles demonstration flight was undertaken, entailing a complete circuit of Lakes Winnipeg, Winnipegosis and part of Lake Manitoba, and as far north as The Pas and Cumberland House. This flight was undertaken for the District Forest Inspector for Manitoba, Lieut.-Col. H. I. Stevenson, who was taken as passenger throughout the trip. The object of the flight was twofold :—(*a*) To enable a special investigation to be made of the possibilities of instituting aerial forest patrols over virtually the whole of the forest areas of Northern Manitoba, and (*b*) to enable District Fire Rangers to be taken up and flown over their respective districts.

The route followed, starting and finishing at Victoria Beach Station, was as follows :—Victoria Beach, Manigotogan, Berens River, Norway House, The Pas, Cumberland House, Cedar Lake, Grand Rapids, Winnipegosis, Sturgeon Bay and Victoria Beach. Stops were made at Norway House, The Pas, Cumberland House and Winnipegosis, where District Fire Rangers were flown over their respective areas and given a comprehensive view of the topographical features of the country.

As a commentary on the possibilities of use of aircraft for work of this kind we quote the following from a letter sent to the Air Board of Canada by Dr. Wallace, Commissioner for Northern Manitoba :—

"More than anything I had previously imagined, this trip impressed me with the future of the Air Service in northern territory. I obtained a grasp of the topography and water system in the Saskatchewan River Valley that I had not had any clear conception of. I have had considerable experience in mapping territory from the canoe, and feel satisfied and more than ever impressed with the conviction that the only way in which northern territory can be mapped is by the camera from the air."

In connection with this flight, we cannot refrain from quoting certain passages from the report sent by Lt.-Col. Stevenson, District Forest Inspector for Manitoba, to the Director of Forestry, Ottawa :—

"From my observations I am thoroughly convinced that flying boats are very far ahead of our present method of patrols. We could always see from 30 to 50 miles on either side of the 'plane, and it would be no difficulty to locate smoke at this distance. When you compare this with a canoe travelling up a river with high banks, where it is impossible to see more than 100 yards in either direction, and where the patrol would be unable to notice smoke unless it were driven down over him, the advantage is entirely on the side of the 'plane. By reading the diaries of the fire rangers, I find that in a great many instances, even though they see smoke, they spend days in locating the fire, and I am convinced that half of the fires which occur are never located or reported. On the other hand, the aeroplane is able to fly directly to the scene of the smoke and land on a nearby lake. We have already proved this conclusively, as we have observed smoke, located the fire, taken men into the fire district and extinguished the fire in five cases already, east of Lake Winnipeg.

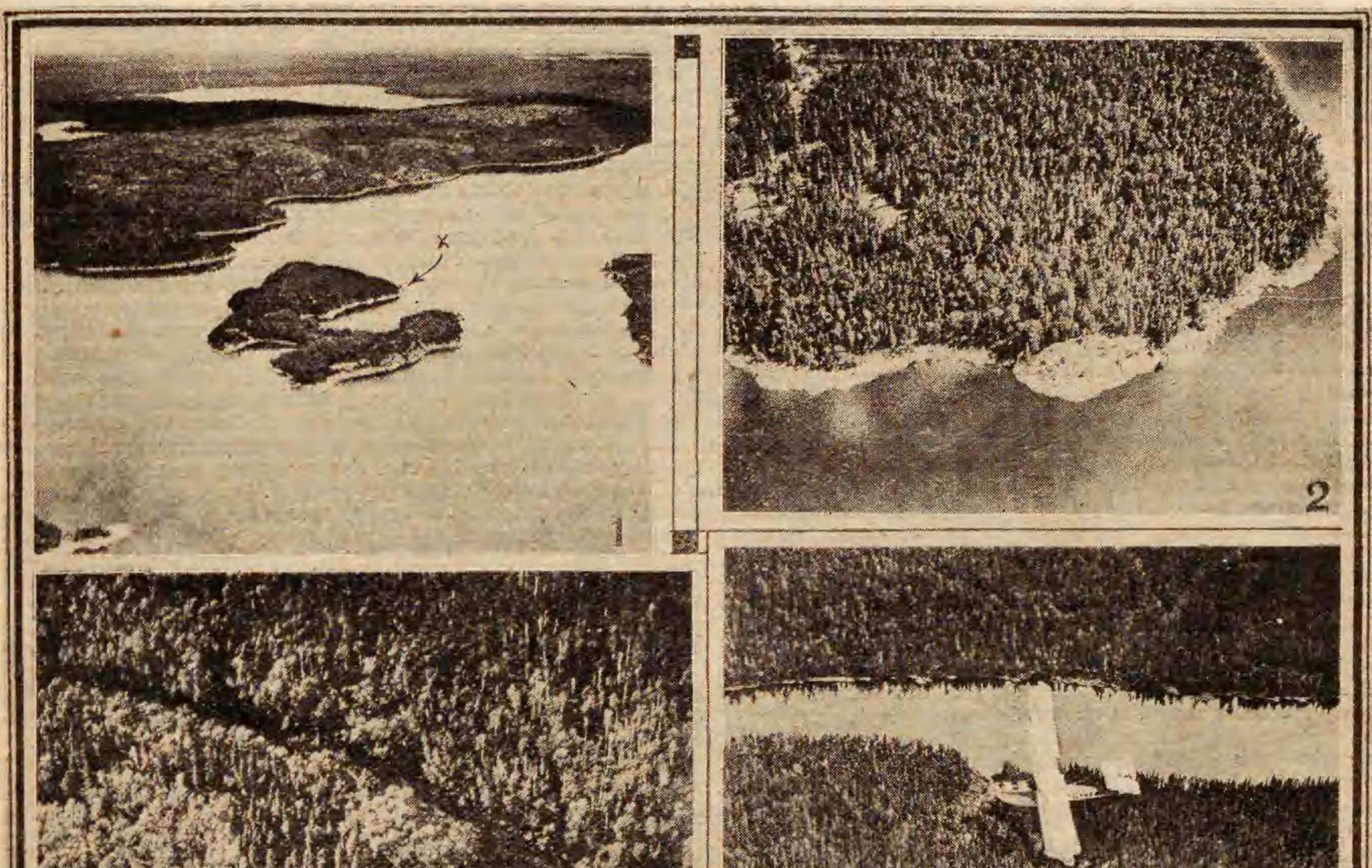
"I have discussed the use of 'planes very fully with the three District Fire Rangers, and they agree with me that one seaplane of the F.3 type located at Norway House and one at The Pas, in addition to the main base at Victoria Beach, would be able to do all the work at present done by ground patrol in these districts, and do it a hundred times more efficiently.

"I believe that next year, provided we can be supplied with the machines, it would be possible to do away entirely with the ground men and canoes, keeping the District Fire Rangers, and possibly two men, who would make trips with the machines and take charge of the fire fighting crews in the event of fire. In this way we could fight two or three fires in each district.

"If it were possible I should like to extend the work at once. I am thoroughly convinced that patrol with canoes is obsolete, and also convinced that it will be possible to do the work more efficiently with aircraft and at considerably less cost than our present methods."

Reconnaissance of Flooded Areas.—On the occasion of the above-mentioned flight of 1,000 miles, advantage was taken of an opportunity to use seaplanes for reconnaissance and survey of flooded areas in connection with land drainage and reclamation projects. Mr. G. F. Horsey, Hydraulic Engineer of the Reclamation Service, was engaged on a survey of the Carrot River Triangle district for a proposed drainage project involving the reclamation of approximately 900,000 acres of land. Having experienced very great difficulty in conducting his survey on foot, owing to the floods and swamps, Mr. Horsey decided to give the seaplane a trial. A special flight was accordingly made over the Carrot River Triangle district, with Mr. Horsey on board. In his report to the Director of the Reclamation Service, Ottawa, Mr. Horsey wrote, among other things :—

"Through Dr. Wallace, Commissioner of Northern Manitoba, and Lt.-Col. Stevenson, I met the Air Board's Station Superintendent, Major Hobbs, who kindly consented to stop over a day and take me over the Triangle in his 'plane. We started from The Pas at 6 p.m. and returned at 8 p.m., spending two hours in the air and covering approximately 120



AERIAL "OBLIQUE" PHOTOGRAPHS, ILLUSTRATING FOREST RECONNAISSANCE, TIMBER CRUISING AND FIRE PROTECTION AS CARRIED OUT BY SEAPLANE IN CANADA : 1. Distant view of forest and lake area ; altitude 3,000 ft. Note point of land x. 2. Nearer view of point of land shown at x in 1; altitude 1,000 ft. 3. "Close-up" view of same area, showing actual timber types ; altitude 200 ft. 4. A flying boat on patrol, as seen from another machine flying above it. 5. Landing supplies for fire fighters on a lake near the scene of the fire. 6. Comparison of the old and the new way. The former is illustrated in the photograph by the look-out tower at Norway House, Lake Winnipeg, photographed from the seaplane which provides the new way.

miles, going nearly due west from The Pas, crossing Saskeram Lake and then following the Saskatchewan River to within about 20 or 25 miles of the Sipanok Channel, and flying at a height of from 1,000 to 4,000 ft. We were only able in two hours to cover a part of the interior.

"I cannot speak too highly of the benefit derived from a flight of this kind in connection with survey work on a project of the magnitude of the proposed Carrot River Triangle Drainage Project, involving as it does an area of from 800,000 to 900,000 acres, a large part of which is practically inaccessible in the summer season on account of the flooded condition of the interior. Much of this district is unsurveyed, and very little information of the topographical features of this section is obtainable without running a traverse survey. From the air you can see the various drainage channels in the interior quite distinctly, and information of this kind would prove of great value in determining to a large extent where it would be necessary to run our interior traverse lines and where lines would not be necessary, thereby saving time and money. Information regarding the timber in the interior could also be obtained.

"From my personal experience I feel confident that I obtained more general information of the area covered in the two hours' flight that I made in the air than I could have learned in a month's trip on foot in the late fall or winter when it is only possible to travel in this section."

Geodetic Survey in British Columbia.—During the summer of last year Mr. H. F. Lambart, Engineer of the Geodetic Survey Branch, was engaged upon establishing a preliminary triangulation scheme in British Columbia, and with the assistance of seaplanes from the Vancouver Air Station, the work was very greatly facilitated, a considerable saving both in time and expense being effected. In Geodetic Survey operations, one of the main problems is to find means of viewing the country so as to enable the engineer to determine and identify the position of the points constituting his triangulation scheme. To minimise as far as possible the fatigue and loss of time in long excursions over bad country or through almost impassable woods, extension ladders and temporarily erected wooden towers have to be resorted to. One of these, at Norway House, is shown in one of the accompanying illustrations. By making use of seaplanes, observations could be made rapidly and easily at any point desired, and thus the work was greatly facilitated. We can do no better than note the assistance rendered by seaplanes in the words of Mr. Lambart in a report to the Air Board of Canada :—" Now, through the introduction of the aeroplane [Should have been seaplane, strictly speaking—Ed., Flight], " for the first time as far as I know," Mr. Lambart says, " into this class of survey work, we have met with signal success, and established a record not hitherto approached by this Survey.

"It is very difficult indeed to give any comparisons that are reliable, as conditions differ so greatly, but we have arrived at some rough, and which we think conservative, conclusions as follows :—Firstly, that the ground covered this summer (300 miles) in the short period from June 1 to the end of August, was three times more than could have been covered by any of the previously known methods ; and secondly, that the saving in expense as a direct result of the assistance rendered by aircraft was over twelve thousand dollars.

"Although it is possible the soundness of these conclusions may be disputed, there is, however, no doubt whatever left in my mind as to the certainty that this Survey has secured through one of the most rugged portions of the Dominion a primary system of triangulation which would be difficult to improve without increasing the cost of the ultimate survey beyond all reason.

"The greatest benefit has been derived from the reconnaissance flights, giving a clear and distinct view of the whole country and making it possible to secure a careful and detailed inspection of the points selected for the stations of the scheme. The information so obtained can hardly be over-estimated, and is not realised until the actual ground work on the stations is taken in hand.

"We are earnestly looking forward to a vigorous pursuance of this work next summer with a still greater use of aircraft, and feel confident of being able to turn out final results of the Survey, for the use of the surveyor and engineer in general, years in advance of what would otherwise be possible."

Observation and Photographic Reconnaissance of Mosquito-breeding Areas.—The valuable assistance of seaplanes in materially aiding investigations into the mosquito pest of low-lying swampy areas was strikingly demonstrated in operations carried out from the Vancouver Air Station over sections of the Lower Fraser Valley, B.C. Following are extracts of what Mr. Eric Hearle, Entomologist of the Entomological Branch of the Department of Agriculture, said in a report submitted to the Air Board :—

"I would like to state my appreciation of the courtesy and co-operation that the officials of the Air Board have shown in connection with our investigations of mosquito breeding areas in B.C., and I may say that nothing has helped us to a satisfactory conclusion of our investigations in the Fraser Valley, so much as the observation flights and aerial photographs undertaken by the Air Board.

"For years there have been demands for an investigation into the mosquito pest of the Fraser Valley, B.C. During bad seasons all outdoor activities have been seriously affected, lumber camps have been obliged to close down, small fruit picking has been much hampered, and great material loss has been incurred through the drop in milk production in the dairy sections. Cases are even on record where cattle have actually succumbed through the attacks of mosquitoes.

"For two years efforts were made by various surveys (by auto., on foot, and by boat) to locate and define the position and extent of the various breeding areas (which often ran to many thousand acres). It was found impossible to obtain sufficient data over such an extensive territory, and the value of aerial surveys in this connection presented itself. The results obtained during the present season have justified our expectations, and I am of the conclusion that this is the most feasible method of covering such an extensive territory, where detailed maps are not available. From the observation flights and the aerial photographs we have been able to more or less accurately map the important breeding areas, showing the extent of flooding at 17 ft. 6 ins., and the more extensive flooding at levels where conditions suitable for a serious outbreak occur.

"The field notes obtained during the flights, together with the photographs, have enabled us to obtain a comprehensive idea of the Fraser Valley situation, and have placed us in a position to make concrete recommendations dealing with the control of the pest."

Geological Reconnaissance by Air in Northern Ontario.—Another example of the useful work done by seaplanes in Canada is provided by the account of a seaplane flight made by a machine belonging to the Air Board Mobile Unit at Sioux Lookout, Northern Ontario. This flight was made to assist in the geological examination of that district by the Mines Department of the Government of Ontario. Prof. E. L. Bruce, of the Dept. of Mineralogy, was the geologist taken up as observer on this occasion. The nature and importance of the geological information which he was able to obtain from the air in a few hours' flying are set out in a report by Prof. Bruce, from which the following passages are quoted :—

"The district lying north of Sioux Lookout is a network of lakes, of which the southern ones drain to Lake Winnipeg, the northern to the Albany River and James Bay. From the railway to Lake St. Joseph required for our survey party, with outfit, four days of travel. By seaplane the distance was made in a little over one hour. . . . Most of that district between the railway and Lake St. Joseph is practically unmapped, and many large lakes are not shown at all or very imperfectly. Of those shown on Map No. 9a of the Geological Survey of Canada, Green Grass Lake is one of the largest. Its outline is quite different from that on the map. Long Lake lies a considerable distance to the east of Green Grass Lake. The flight did not take us over this, but it was recognisable to the eastward of our course. It is narrower than mapped, and the bend in the middle of the lake is more pronounced than shown. The lakes not shown at all are almost numberless, and vary in size from mere ponds to lakes larger than Green Grass Lake. . . .

"Geologically some additions to the previous knowledge of the districts were made, even by this brief aerial examination. On map No. 9a of the Geological Survey the district about Green Grass Lake is left uncoloured, indicating lack of geological information. This solid rock is undoubtedly granite. Ridges of that rock were easily recognisable for considerable distances in all directions from the lake during our flight over that part of the area.

"These are briefly the observations made during the flight, and they seem to indicate that much time and labour could be saved by using a seaplane for a few days in examining an area such as that about Lake St. Joseph. It would be possible in this way to eliminate from ordinary detailed geological examination the areas of granite which are not important economically, and the areas where the solid rocks are covered by heavy glacial débris. This would leave the geologist more time for the exploration of the areas of promising rocks, and so make it possible to cover larger areas in the field season."

Photographic Surveys of St. Croix River, N.B.—Vertical and oblique photographs of portions of the St Croix River, which forms the International Boundary between the Province of New Brunswick and the State of Maine, were undertaken by seaplane from the Halifax Air Station on behalf of the International Boundary Commission. Sections of the river in the vicinity of St. Stephen, Oak Bay and Milltown were covered, and proved of value to the Commission, as they reproduced exactly all natural features, and supplemented the surveys already made by their engineers.

We could mention a number of other examples of the way in which Canada is making use of the seaplane, but sufficient has, we think, been said to indicate that not only the Canadian Air Board, but a very great number of other Canadian Government Departments are fully alive to its possibilities. Comparison with the attitude towards the seaplane at home leaves one with a feeling that all is not well. We willingly grant that Canada has facilities and possibilities which do not exist in England, but a very great deal might be done towards a greater utilisation of the seaplane than is the case, even if the purposes for which it was used were somewhat different. But that is another story, to which we may return at a later date. In the meantime, we congratulate Canada on its energetic Air Board, and on its other progressive and wide-awake Government departments. They have provided us with an excellent example to follow.

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A NEW GAS FOR AIRSHIPS

According to our American contemporary *Aerial Age*, the new gas for airships, "Currenium," which has been discovered was demonstrated recently at Los Angeles. This gas possesses a lift about equal to hydrogen, and has non-inflammable and non-explosive qualities which should render it a valuable asset in connection with airship work. It is a manufactured gas, and can be produced in any quantity by an electrolytic process at an estimated cost of $30 per thousand cubic feet, $100 less than it costs to produce helium.

"Currenium" has been developed by Dr. Edward Curran, head of the research department of the International Transportation Co., of Los Angeles. It is the result of several years of research work on the part of Dr. Curran, who produced the gas successfully in 1918, since when he has continued the development of the process, and has succeeded in producing a 100 per cent. purity gas. As a result a new company has been formed known as "Airway Load Carriers," a combination of the International Co. and the Hall Aeroplane Co., and both the new gas and the Hall "Helicoidal" propellers will be put to practical use.

The new gas weighs 6.2 lbs. per 1,000 cubic ft. at a barometric pressure of 30 ins. and a temperature of 40° F. Its lift under these conditions is, therefore, 73.8 lbs. per cubic ft. In the demonstration, previously referred to, made by Dr. Curran a flame was passed through the gas and an electric spark inserted in it without occasioning fire or explosion. The purity was allowed to drop below 80 per cent., with similar results. A small elongated balloon was filled with "Currenium" of low purity, and a flame applied to the end of the balloon. The gas did not explode, and the balloon was only burned where it came into contact with the flame—the gas escaping through the hole thus made. Under certain conditions of extremely low purity—which would never be allowed to exist in aircraft—it was found possible to unite "Currenium" with oxygen and air, and cause a flame, but without explosion.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN MAY 7 AND May 13, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	60	104	16	42	58	2 27	Breguet F-CMAC (1h. 43m.)	B. (3), D.H. 4 (2), D.H. 9 (1), D.H. 18 (3), D.H. 34 (5), G. (8), H.P. (3), Sp. (6).
Paris–Croydon	62	145	8	38	62	2 43	D.H. 4a G-EAWH (2h. 2m.)	B. (4), D.H. 4 (2), D.H. 9 (1), D.H. 18 (3), D.H. 34 (5), G. (8), H.P. (2), Sp. (7).
Croydon–Rotterdam–Amsterdam.	6	1	6	6	6	2 33	Fokker H-NABQ (2h. 23m.)	F. (3).
Amsterdam–Rotterdam–Croydon.	7	4	6	6	7	3 11	Fokker H-NABM (2h. 21m.)	F. (5).
Totals for week ...	135	254	36	92	133		*Note.*—Four trips to Rotterdam, and six trips from Rotterdam.	

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc. :—Co. des Grandes Expresses Aériennes ; Daimler Hire, Ltd. ; Handley Page Transport, Ltd. ; Instone Air Line ; Koninklijkie Luchtvaart Maatschappij ; Messageries Aériennes ; Syndicat National pour l'Étude des Transports Aériens ; Co. Transaérienne.

Incidental Flying.—Five D.H. 9's were on test for the Aircraft Disposal Co., Capt. Stocken taking four, and Maj. Foot one. During the week numerous flights were made between Croydon–Brussels—mainly in connection with the Royal visit to Belgium—by the Aircraft Disposal Co., De Havilland Aircraft Co., Instone Air Line and Surrey Flying Services.

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Cunard Enterprise

The Cunard Company have arranged with the Compagnie Aérienne Française, as from June 1, for fast aeroplanes to connect with the arrival and departure of the giant Cunarders calling at Cherbourg. By using this air service the passengers will save at least five hours in the journey to and from Paris. For passengers arriving at the French port from New York a motor-car will be waiting and will proceed to the aerodrome, from which they will fly direct to the capital. Outward-bound passengers from Paris will be able to arrange for an aerodrome motor-car to call for them at their hotel. It is possible to take a certain amount of baggage.

LONDON TERMINAL AERODROME

Monday Evening, May 15.

Having regard to the number of machines now employed on the London-Paris airway, there is for the time being plenty of accommodation for passengers, and until the rush which is anticipated materialises, there need be no fear of the public being disappointed should they be last-minute passengers. Competition is keen, and what some of those who are watching the situation closely believe will happen is, that the French air-lines will suddenly decide to "cut" the fares again, and so create a new air transport crisis.

The Goliath belonging to the Grands Express which came to grief in an encounter with the wall of one of the sheds, and had the fore part of the cabin demolished, has now been neatly patched. The cabin has been made up square with a piece of three-ply, giving the machine a square nose. In this state it is to be flown back to Paris for proper repairs, and there is comment on the 'drome as to what will be the duration of the journey with the added resistance of this square nose.

The Marconi Company have now got into their new office, and have installed a wireless set for listening-in to hear that all is going well with the airway wireless installations both in the machines and on the ground.

Since the daily papers have begun their great "shout" about wireless in the home the Marconi officials on the aerodrome have been having a busy time answering enquiries from members of the aerodrome staffs as to the possibility of fitting up home wireless sets. Lest enthusiasts should be led away by statements that, with any wireless listening-in sets bought for £5, they would be able to hear wireless conversations on the airway, I hasten to pass on the information, obtained from one of the Marconi people, that such a set would cost in the neighbourhood of £30.

"Air Express" Sheds a Wheel

Mr. Bradly, while piloting one of the Instone D.H.34's on a return trip from Paris on Thursday, had the misfortune to shed a wheel on alighting at Croydon. He made quite a good landing, but immediately after he touched the ground one wheel came off and the machine immediately stood on her nose.

Mr. Bradly was unhurt, and there were no passengers on board. The engine, too, Mr. Hall informs me, is practically undamaged, but is to be overhauled as a precautionary measure. Owing to the construction of the 34's, with removable noses, it will only be necessary to put in a new nose and engine to have the machine on the service again.

The Surrey Flying Services, and the De Havilland Aircraft Company, have been reaping a harvest during the King's visit to Belgium. The various newspapers have been competing with one another in obtaining up-to-the-minute photographs of the visit, and aeroplanes belonging to these two companies have been flying between London and Brussels, or some part of the battlefields, every day for the past week. Mr. Muir, of the Surrey Flying Services, has been using a Martinsyde loaned to him by the Aircraft Disposal Company, while the De Havilland Company have been using their three-seater "air-taxi" 9's. On Saturday the Instone D.H.4 flew over to St. Inglevert to pick up photographs, and, flying back to Croydon with these in the late afternoon, continued on to Manchester with photographs for a northern paper.

Signalling the Approach of Incoming Machines

The old electric bell which was, at one time, used to announce the arrival of machines has been replaced by a powerful klaxon horn, also operated electrically. Now a system of signalling has been devised to avoid confusion as to what aeroplane is arriving, and thus preventing all the officials and mechanics of all the firms from immediately rushing out of their offices and sheds to see what machine it is. In future, after the first long warning signal on the klaxon, there will be a pause and then the initial letter of the company to whom the approaching machine belongs will be given in the Morse code.

On Tuesday next the two new Handley Page W.8B's are to be officially christened by the new Director of Civil Aviation, Maj.-Gen. Sir W. S. Brancker. I understand that on this occasion we shall see what these machines can do in the way of passenger carrying. Both machines have already been on the service, and the pilots speak highly of them. Certainly they are the most comfortably equipped "air expresses" from the passengers' point of view which have, as yet, been placed on the London–Paris airway.

The Vickers "Vulcan" has not yet been delivered at Croydon. I understand that her designer is not quite satisfied with the machine yet, as it is not lifting its full load by something like 200 lbs. Slight alterations are being made which will put this right. The Instone Air Line are anxiously awaiting this machine, for, with the new regular service to Brussels, they will want all the machines they can get hold of to carry out their scheduled services. Several of the Instone pilots have been flying round on the Hispano-Westland during the week, in order to have this put on their licences.

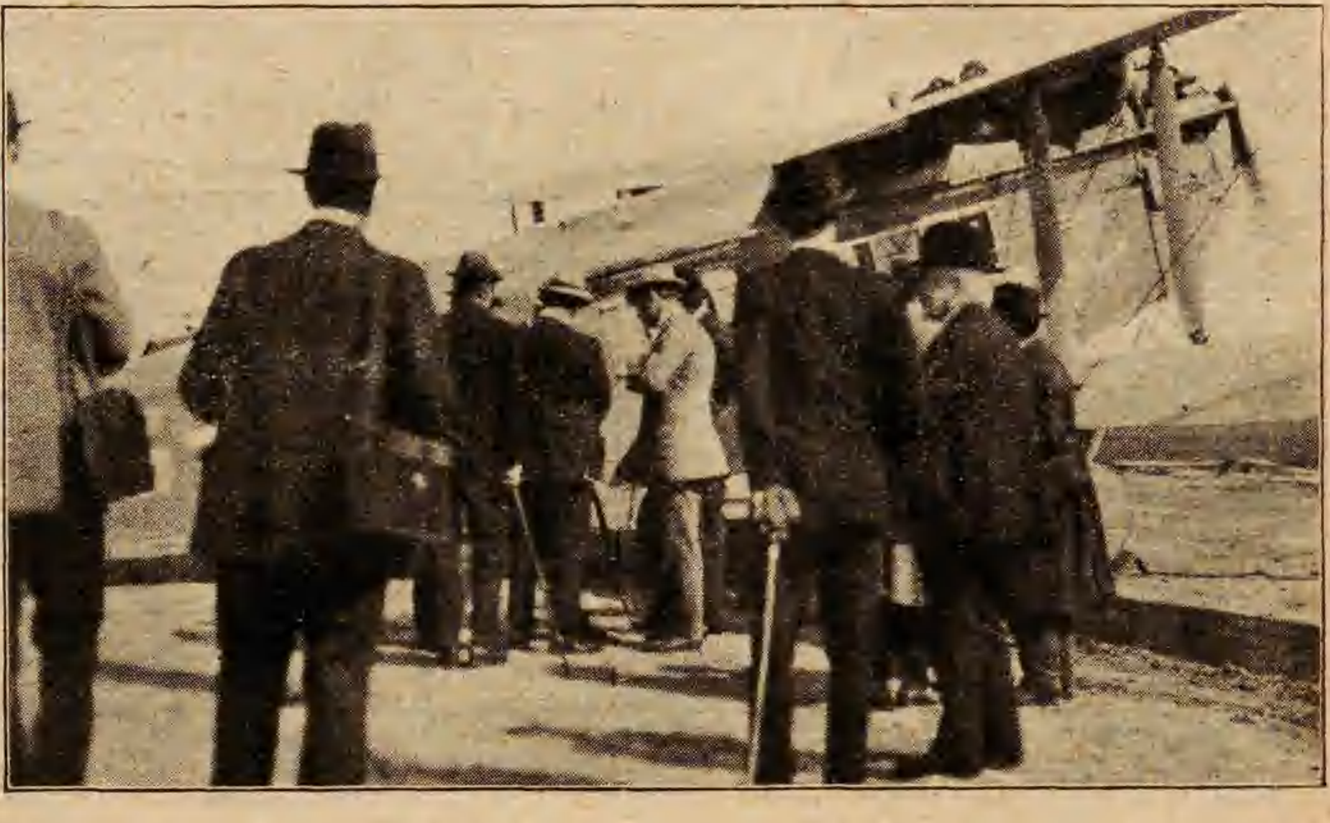
Workmen are still busily engaged on the various petrol systems, some of which, though in working order, still lack final refinements.

The fine weather over the week-end gave a fillip to the joy-ride concerns, and things began to look up. Capt. Muir was busy on Saturday and Sunday taking up numerous passengers in the Surrey Flying Services Avro.

The Services to Amsterdam and Brussels

The K.L.M. began their double service between Croydon and Amsterdam on Monday, monoplanes leaving both places at 10 a.m. and 2 p.m. The daily load of newspapers to Amsterdam and Rotterdam is steadily increasing, and now includes copies of most of the London morning dailies.

The Instone Air Line also commenced the regular running of their new Brussels service, the air express leaving Croydon at 11 a.m. and returning from Brussels at 4 p.m. His Majesty



Inauguration of London-Brussels Air Service : On Monday of last week the Instone Air Line inaugurated their service between London and Brussels by sending one of the new Napier-engined D.H.34 biplanes to Brussels and back, piloted by Capt. Barnard. The occasion was recorded in last week's issue of FLIGHT. Our photograph shows the machine just before the start, Capt. the Hon. F. E. Guest being seen in conversation with Sir Samuel Instone, while, in the foreground, with his back to the camera, is Sir Frederick Sykes, late Controller-General of Civil Aviation.

the King of the Belgians had signified his intention of seeing the aeroplane start on its return journey from Brussels.

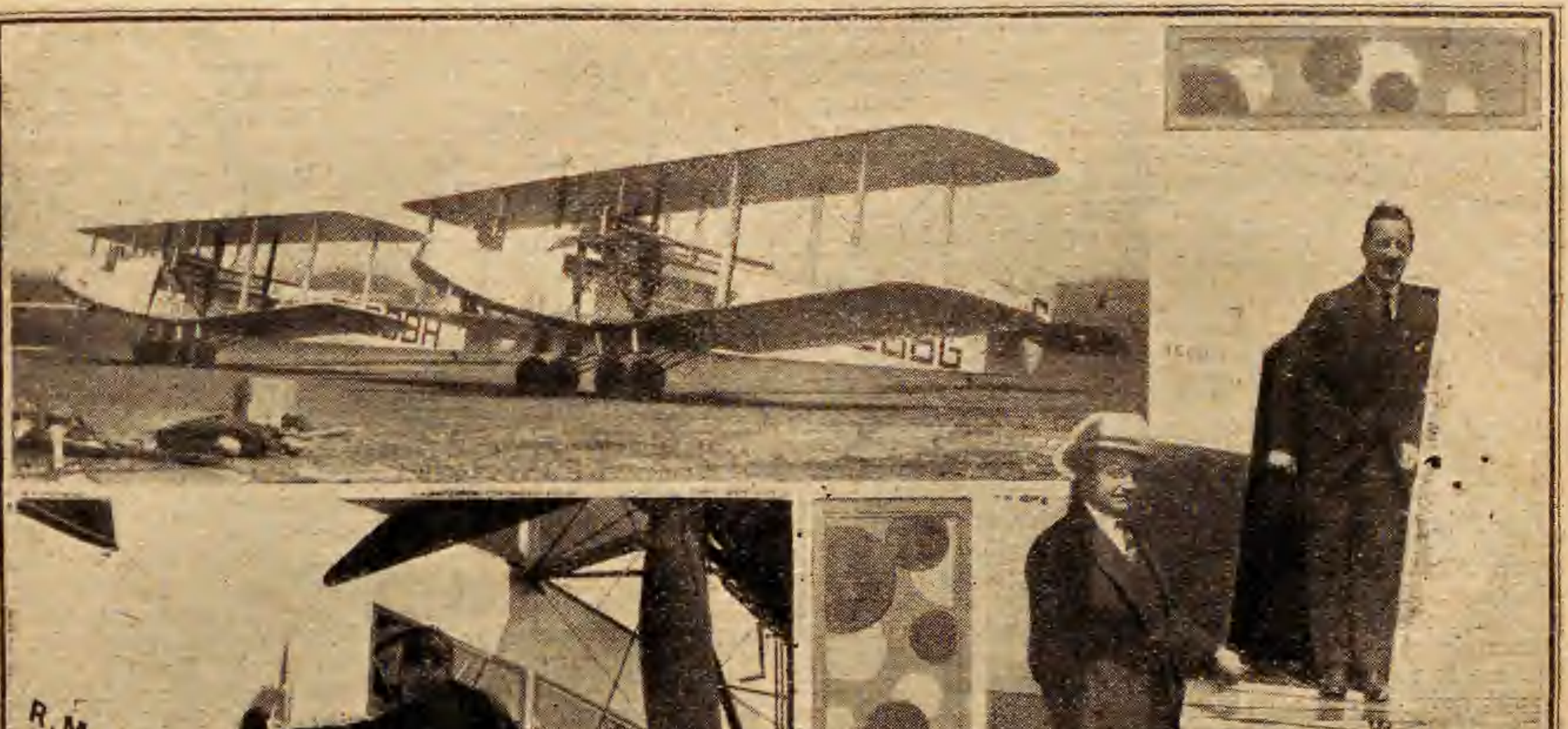
When the 12.45 p.m. Daimler Airways machine left the air-station for Paris on Monday, piloted by Mr. Robertson, it was noticed by those on the ground who were watching it circle round over the aerodrome before heading for Lympne that a portion of the under-carriage had come loose, and that one wheel was hanging down.

Star shells were fired in the hope of attracting the pilot's attention. This was unsuccessful, but the wireless operators got him on the 'phone and told him what had happened. It was arranged that, as there were no passengers on board the machine, it should be diverted to Stag Lane, where whatever damage was done on landing could,best be repaired. So Mr. Robertson turned round and, passing over the air station, flew to Stag Lane, alighting there safely despite his defective under-carriage.

Maj.-Gen. Sir Sefton Brancker made his first public appearance as Director of Civil Aviation at the Waddon Aerodrome on May 16, where he christened two of the new Handley Page W.8 B's, which are being put on the London-Paris service. The W. 8 B was fully described and illustrated in our issue of April 27, 1922. The D. of C.A. broke a bottle of champagne over each machine in turn, and pulled away the fabric strips which concealed the names of the machines, R.M.A. "Princess Mary" and R.M.A. "Prince George." In a short speech Sir Sefton Brancker stated that he had in the past been criticising the Air Ministry's aviation policy, and that now, with his appointment to the post of Director of Civil Aviation, it had become his turn to be criticised. He said he hoped he would be, as he would always welcome criticism. He pointed out that, as far as the present financial year was concerned, the policy in regard to Civil Aviation was already settled upon, but that for next year he hoped to frame a policy that would be the best possible for Civil Aviation.

Gen. Brancker also stated that he had always held the view that operational firms should not be constructing firms. He still held that view, but he thought that Handley Page was the exception which proved the rule, and said he was glad to be able to make his first public appearance in connection with the oldest existing air line.

The R.M.A. "Princess Mary" then left for Paris with nine passengers on board, while a party of 15 passengers, in addition to pilot and engineer, was taken up for a flight in the R.M.A. "Prince George."



"LAUNCHING" TWO HANDLEY PAGE W.8 B BIPLANES: On May 16 two of the new W.8 B's to be put on the London-Paris air service were christened by Major-General Sir Sefton Brancker, the new Director of Civil Aviation. The names of the two machines are "Princess Mary" and "Prince George." Our photographs show: 1. The two machines before the christening. 2. Mr. Handley Page and, in the doorway of the machine, the D. of C.A. 3. Sir Sefton Brancker breaks a bottle of champagne on the first machine, and (4) tears off the strip which covers the name. In 5 Lieut.-Col. Barrett-Lennard is seen explaining some of the details to Sir Sefton Brancker.

QUEENSLAND AVIATION GOING AHEAD

Charleville–Cloncurry Air Service Subsidised

ALTHOUGH, generally speaking, the progress made with aviation in Australia has not been so great as might have been expected, there are now signs that things are beginning to improve, and one company at least, the Queensland and Northern Territory Aerial Services, has succeeded in obtaining a Government subsidy for an air mail and passenger service between the railhead towns of Charleville and Cloncurry. The contract with the Federal Government covers one year, and calls for one journey per week each way. The subsidy agreed to is 4*s*. per mile, and it is proposed to make the following charges for passengers; 9*d*. per mile for the whole journey of 580 miles, 10*d*. per mile over 250 miles, and 11*d*. per mile under 250 miles. As regards the carriage of mails, the only stipulation made by the Federal Government is that each machine shall carry up to 100 lbs. of mails, and that a proper time-table shall be adhered to.

It is proposed to make four landings on each journey, partly in order to reduce the amount of petrol that must be carried, and partly to increase the general usefulness of the service. Even with the four intermediate landings it is expected to cover the whole journey of 580 miles in one day. There should, therefore, be ample support forthcoming for the service, both in the matter of mails and passengers, and the company are hoping to keep their running costs down so as to be within the 4*s*. per mile subsidy. The revenue of passengers and goods will thus be almost clear profit. If these expectations are realised, the company intend to extend the services to other parts, but in the meantime the Charleville-Cloncurry route will form an excellent beginning.

The company was formed by Lieut. Hudson Fysh, D.F.C., Lieut. P. J. McGinnis, D.F.C., D.C.M., Mr. Fergus McMaster and Mr. A. N. Templeton, who backed their faith in aviation to the extent of £4,000. Since then the company has been successfully floated, and has purchased one Avro five-seater triplane, one three-seater Avro biplane and one two-seater B.E.2E. The latter two machines have flown 26,500 miles, and have carried 1,140 passengers without a single injury to passengers or pilots.

It is expected to begin the new service in September, and two Vickers "Vulcans," Rolls-Royce "Eagle" engines, are to be put on the service, with a D.H.4 as an auxiliary machine. The two pilots will be Lieuts. Fysh and McGinnis, while a third pilot is being secured in England. The latter will be familiar with the Vickers machines, and will be able to initiate the two older pilots into the handling of them. We should imagine that the Vickers "Vulcans" will prove well-nigh ideal machines for this work. As they will not have to compete against very fast railway expresses their speed should be ample, while their landing speed is so low that it should be possible to "put them down" almost anywhere. Furthermore, they should be very economical to run, as they carry a considerable useful load per horse-power expended. Altogether it appears to us that the new air line "down under" gives every promise of being a success, and as the nature of the country over which the line will run is, we understand, in the nature of open downs, there should be no mishaps of any sort to mar the safety and regularity of the service. We hope later on to be able to give more detailed information of this service when it gets going in September.

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GERMANY'S POSITION IN THE AIR

Regulations in Force Since May 5, 1922

As from May 5, 1922, the Inter-Allied Aircraft Commission in Germany ceased to exist, and in its stead a "Committee of Guarantees" has been appointed to ensure that the regulations framed to define Germany's position in the air are followed. This "Committee of Guarantees" is composed of representatives of Great Britain, France, Italy, Japan and Belgium. England is represented by one Air Commodore and three other officers, France by three officers, and the other countries mentioned by two officers each. The Committee is to have the right to visit any aircraft works, or plant devoted to the manufacture or repair of aircraft and aircraft engines and other material, at any time, and is to be provided by the German Government with full particulars of all machines and engines built and of all commercial air services being operated by German firms.

A list of regulations has been drawn up, of which we must confine ourselves to publishing details of those which relate to the manner of distinguishing between military and commercial aircraft. The regulations are to be revised every two years in order to allow of such adjustments as are rendered necessary by the general progress in the science of flying.

Regulations Relating to Heavier-than-Air Craft

1. A single-seater with greater engine power than 60 h.p. is to be considered a military machine. 2. Every aircraft which is capable of flying without a pilot is considered a military machine. 3. Every aircraft which is armoured, or which has any provision for mounting guns, bombs, etc., is considered a military machine. 4. The "ceiling" with full load of any German commercial aircraft is not to exceed 4,000 metres (13,100 ft.), and the fitting of an aircraft with a high-compression engine will place that aircraft in the category of military machines. 5. The maximum speed, with full load and at a height of 2,000 metres (6,500 ft.) is not to exceed 170 km. (105 miles) per hour at the maximum power of the engine. 6. The amount of oil and fuel (best quality of aviation petrol) carried on board must not exceed $\frac{800 \times 170}{V}$ grammes for each horse power (where V is the speed at full power and 2,000 metres). 7. Every aircraft whose useful load, including pilot, engineer and instruments, exceeds 600 kg. (1,320 lbs.) is considered a military machine if the maximum conditions of 4, 5 and 6 are attained.

Lighter-than-Air Craft

Airships whose volume exceeds the following figures are considered as war material, and are "verboten":—Rigid airships, 30,000 cu. m. (1,060,000 cu. ft.); semi-rigid airships, 25,000 cu. m. (884,000 cu. ft.); non-rigid airships, 20,000 cu. m. (760,000 cu. ft.).

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AIR SERVICE IN COLOMBIA

Developments in 1921—Facts and Figures

COLOMBIA is considered to be ahead of other South American countries in Civil aviation, and the latest developments confirm this view. Since the beginning of September, the German-Colombian Aviation Company established a regular service for mail and passengers along the following routes: Barranquilla-Girardot-Neiva and Barranquilla-Cartagena. Other routes are under consideration. Five machines are employed in the River Magdalena, covering in 7 hours the distance which usually takes 9 days by steamer and rail.

During September last, two hydroplanes covered 4,956 miles in 41 flights, transporting 27 passengers and four tons of mails and parcels. In October, three machines covered 9,114 miles in 67 journeys with 57 passengers and 5¾ tons of goods. In November, four machines accomplished 105 flights, travelling over 10,224 miles and carrying 126 passengers and just over 10 tons of goods. The figures for December were: 94 flights, distance covered 10,256 miles, 93 passengers and 9⅓ tons of goods.

Total flights (last four months of 1921) ..	307
Miles covered	34,550
Mail and parcels, tons	29⅓
Passengers	303

The above figures clearly show the high decree of prosperity of our Civil Aviation Service. In the routes mentioned not a single accident has been registered. In Manizales, Medellin, Cali and Pasto, Italian, French and Colombian aviators give frequently spectacular flights, and all the principal towns are considering schemes for regular aerial transport. Before the end of the year we expect to have a complete net of aerial routes. The great gold and platinum mines of the country will be able to save two or three weeks in the conveyance of their valuable metals to the coast.

The Government has a Military Aviation School under French tutors, and considerable progress has been already attained by the Colombian pilots.—***The Colombian Trade Review* (*London*)**, February, 1922.

Personals

Married

CHARLES THORNTON CLEAVER, M.C., D.F.C., late Capt. R.F.C., of 34, Hanover House, London, N.W., sixth son of the late Richard Stewart Cleaver, of Liverpool, was married on May 6, at Paris, Texas, to RUTH, only daughter of Mrs. J. F. McREYNOLDS and the late J. F. McReynolds, of Paris, Texas, U.S.A.

HAROLD JOHN SAKER, R.A.F., was married on May 4 at St. Mary's Church, Alverstoke, to STELLA, youngest daughter of the Rev. R. W. and Mrs. TOWNSON, 7, St. Mark's Road, Alverstoke.

To be Married

The engagement is announced between Major H. L. H. OWEN, A.F.C., late of the Dorsetshire Regiment and R.A.F., son of Mr. and Mrs. W. Haddon Owen, of Louth, Lincolnshire, and ANNA HARDY (OLIVE) DANIEL, elder daughter of Mrs. BARNETT, of Gribdal, North Berwick.

Death

THE death, we regret to record, is announced of Sir Walter Alexander Raleigh. Born in 1861, the son of Dr. Alexander Raleigh, an eminent Scottish Congregationalist divine, he was educated at University College, London, and at King's College, Cambridge, and was knighted in 1911. Sir Walter had in hand the task, entrusted to him by the Air Ministry, of compiling the official history of the work in the air during the late Great War. We learn that since 1919 he had been at work on the first volume, which was passed for press only a few days ago; and with a view to a second a flight was arranged for him to the chief scenes of air warfare in the Near and Middle East. He left for Egypt in March last, and visited the "Valley of Death," Wadi Fura, and other places. While flying on to Mesopotamia across the Syrian desert, one of three 'planes conveying his party broke down, and a halt of nearly four days had to be made on the open sand under unfavourable weather conditions. On arrival at Baghdad, too late to go on to Basra, Raleigh felt unwell; but after treatment, he flew on to Mosul, fever setting in on the way. He was treated again there and advised to await recovery; but, fearing the coming heat, and unwilling to miss the steamer arranged for him, he insisted on returning immediately to Baghdad and Egypt. He found the journey trying, and after landing in England, had a prolonged attack of fever. Typhoid was diagnosed, and peritonitis supervened. He was operated upon last week, but his case was found to be desperate; and, though he rallied, the end came in the early morning of May 13. After his appointment as historian of the Air Force his professorial lectures were better than ever. He found a new stimulus in lecturing to crowds of undergraduates who had seen active service in all parts of the world, and of whom some had taken part in what he hoped to describe.

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ROYAL AERONAUTICAL SOCIETY

Students' Section.—The date of the Students' visit to the National Physical Laboratory has been changed from June 3 to June 10. Students desiring to attend are reminded that they should meet at 9.15 a.m. for special tickets at the Booking Office, Waterloo Station (L.S.W.R.).

The next Students' visit will be to the Royal Aircraft Establishment, South Farnborough, on May 31. Meet at 8.40 a.m. for special tickets at Booking Office, Waterloo Station (L.S.W.R.) for 9 a.m. train.

W. LOCKWOOD MARSH,
Secretary

Second Mishap to Portuguese Aviators

IT is with great regret that we have to record this week a second mishap to the two Portuguese aviators, Commander Sacadura-Cabral and Capt. Gago Coutinho, who were attempting a flight from Lisbon to Rio. Their first machine, a Fairey long-distance seaplane with Rolls-Royce "Eagle" engine, came to grief in alighting in a rough sea near St. Paul's Rocks. A second machine was sent out to Fernando Noronha, and the two aviators started off from there for St. Paul's Rocks (in order, of course, to cover the whole distance in flight), where they intended to turn and fly back to Fernando Noronha and on to the Brazilian coast. It appears that they were forced down by engine trouble, fortunately being found and picked up by the British steamer, "Paris City." Both aviators are stated to be safe, but the machine is wrecked. After their magnificent performance this is very hard luck, and everyone will sympathise with the two plucky aviators.

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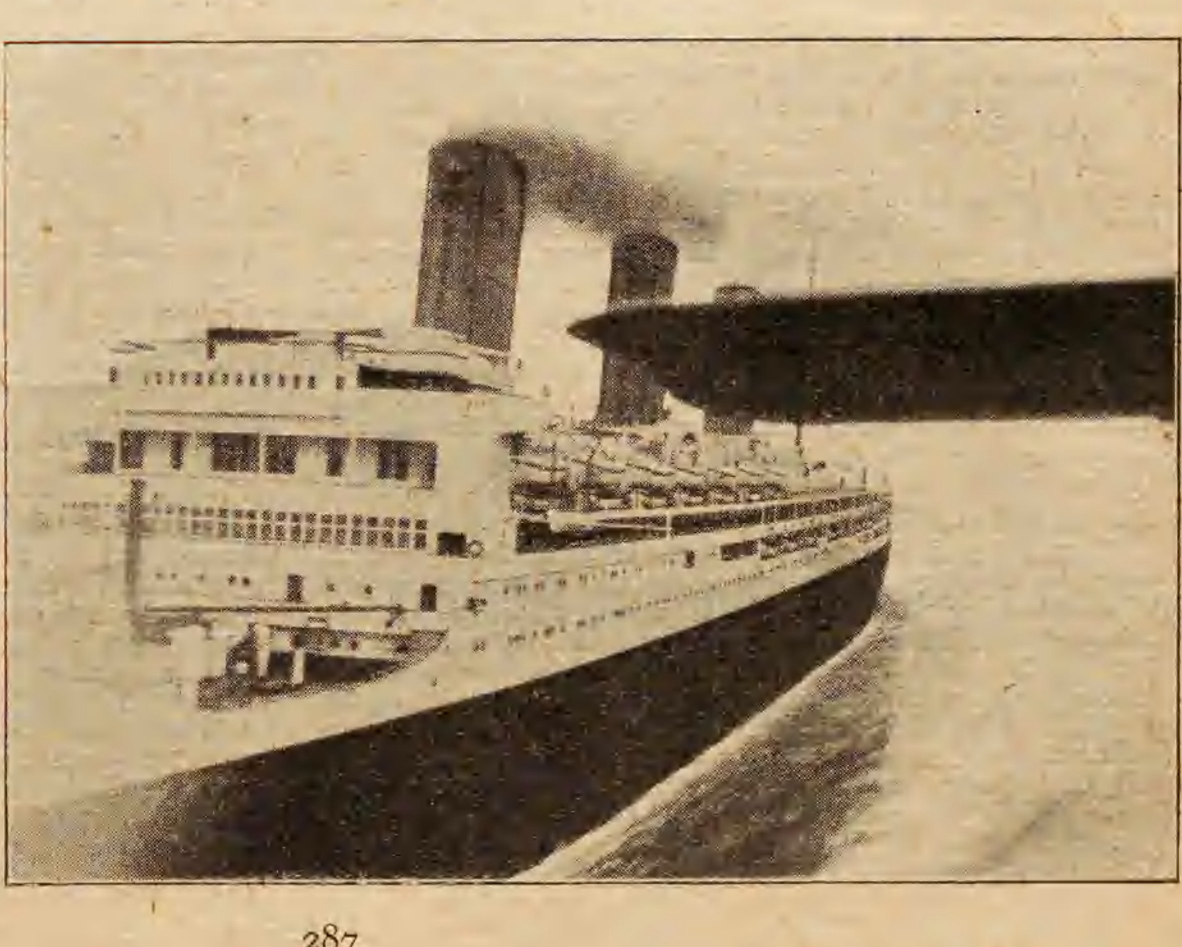
A Maiden Voyage: Photograph, taken from a Supermarine flying boat, of the "Majestic" leaving Southampton for New York on May 10. This was the first voyage of the vessel since she was taken over from the German authorities.



R.A.F. MEMORIAL FUND

A MEETING of the Executive Committee of the Fund was held at No. 7, Iddesleigh House, on May 10, Lord Hugh Cecil in the Chair. Amongst others present were Lady Leighton, Dame Helen Gwynne-Vaughan, Mrs. Barrington-Kennett, Sir Charles McLeod, Mr. H. E. Perrin, and Mr. W. S. Field.

It was reported that the Architect, Sir Reginald Blomfield, had placed a scale model of the War Memorial in the Architectural Room at the Royal Academy, where it would probably remain during the London season.

It was mentioned at the meeting that the Royal Air Force Pageant would probably be held at Hendon on Saturday, June 24 next.

The Secretary reported to the Committee that the Annual Report for 1921 had been issued during the month of March, and he read to the Committee a letter addressed to the Chairman by the Comptroller to H.R.H. The Duke of York, K.G., President of the Fund, thanking Lord Hugh Cecil for sending him a copy of the Report, and expressing H.R.H.'s keen appreciation of the work the Fund has done, and is doing.

The Hon. Mr. P. C. Larkin, the recently appointed High Commissioner for the Dominion of Canada, was unanimously appointed a Vice-President of the Fund.

At the conclusion of the meeting the Chairman read a communication received from Air Vice-Marshal Sir J. M. Salmond, K.C.B., conveying his resignation of his membership of the Executive Committee, and of the Chairmanship of the Vanbrugh Castle School Sub-Committee, by reason of the fact that he is under orders to proceed to India and Mesopotamia at the end of the present month. This communication was received with the keenest regret, and the Chairman was asked to convey to Sir John Salmond the high appreciation held of his excellent services to the Fund.

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Reunion of Independent Force, R.A.F.

THE fourth annual Reunion Dinner of the Independent Force, Royal Air Force, will be held at the Hotel Cecil at 8 p.m. on Monday, June 19. Sir H. M. Trenchard, Chief of the Air Staff, who commanded the Independent Force in France, will preside.

Among those who have already notified their intention of being present are the Duke of York and General de Castlenau, who commanded the French Army of the East from whose area the Independent Force operated.

Tickets, 15s. each, can be obtained from the Honorary Secretary, Independent Air Force Dinner, Room A, 337E, Air Ministry, W.C. 2.

Dunkerque Officers' Dinner

THE fourth Annual Dinner for Officers who served in the Dunkerque Command of the Royal Naval Air Service and the Royal Air Force from 1914 to the Armistice will be held at the Hotel Cecil on Wednesday, June 28, 1922, at 7.30 p.m. for 8 p.m. The Chair will be taken by Lieut.-Col. F. K. McClean, A.F.C.

The tickets are £1 each, which sum should be forwarded with the application. Those who wish to be present should apply not later than June 24 to Treasurer, Dunkerque Dinner, Royal Aero Club, 3, Clifford Street, W. 1.

Gordon Shephard Memorial Prize Essay Awards

THE awards in the 1921 Competition for the Gordon Shephard Memorial Prize essay, the subject of which was "The probable Influence of Air Reconnaissance on Strategy and Tactics," are :—

1st Prize.—Flight Lieut. C. J. Mackay, M.C., D.F.C.

2nd Prize.—Sqdn. Ldr. Sir Norman R. A. D. Leslie, Bart., O.B.E.

The Competition, which is open to all R.A.F. officers, N.C.Os. and men, was established as a memorial to the late Brig.-Gen. G. S. Shephard, D.S.O., M.C., Royal Air Force.

9,000 Miles Over Unknown Country in Australia

IN connection with the aerial routes already started in Australia, the work of the Australian Controller of Civil Aviation, Col. H. Brinsmead, has been done in no half-hearted manner. He has recently completed a 9,000 miles aerial tour on the "Bristol" tourer provided for his use, and during the flight thousands of miles of practically unknown country have been traversed. This ranks as one of the finest flying achievements which has yet been recorded. To carry out this trip by any other than the aerial route would have been practically impossible. This flight must be added to the aeronautical feats already achieved by such notable Australians as Sir Ross Smith and Lieut. MacIntosh, and speaks well both for the Australian flying spirit and for the British design and workmanship embodied in the machine.

The Aviation Meeting at Le Bourget.

AN Aviation meeting is being held at le Bourget Aerodrome on May 25, 26, 27 and 28 by the French Society of Pilot Aviators. This Society is composed of pilots who obtained their certificate prior to 1914, and is known as the "Vielles Tiges." Its president is M. Léon Bathiat, who was at one time associated with M. Sanchez and produced the Bathiat-Sanchez biplanes. The meeting is to be an international one, and we understand that cross-country races will be flown to various cities. On the evening of May 27 there will be an exhibition of night-flying, and extensive arrangements are being made for dealing with the crowds which it is expected will visit le Bourget from Paris. Special trains are to be run, and a frequent service of 'buses from Paris has been promised. At the moment of writing we are not aware of any British machines having been entered, but some of those which will normally be at le Bourget may take part in some of the competitions, if they can be spared from the more serious work of the air services. A great number of French constructors have promised to send machines and pilots, and it would be a pity if this country were not represented.

French Competition for Commercial Aeroplanes

FROM Paris it is reported that in 1923 a competition is to be held for commercial aeroplanes. It is stated that the French Under-Secretary of State for Air will offer a prize of one million francs, and possibly other bodies will offer prizes. At the moment, however, nothing definite is known as regards the rules, etc., nor has it been decided whether or not the competition is to be international.

M. Santos Dumont Returns to France

AFTER an absence of nearly seven years M. Santos Dumont, one of the pioneers of French aviation, has returned to France in time to participate in the Grand Prix (Balloons) of the French Aero Club. It may be recollected that M. Santos Dumont left France during the War, as a result of falling a victim to the spy craze of the early days of the War. Needless to say, the suspicions of ignorant country people were entirely unfounded, but M. Santos Dumont felt the implied insult very keenly, and at once returned to his native Brazil.

Three-engined Potez Tested.

THE three-engined Henry Potez biplane exhibited at the last Paris Aero Show has now been tested. Flown by the well-known pilot Labouchere—and carrying a useful load of 1,550 lbs., the machine got off with only two of its three engines running. The full useful load is 2,200 lbs., and it is not known how much fuel was carried on the test flight. Nevertheless, there is little doubt that the machine will be able to fly level on two of its engines, even with full load.

Levasseur Sports Model Tested

THE very original sporting biplane exhibited by Pierre Levasseur at the last Paris Aero Show has now been tested. This machine was described in detail in FLIGHT of December 8, 1921. It is a side-by-side two-seater, and is fitted with a 180 h.p. Hispano-Suiza engine. Piloted by M. Henri Pitot, the machine reached a height of about 2 000 ft., and was kept flying at that height for about 20 minutes. It is stated that the pilot was very satisfied with its behaviour.

Entries for French Gliding Competition

IT appears that there will be a fair number of entries for the French gliding competition which, as recorded in FLIGHT of May 11, is to take place at Puy-de-Combegrasse, Clermont-Ferrand, from August 6 to August 20. Already 16 machines have been entered, and it is expected that as many more will be entered in time for the competition. The machines will be numbered according to order of entry, and will carry this number on their wings. The following are the entries :—1, Morris Abbins. 2, Louis de Monge. 3, Louis de Monge. 4, Eric Nessler. 5, E. Dewoitine. 6, G. Beuchet. 7, E. Derivaux. 8, Lucien Coupet. 9, J. Gilbert. 10, Georges Groux. 11, J. Pimoule. 12, Max Massy. 13, Jules Deshayes. 14, 15 and 16, Francis Chardon. The last three machines represent Switzerland. At the moment no details of the machines are available.

THE ROYAL AIR FORCE

London Gazette, May 5, 1922

General Duties Branch

Flying Offr. B. Ankers, D.C.M., is restored to full pay from half-pay; April 25.

Stores Branch

Flying Offr. on probation, G. G. C. Pigott is confirmed in rank; April 20.

London Gazette, May 9, 1922

General Duties Branch

Flight-Lieut. D. Cloete, M.C., A.F.C., is seconded for duty with the Union Government of South Africa, for three years; July 21, 1921 (from half-pay list). Flying Offr. H. V. Puckridge, D.F.C., resigns his permanent commn.; May 10. Flying Offr. T. L. F. Burnett, M.B.E., is placed on the retired list on account of ill-health contracted on active service, and is granted the rank of Major; May 10. Flying Offr. R. J. P. Grebby, D.F.C., relinquishes his short service commn. on account of ill-health, contracted on active service, and is permitted to retain the rank of Lieut.; May 3.

Stores Branch

C. Littlejohn is granted a short service commn. as a Flying Offr. on probation, with effect from and with seniority of April 28.

Medical Service

Flying Offr. T. P. Harpur to be Flight-Lieut.; April 19. Flight-Lieut. L. Game is granted a short service commn., retaining his present substantive rank and seniority; April 21. The following are granted short service commns. in the ranks stated, with effect from and with seniority of April 24:—Flight-Lieut. J. B. Woodrow, Flying Offr. J. D. Leahy, M.B., B.A. The following are granted temp. commns. in the ranks stated, with effect from and with seniority of April 24:—Squad.-Leader A. G. Higgins, Flight-Lieut. (Hon. Squadron-Leader) E. A. Aldridge, B.A.

Nursing Service

The following are confirmed in their appointments as Staff Nurses, with effect from the dates indicated:—Miss A. M. Hardwicke; September 17, 1921. Mrs. G. M. Rutledge; September 29, 1921.

London Gazette, May 12, 1922

General Duties Branch

Sqdn.-Ldr. P. C. Sherren, M.C., to take rank and precedence as if his appt. as Sqdn.-Ldr. bore date Aug. 1, 1921. Reduction to take effect from Jan. 6. Sqdn. Ldr. P. C. Sherren, M.C., is placed on half-pay, Scale B (May 12).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

Air Commodore.—E. A. D. Masterman, C.M.G., O.B.E., A.F.C., from Inter-Allied Aeronautical Commission of Control (Germany) to Headquarters (Coastal Area) (Supernumerary) on disbandment of Inter-Allied Aeronautical Commission of Control (Germany). 8.5.22.

Wing-Commanders.—H. S. Turner, M.B.E., D.T.M., from No. 1 School of Technical Training (Boys), Halton, to Headquarters R.A.F. (Middle East) as Principal Medical Officer. 25.4.22. J. MacGregor, M.C., M.D., to No. 1 School of Technical Training (Boys), Halton, as Principal Medical Officer in Charge, R.A.F. Hospital, Halton. 25.4.22. A. V. Bettington, C.M.G., from R.A.F. Depôt (Inland Area) to Half-pay list. 1.5.22. F. E. T. Hewlett, D.S.O., O.B.E., to Headquarters (Coastal Area) on completion of Special duty with Admiralty. 20.3.22.

Squadron-Leaders.—W. B. Cushion, from Care and Maintenance Party, Donibristle (Coastal Area), to Headquarters (Coastal Area). 10.5.22. A. J. Currie, from Headquarters (Middle East) to command No. 1 Armoured Car Company (Middle East). 7.4.22. M. B. G. Copeman, from Headquarters (Middle East) to command No. 2 Armoured Car Company (Middle East). 7.4.22. V. O. Rees, O.B.E., from Aircraft Park (Iraq) to R.A.F. Depôt (Inland Area) (Supernumerary) (Non-effective). 31.3.22. P. Babington, M.C., A.F.C., from R.A.F. Depôt (Inland Area) to Air Ministry (Director of Personnel). 1.4.22. A. J. Miley, O.B.E. from Air Ministry (Director-General of Supply and Research) to Aircraft Depôt, Egypt (Middle East). 29.4.22. O. T. Boyd, O.B.E., M.C., A.F.C., from Air Ministry (Directorate of Operations and Intelligence) to R.A.F. Depôt (Inland Area) (Supernumerary). 15.5.22. A. Corbett-Wilson, from No. 1 Flying Training School (Inland Area) to Headquarters (Middle East) (Supernumerary). 29.4.22. R. S. Maxwell, M.C., D.F.C., from R.A.F. Depôt (Inland Area) to Air Ministry (Directorate of Operations and Intelligence). 15.5.22. R. L. G. Marix, D.S.O., from Motor Transport Repair Depôt (Inland Area) to R.A.F. Depôt (Inland Area) (Supernumerary) (Non-effective). 11.4.22. R. S. Overton, from R.A.F. Depôt (Inland Area) to Inland Area Aircraft Depôt (Inland Area) as Senior Medical Officer. 10.5.22. A. J. O. Wigmore, M.B., from Palestine Group Headquarters (Middle East) to Palestine Wing Headquarters (Middle East) as Senior Medical Officer. 1.4.22. A. G. Higgins, to Research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to Temp. Com. 24.4.22. R. B. Maycock, O.B.E., from 230 Squadron (Coastal Area) to Marine and Armament Experimental Establishment (Coastal Area). 4.5.22. L. F. Forbes, M.C., from R.A.F. Depôt (Inland Area) to command No. 2 Squadron (Inland Area). 15.5.22. A. J. Butler, M.C., A.F.C., from No. 2 Squadron (Inland Area) to R.A.F. Depôt (Inland Area) (Supernumerary). 26.5.22. R. E. Bell, M.B., from Headquarters R.A.F. Ireland, to R.A.F. Depôt (Inland Area) (Supernumerary). 5.5.22.

Flight-Lieutenants.—A. C. Randall, D.F.C., from R.A.F. Base, Leuchars (203 Squadron) (Coastal Area), to R.A.F. Depôt (Inland Area) (Supernumerary). 3.4.22. H. G. P. Rees, from R.A.F. Depôt (Inland Area) to Seaplane Training School (Coastal Area). 10.5.22. J. M. A. Costello, M.C., M.B., to Research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to Short Service Commission. 1.5.22. J. H. Wood, M.C., M.B., D.P.H., to Research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to Temporary Commission. 1.5.22. R. M. King, from No. 207 Squadron (Inland Area) to R.A.F. Depôt (Inland Area). 8.5.22. T. P. Y. Moore, from No. 216 Squadron (Middle East) to No. 2 Armoured Car Company (Middle East). 7.4.22. E. C. W. Fitzherbert, from Aircraft Park (Iraq) to R.A.F. Depôt (Inland Area) (Supernumerary). 31.3.22. J. W. B. Grigson, D.S.O., D.F.C., from No. 55 Squadron (Iraq) to R.A.F. Depôt (Inland Area) (Supernumerary). 31.3.22. C. H. Tancred, M.B.E., from Headquarters R.A.F., Iraq, to R.A.F. Depôt (Inland Area) (Supernumerary). 31.3.22. P. H. Cummings, D.F.C., from No. 5 Squadron (India) to R.A.F. Depôt (Inland Area) (Supernumerary). 6.4.22. G. C. Gardiner, D.F.C., from No. 84 Squadron (Iraq) to R.A.F. Depôt (Inland Area) (Supernumerary). 31.3.22. R. E. H. Daniel, from R.A.F. Depôt (Inland Area) to No. 1 Armoured Car Company (Middle East). 29.4.22. M. B. Ward, from School of Technical Training (Men) (Inland Area) to Aircraft Depôt, Egypt (Middle East). 29.4.22. J. K. Waugh, D.S.C., from Instrument Design Establishment (Inland Area) to Seaplane Training School (Coastal Area). 10.5.22. H. L. Hanmer, D.F.C., from Headquarters R.A.F. (Middle East) to R.A.F. Depôt (Inland Area) (Supernumerary). 1.5.22. J. B. Woodrow, to Research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to Short Service Commission. 24.4.22. E. A. Aldridge, M.C., to Research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to Temporary Commission. 24.4.22. G. E. Livock, D.F.C., from No. 230 Squadron (Coastal Area) to Marine Armament Experimental Establishment (Coastal Area). 4.5.22. J. S. Goggin, from R.A.F. Base, Leuchars (Coastal Area), to Headquarters (Inland Area). 18.5.22. T. H. K. MacLaughlin, from 39 Squadron (Inland Area) to No. 2 Squadron (Inland Area). 17.5.22. G. H. H. Maxwell, M.B., from Inland Area Aircraft Depôt (Inland Area) to 39 Squadron (Inland Area). 15.5.22. A. Williams, from Inland Area Aircraft Depôt (Inland Area) to No. 2 Flying Training School (Inland Area). 15.5.22. O. Armer, from R.A.F. Depôt (Inland Area) to No. 5 Flying Training School (Inland Area). 15.5.22. G. Fox-Pitt, from R.A.F. Depôt (Inland Area) to Armament and Gunnery School (Inland Area). 8.5.22. N. S. Douglas, from No. 56 Squadron (Middle East) to No. 216 Squadron (Middle East). 1.5.22. J. H. D'Albiac, D.S.O., from No. 47 Squadron (Middle East) to R.A.F. Trans-Jordania Headquarters (Middle East). 1.4.22. W. H. L. O'Neill, M.C., from R.A.F. Depôt (Inland Area) to R.A.F. Base, Leuchars (Coastal Area). 15.5.22. J. M. Burke, from R.A.F. Depôt (Inland Area) to Marine Armament Experimental Establishment (Coastal Area). 15.5.22. H. C. Irwin, A.F.C., from R.A.F. Base, Leuchars (Coastal Area), to Air Ministry (Director of Operations and Intelligence). 15.5.22. R. H. Smyth, M.C., from No. 31 Squadron (India) to R.A.F. Depôt (Inland Area) (Supernumerary). 15.4.22. C. McColm Jones, M.A., from R.A.F. Central Hospital (Inland Area) to Central Medical Board (Inland Area). 22.5.22. O. St. Leger Campion, from No. 2 Squadron (Inland Area) to R.A.F. Central Hospital (Inland Area). 19.5.22.

IN PARLIAMENT

U.S. "Bombing" Report

VISCOUNT CURZON, on May 10, asked the Parliamentary Secretary to the Admiralty whether steps can be taken to publish the Report of the Joint Army and Navy Board appointed by the United States Government to enquire into sea and air power as a White Paper?

Mr. Amery: I am afraid that, owing to the expense involved, the printing of this Report on the results of the United States bombing and gunfire experiments with ex-German ships would not be justified, especially as it was published in the American Press last autumn. I shall, however, be happy to supply typed copies to any hon. members who may be interested.

Viscount Curzon: Is the hon. gentleman aware that this Report, not only deals with the bombing of ex-German ships, but also gives very valuable conclusions arrived at by the Committee set up by the United States Government?

Mr. Amery: It is a very interesting Report, and I shall be very happy to send any hon. member who likes to write to me, a typed copy.

Commander Bellairs: Would it not be better to send a typed copy to the Library of the House of Commons?

Mr. Amery: Certainly.

Royal Air Force Contracts

MR. R. YOUNG asked the Secretary of State for Air what percentage of contracts for the Air Ministry has been referred to the Technical Costs Branch during the period March, 1921–March, 1922; and what was the saving effected and the total amount of the original quotations on which the savings were effected?

Capt. Guest: Three classes of contracts are placed by the Air Ministry, namely, general stores, aeronautical stores, and works services, and by far the greater percentage of them are placed after open competition, which, of itself, affords a sufficient check on prices and makes costing unnecessary.

As regards general stores, quotations, totalling £176,500, or 22 per cent. of the value of all the contracts for such stores placed, were referred for costing in the financial year 1921-22, and a saving of nearly £29,000, or 16 per cent. of the amount of the quotations, was effected. During the financial year 1921-22, it has not been found necessary to refer quotations for aeronautical stores or works to the Costs Branch.

New Director of Civil Aviation

THE Air Ministry announces that Maj.-Gen. Sir W. S. Brancker, K.C.B., A.F.C., has been appointed Director of Civil Aviation in the Air Ministry.

Air Ministry Resignations

WE learn that Wing-Commanders W. D. Beatty and W. O. Raikes, two heads of departments in the Air Ministry, have tendered their resignations.

The Destroyed Zeppelins

As an aftermath of the destruction of the airships which should have been delivered to the Allied and Associated Powers, it is announced that the Ambassadors' Council have decided that Germany is to pay nine million gold marks (£450,000) by way of compensation. And a very cheap let-off, assuming she pays it.

IMPORTS AND EXPORTS, 1921-1922

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
Mar. ...	14	1,471	118,199	166,607	1,565	100
April...	1,370	3,846	138,983	139,995	450	5,880
	8,222	7,036	404,139	452,283	4,319	7,103

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SIDE-WINDS

WE understand that the Bristol Aeroplane Co., Ltd., have concluded arrangements for granting the sole licence to manufacture the 400 h.p. "Bristol" Jupiter radial air-cooled aero engine in France to the well-known Gnome and Le Rhone Engine Co. The announcement is of more than ordinary interest as an indication of the high estimate formed in regard to the "Bristol" engines by the French aviation experts. The fact that the "Bristol" Jupiter and "Bristol" Lucifer engines are the only two air-cooled engines which have ever satisfied the strenuous conditions of the British Air Ministry Type Tests has created a great impression in Continental aviation centres. The selling rights for the "Bristol" Jupiter engine in France and many of the countries of Europe have also been ceded to the Gnome and Le Rhone Co.

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LIEUT.-COL. C. F. HITCHINS, D.S.O., M.I.Mech.E., who recently resigned the appointment of General Manager to Agricultural and General Engineers, Ltd., has joined Sir W. G. Armstrong, Whitworth and Co., Ltd.

- - -

"BY AIR TO EVERYWHERE" is the title of an extremely useful and attractive booklet issued by the Lepaerial Bureau of 27, Piccadilly. The first issue for the present season has just been published, and contains the time-tables of the more important air lines in Europe, together with fares and other information useful to air travellers. At the end of the book will be found a sketch-map which gives an excellent idea of the number and extent of the air lines at present in operation. Excellent little sketches of some of the new machines in regular use on the various air lines illustrate the book, and altogether the publication is one which all intending travellers by air should make a point of securing. Copies can be had on application at the office of the Lepaerial Bureau, 27, Piccadilly (under the Piccadilly Hotel).

* * * *

PUBLICATIONS RECEIVED

The Professional Photographer, May, 1922. Kodak, Ltd., Kingsway, London, W.C. 2.

The Year Book of Wireless Telegraphy and Telephony, 1922. London: The Wireless Press, Ltd., 12–13, Henrietta Street, Strand, W.C. 2. Price 15s.

Technical Note No. 25. Center of Pressure Coefficients for Aerofoils at High Speeds. By W. S. Diehl. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 91. Notes on Propeller Design: The Energy Losses of the Propeller—I. By Max M. Munk, National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 93. The Background of Detonation. By S. W. Sparrow. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 94. Notes on Propeller Design, II: The Distribution of Thrust over a Propeller Blade. By Max M. Munk. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 95. Notes on Propeller Design—III. The Aerodynamical Equations of the Propeller Blade Elements. By Max M. Munk. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 135. Performance of B.M.W. 185-Horsepower Airplane Engine. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

THE LONDON AERO-MODELS ASSOCIATION

THE winner of Competition No. 3 was Mr. M. Levy; second prize, Mr. C. Hersom; third prize, Mr. F. de P. Green.

At the meeting held at Headquarters on Thursday last, the 11th inst., Mr. W. Hersom occupying the chair, it was decided to hold an Aerial Golf Competition on Hackney Marshes, on Saturday, June 3, at 4.30 p.m., prizes having kindly been given by Mr. F. de P. Green and Mr. L. Grey. This competition is limited to members only, and any type of model is eligible; the only condition laid down is, "All models must have and fly with an under-carriage."

On Sunday, the 21st inst., a special Flying Demonstration will be held on Parliament Hill Fields at 10.30 a.m., and it is hoped every member will endeavour to bring a model and fly same.

On Saturday, the 20th inst., a Smoking Concert under the management of Mr. J. E. Louch is being held at Headquarters, 20, Great Windmill Street, at 7 p.m. prompt.

On Thursday, the 25th inst., a Discussion will be opened on "The Construction of Built-up Fuselages for Enclosed Motors," and those members who can are requested to bring a fuselage along with them for demonstration purposes.

Report from Research Committee

THE propeller-testing apparatus is now completed and ready for tests. A few propellers have been tested for thrust, and the apparatus appears to work satisfactorily, the results being quite up to expectations. The few trials which have taken place seem to show that the apparatus will be a complete success for testing propellers up to 10 ins. diameter. Further details and results will be made known after the next meeting of the Research Committee in the course of a week. Hon. Sec. of Research Committee *pro tem.*, W. E. Evans.

Meetings are held at Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, every Thursday evening at 7.30 p.m. Intending members cordially invited. Particulars of the Association may be obtained from A. E. Jones, Hon. Sec., 48, Narcissus Road, West Hampstead, N.W. 6.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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2,209. C. MENDEL. Gyroscopical stabilising means for aircraft. (178,542.)
2,571. H. JUNKERS. Landing-gear. (158,277.)
2,652. G. H. SCOTT. Mooring-masts. (178,568.)
9,072. H. F. ADAMS. Mascots. (178,692.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from p. xiv.*)

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City 3115; "Vanduara," Cent. London.

LUBRICATING OILS—

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Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15.
Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5.
Dalston 1893.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.

PROPELLERS—

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19.
Hornsey 910 & 2472.

Lang Propeller, Ltd., Weybridge, Surrey.
520-521, Weybridge; "Aerosticks," Weybridge.

PUTTEES—

Fox Bros. & Co., Ltd. (Dept. R), Wellington, Somerset.

RADIATORS AND RADIATOR REPAIRS—

Serck Radiators, Ltd., Warwick Road, Greet, Birmingham.
Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—

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SPARKING PLUGS—

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MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent. London.

TIMBER—

Owen, Joseph, & Son, Boro' High Street, S.E.
Hop 3811; "Bucheron," London.

TUBES, ALUMINIUM—

British Aluminium Co., Ltd., The, 109, Queen Victoria St., London.
City 2676; "Cryolite," Cent. London.

TYRES AND WHEELS—

Palmer Tyre, Ltd., Shaftesbury Avenue, W.C. 2.
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Barimar, Ltd., 10, Poland Street, London, W. 1.
Gerrard 8173; "Bariquamar," Reg. London.

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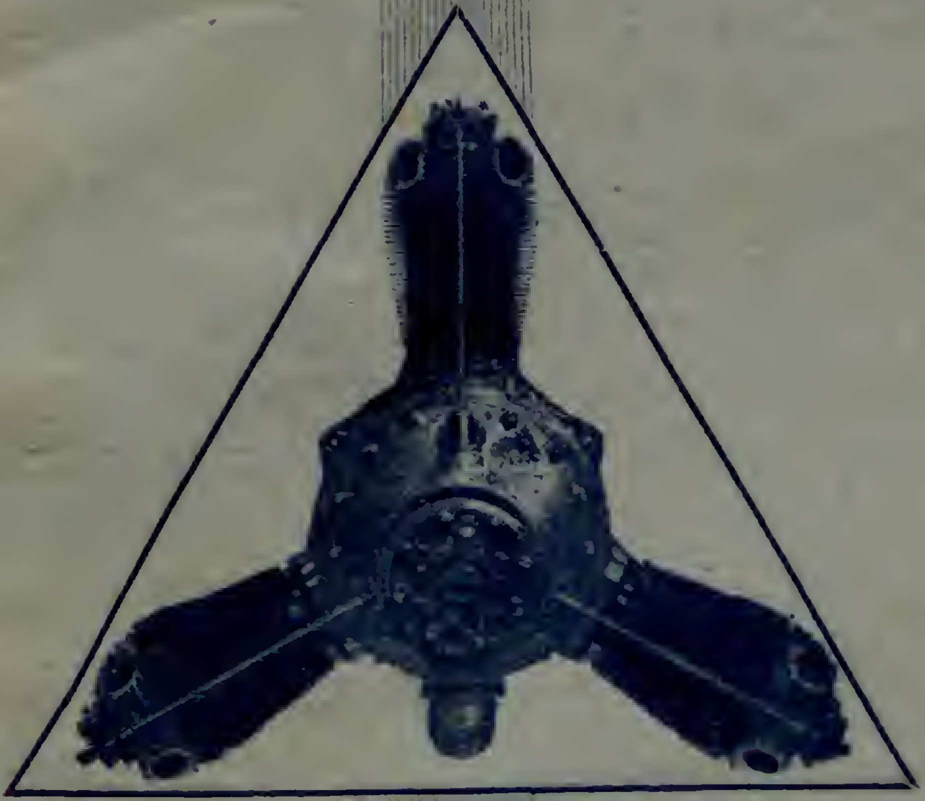

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
June 1	**Entries close for Schneider Cup Race**
June 3	**R.Ae.C. Whitsun Race Meeting, at Waddon**
June 23-25	**International Competition for Touring Aeroplanes, Brussels**
July 29	**Aerial Derby, starting at Waddon**
Aug. 6-20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT.

THE very greatest interest attaches to the Russo-German Pact, which, it is alleged, actually provides for the supply of arms and ammunition for Bolshevik Russia by Germany. What purports to be the actual text of the secret military convention concluded in Berlin on April 3, 1922, between Russian and German representatives was published in the Paris *Eclair*, and a translation of it was published in the *Daily Mail* of May 19, 1922, the particular clauses referring to aircraft being given in this week's FLIGHT. That the authenticity of the document has been denied by both Berlin and Moscow need not necessarily mean anything, and it might have been thought that our own Foreign Office would be in a position to know whether or not the document is genuine. Up to the time of writing, no statement has, as far as we are aware, been made by the F.O., and it is, perhaps, permissible to assume that "there may be something in it." No smoke without fire may prove a truthful proverb once more, and at any rate the position is one which will bear the very closest watching.

The Russo-German War Pact.

The portion of the alleged treaty which interests us most is, naturally, that dealing with the supply by Germany of 500 Junkers all-metal aeroplanes. How Germany should have been able to construct under the eyes of the Inter-Allied Commission, 500 aeroplanes of any one type without being discovered, or how 500 such machines could have been hidden away and escaped detection, is a mystery. Although the reported text does not state when and how these machines are to be built, there is evidence that some of them at any rate are in existence. M. de Montjou, the French Deputy, states in a book which he has just published, dealing with his observations on a visit to Germany, that at the Junkers works at Dessau he found 74 machines in hand, nearing completion.

For whom were these intended? What was the explanation given to the Inter-Allied Commission, which must have known of their existence? Again we do not know. But one thing is certain, handicap Germany as we may by rules and regulations, we cannot prevent her from making arrangements for building her aeroplanes abroad. And it requires no great stretch of the imagination to see that even if the alleged text of the secret treaty is *not* genuine, the very fact of Germany having a treaty with Bolshevik Russia invites the construction of German machines across the border as the easiest and obvious way of circumventing the restrictions imposed by the Allies.

We may limit the power of the engines and the ceiling of machines and the fuel carried and the useful load which may be taken, but if, at the same time, we are unable to prevent Germany making arrangements for constructing aircraft and other war material abroad, to what purpose is it all? The situation is one fraught with danger to the Allies, and the future peace of the world.

◆ ◆ ◆

Our Neglected Seaplanes. We have had occasion to refer frequently of late to the manner in which the development of the seaplane—and by the term we mean both the twin-float machine and the flying boat—has been neglected by this country, in spite of the fact that the sea has been for generations our home, and the parts of our far-flung Empire are separated, or connected, according to the way one looks at it, by leagues of ocean. By way of stimulating the interest in seaplanes, and of furnishing an illustration of what seaplanes can do, we published in our issue of last week an article dealing with the use which Canada is making of seaplanes. Elsewhere in this issue we publish a letter from a correspondent dealing with the question of Canada as a market for aircraft. As our correspondent is just returned from a visit to Canada, where he has been studying the conditions at close quarters, his opinions carry a good deal of weight, and we would recommend manufacturers to read carefully our correspondent's letter. His warning that America, as a next-door neighbour, is likely to get ahead of us if we do not look sharp is, we think, very timely, and should be given every consideration.

It is not, however, in Canada only that there is a future for the seaplane. In fact, practically the whole of our Empire could show similar opportunities, and it is surely high time that the authorities took steps to ensure that the seaplane is given the amount of attention which it merits. In this connection it is worth remembering, and this is a fact which appears apt to be lost sight of, that the personnel of aeroplanes can be built up very much more quickly than can that for the seagoing type. The machines themselves take longer to develop, although once a type has been standardised a flying boat does not, probably, take very much longer to build than does a land machine. But the question of personnel is a vital one. Unless we start at once, there is a very grave danger that in the next war our lack of trained seagoing flying personnel may result in our defeat at sea.

While the Navy is doing a certain amount, it is limited by the allocation of machines and men, and it becomes necessary to look elsewhere if we are to have that reserve which will be an absolute necessity.

It would appear that, quite apart from the commercial possibilities of seaplanes, we shall have to run services whether they pay or not, simply to obtain experience in different parts of the globe, and in order to keep a reserve of trained personnel against emergencies. But—and that is the bright spot in all this present lack of seaplane development—there is every reason to suppose that seaplane services can be made to pay at least as well as aeroplane services, and probably better. They are not competing against railways running express trains at 60 m.p.h., but against steamers doing, at the outside, 20 m.p.h. Seaplanes do not require a large ground organisation, being able to utilise existing lighthouses, harbours, customs, etc. As they need not have a particularly good climb, nor a very high ceiling, the power can be used for carrying useful load. The insurance rates are, we believe, very much lower than those asked for land machines owing to the fact that the sea is an "aerodrome" always available. There is no question of having to find any particular aerodrome in a fog, and we are informed that it is a comparatively simple matter to alight on the sea in a fog, as there are, for practical purposes, no obstacles to worry about, only altitude.

We ought to see to it, and sooner or later we shall have to see to it whether we like it or not, that wherever there is a coaling station there should also be a seaplane base. Whether these should be purely naval, or whether they should be commercial as well, would be a matter for experts to decide. The salient fact to remember is that at present we are unprepared as regards seaplanes, and that it takes a number of years to train seaplane personnel, especially as such training will have to be done in practically all corners of the world, under all manner of different and difficult conditions. Is it not then high time that we commenced, even in a modest way, by establishing a seaplane service to be run regularly. Such a service would be extremely useful for the gathering of data and for the training of a nucleus of personnel upon which to draw later when we are able to expand the services.

◆ ◆ ◆

Fireproof Aircraft Tanks. In this issue of FLIGHT we publish a brief description of the Silvertown tank which won first prize in the Air Ministry competition at Farnborough. The tank, it will be seen, consists of a welded sheet steel inner case, covered with a loose jacket of india-rubber. Although the tank is considerably heavier than the ordinary tank, weighing in the 30 gallons size approximately 1·9 lbs. per gallon capacity, its fire resisting qualities are such as to offer relative immunity from fire, one of the most terrifying of the dangers which threaten modern aircraft. It is true that in peace time the number of fires has been relatively small, but so long as petrol is used as a fuel the danger will be there to a smaller or larger extent, and any safeguard which will minimise the danger is deserving of the closest consideration. We strongly advise aircraft manufacturers to investigate the Silvertown tank, which is being marketed by the Palmer Tyre, Ltd., of Shaftesbury Avenue, who will be pleased to give further particulars.

◆ ◆ ◆

Sir Hugh Trenchard's Promotion

IT was announced in the *London Gazette* for May 23, that Air Marshal Sir Hugh M. Trenchard, K.C.B., D.S.O., Principal Air Aide-de-Camp to the King, has been promoted to the rank of Air Chief Marshal, as from April 1.

BRITISH AIRCRAFT IN FOREIGN MARKETS

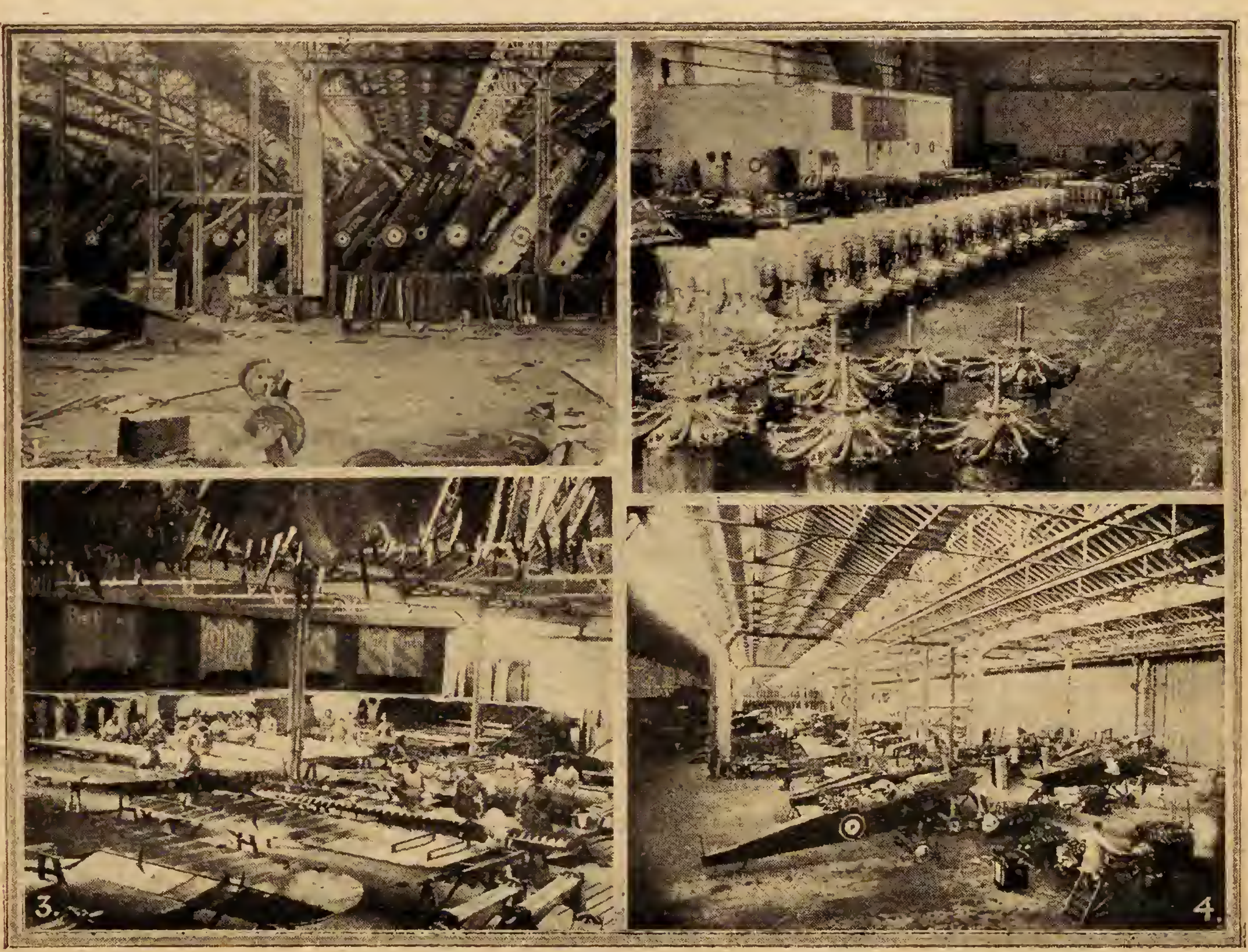
Some Notes Dealing with the Aircraft Disposal Company and Its Methods

WHEN the War came to an end a question that was frequently asked was "What are we going to do with all our aircraft?" The question was one of very considerable importance to the British Aircraft Industry, as, naturally, the indiscriminate dumping of war machines might quickly ruin the whole aircraft industry as far as this country was concerned. It may be remembered that the Aircraft Disposal Co., Ltd., was formed early in 1920 to take over from the Government Aircraft Disposal Department all surplus aircraft, and having an agreement with the Government to hand over half of any profits that might be made out of the sale of the stock taken over. It will easily be understood that a very great deal depended upon the way in which the A.D.C. attacked the problem of reconditioning and selling their machines, and it must be frankly admitted that at one time certain misgivings were felt as to the effect which the new company would have on the prospects of sales by private firms to foreign Governments.

If machines were simply handed out to purchasers indiscriminately, at any price which they would bring, and left to stick together or drop to pieces as they thought fit, obviously British aircraft would be in grave danger of getting a bad name abroad, quite apart from the injury which might be done to individual designers for machines over which they had had no control, and whose condition they were in no way responsible for. Secondly, by selling at prices which were far below any that individual firms could possibly quote for new machines, it might be feared that the ground would be cut from under the private companies by the newly formed A.D.C., with equally disastrous results to the industry. The position was, therefore, a delicate one, to say the least of it, and it may not be without interest to examine briefly the methods employed by the Aircraft Disposal Co. during the two years or so of its existence, and the effect on the industry in general.

All the difficulties outlined above, and many more to which we have not referred, were clearly realised by the Aircraft Disposal Co. from the first, and two years of successful business—successful as regards disposing of great numbers of surplus machines at a good profit, of which one-half returns to the Treasury and consequently to the taxpayer—have established the Aircraft Disposal Co. on a firm footing. This is chiefly due to the methods employed, which not only have given satisfaction to foreign customers, but which have protected the original designers by ensuring that no machine or engine is allowed to leave the A.D.C. establishment at Waddon until it is satisfactory in every way and up to A.I.D. standard. The consequence has been that British aircraft is now competing successfully abroad with machines—sometimes of much more recent date—made in other countries. And the harm done to the aircraft industry? Probably this has been quite small, if any harm has been done at all.

It should be remembered that, what with unfavourable rates of exchange and other handicaps of British commercial interest, there have been few Governments who, during the last two years, would have been able to afford to pay the prices which high wages, high cost of materials, etc., would have compelled manufacturers to charge for modern machines. On the other hand, there are now a number of Governments both in Europe and all over the world who have purchased A.D.C. machines, and who, knowing that these machines were not of recent design and consequently not of the highest performance now attainable, have been satisfied with them



THE AIRCRAFT DISPOSAL CO., WADDON: 1, Fuselages "stacked" in stores. 2, A row of Siddeley "Pumas" ready for shipment. 3, A corner of the doping shop. 4, Fuselages being re-conditioned.

for what they required at the moment. These Governments have naturally received a favourable opinion of British aircraft, and it appears natural to suppose that, when things right themselves once more and British manufacturers are able to compete, under normal rates of exchange, with other nations in the matter of price, these customers will return to this country for the latest types. We think, therefore, that, looked upon broadly, the existence of the Aircraft Disposal Co. has not been the cause of any direct harm to the industry, while its sale of machines all over the world has certainly been of very considerable value regarded as propaganda for British aircraft.

With these introductory remarks we may turn to the system adopted by the A.D.C. in order to ensure that machines are up to the required standard as regards soundness of parts, correctness of trueing-up, rigging, etc. To begin with, the A.D.C., on receiving an order from a foreign Government, always agree to having a representative of that Government always at their works while the machines in question are being re-conditioned. In this manner the purchasers have a guarantee that all detail work receives due attention and that no defective part or scamped workmanship creeps into the construction of any machine.

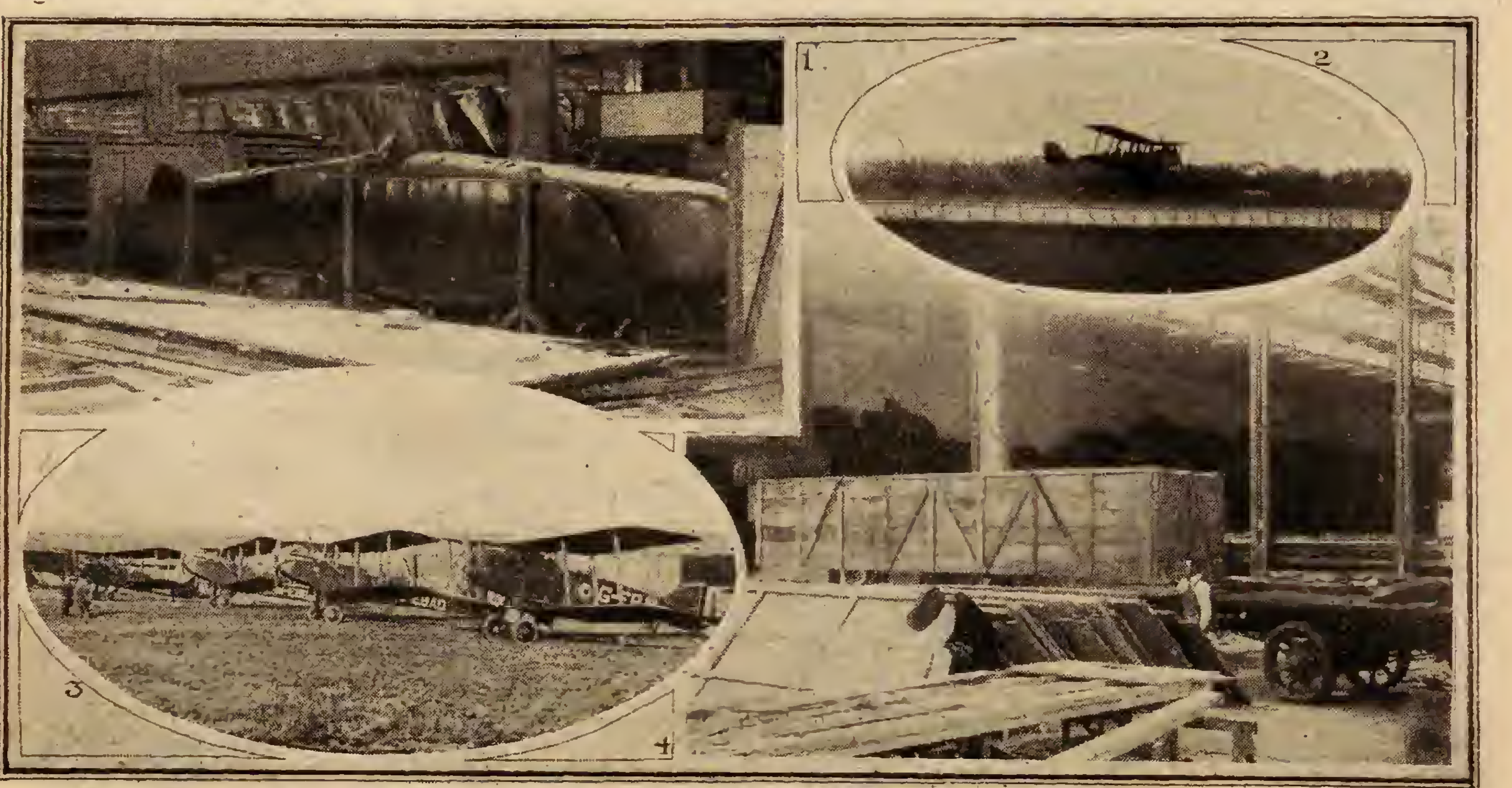
One of the first things done to a *fuselage* or wing taken out of store is to strip off the fabric, so as to ensure that all woodwork, metal fittings, etc., are in good condition. If a defective *longeron* or other part is discovered it is replaced with a new member made from materials passed by the Aircraft Inspection Department. All the wires of a *fuselage* are slacked off and the *fuselage* trued up again, not only to ensure its absolute truth, but also in order that any defect in the bracing, fittings, etc., from rust or any other cause, may be detected. The machine is gone over minutely, always under the supervision of the representative of the purchaser, and is trued-up, covered and doped. The wings are similarly treated, all parts found to be below standard being scrapped. In this connection reference should be made to the question of shrinkage. Owing to the care in storage, maintenance of an even temperature regardless of the time of the year, very few parts are found to have shrunk. If any are found they are replaced, or, if a number of parts have suffered from this cause, the whole component, such as a wing, is scrapped. That is not to say that it is merely flung on the scrap heap and left to anyone who will buy it for a few shillings. If that were done there might be a possibility of unscrupulous persons purchasing wings with defects in their parts and disposing of them for use in an aircraft. In order to avoid this, any component which is found to suffer from so many defects as to render its re-conditioning uneconomical has all its main parts destroyed. Thus such a wing has its spars sawn through so that it could never be patched up to look sound and then be sold by a third party for use as a wing.

The same care as is given to the aeroplane or seaplane is bestowed upon engines. When taken out of store every engine is dismantled and all its parts micrometered and checked for size and truth. The engine is then erected and tested on a test stand, driving a calibrated fan. Such accessories as magnetos and carburettors are also tested individually, the magnetos being run at various speeds connected up to sparking plugs in an inspection chamber in which there is a compression corresponding to that in the engine, and through a window in which it can be seen if all plugs are sparking at all speeds. Carburettor jets are also tested by measuring the amount of liquid which flows through them in a given time under a given pressure, and such items as fuel and oil pipes, radiators, etc., are tested under pressure before being allowed to be put into the machines. All rubber pipes, even if appearing to be sound, are replaced by new pipes.

All this time the parts of a machine or engine are under the supervision not only of the A.D.C. but of the representative of the purchaser, and no part is put into the machine without the consent of both parties. If, as sometimes happens, a client desires modifications made to a machine, this is only done—provided the alteration is one of any importance to the structural or aerodynamical qualities of the machine—after consultation with the original designers. Thus if a machine was originally designed to take a Y engine, but the purchaser for some reason desires to have a Z engine fitted instead, this is only agreed to after the designer of the machine has been consulted and has given his consent. Thus the interests of the original designers are safeguarded, and no machine is allowed to be sent away with modifications which the original designers would not have sanctioned.

Having been finished under due inspection, the machines are erected and flown before the representatives of the purchasers, and a certain guaranteed performance is attained before the machine is considered ready for shipment. The Aircraft Disposal Company have evolved a method of packing which absolutely ensures that the machines will reach their destination in good condition. Usually two *fuselages* are packed in one case, placed side-by-side, but pointing in opposite directions, and they are so secured to the floor and sides of the case that it is absolutely impossible for them to work loose and come adrift. A similar proceeding is followed with engines. If these are to be sent a long distance they are put in tin-lined cases soldered up to exclude any moisture, and as they are well greased before shipment they reach their destination in excellent condition.

We might devote considerably more space to the various



THE AIRCRAFT DISPOSAL CO., WADDON : 1, Shows two D.H. 9 fuselages on the floor of their packing case, the sides of which may be seen lying down ready to be put in place. 2, A D.H. 9 landing after going through its acceptance flight. 3, A Bristol Fighter and three D.H. 9's ready for tests. 4, A packing case containing two D.H. 9 fuselages being hoisted on to the lorry which is to take them to the docks for shipment.

details of inspection, overhaul, etc., of the Aircraft Disposal Co. machines, but sufficient has, we think, been said to indicate that every care is taken to ensure that every machine and engine which leaves Waddon is in as good condition as it is possible for it to be, and that in many instances the machines are actually as good as new. To a certain extent they may be said to be better, since all wood in them is now very well seasoned and any further shrinkage is extremely improbable.

Col. Darby, of the London Office of the A.D.C., and Maj. Grant, who is head of the Waddon establishment, have had a difficult task, but one cannot visit the factory without coming to the conclusion that they have discharged it in an admirable manner, and that customers have been satisfied is proved by the fact that more than one foreign Government has sent in a repeat order. That in itself is a good testimony to the soundness of the system adopted and rigidly adhered to. We are not permitted to quote the number of machines sold, but we think that if it were known it would stagger some people who profess not to believe in aviation. And as we have already said, we really doubt if any harm has been done to the industry as a whole, while undoubtedly a lot of very valuable propaganda work has been the result of all these machines being distributed all over the world.

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The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

WHITSUNTIDE AVIATION MEETING

THE Royal Aero Club will hold an Aviation Race Meeting at Waddon Aerodrome, Croydon, on Saturday, June 3, starting at 3 p.m.

Members of the Club will be admitted free on presentation of their membership cards. Motor cars, 2*s.* 6*d.*

Programme

1. *Third Club Handicap* (16 miles). Prize £20. For machines with a speed not exceeding 120 m.p.h.
2. *Exhibition Flying* by J. H. James, on the Gloucestershire "Bamel," the holder of the British Speed Record.
3. *First Sprint Handicap* (16 miles). Prize £20. For machines with a speed of not less than 120 m.p.h.
4. *Balloon Sniping Competition.*—The entrant of the winner will receive a prize value £10. Entry fee £1. The Club Avro machines will be used for this competition. No charge will be made for the use of the machines.
5. *First Whitsuntide Handicap* (24 miles).—Prizes £70. For machines with a speed of not less than 100 m.p.h.
6. *Parachute Demonstrations.*
7. *Exhibition Flights.*
8. *Surrey Open Handicap* (16 miles). Prizes £40. For machines of all types.

The Races will be over a circuit, the machines remaining in sight of the spectators at the Aerodrome all the time.

Entries close on Monday, May 29, 1922, at 5 p.m. Entry fee, £1 for each event.

Further particulars of the Races may be obtained from the Club.

21st ANNIVERSARY BANQUET

THE **year 1922** being the **21st Anniversary** of the formation of the **Royal Aero Club,** the Committee has decided to celebrate the occasion by holding a Banquet at the **Savoy Hotel, London, on Tuesday, June 27 next.**

His Grace the Duke of Atholl, the President of the Club, will be in the Chair.

The Committee hopes that all members will make a special effort to be present on this occasion.

Small tables of eight covers will be arranged, and members wishing to make up parties must inform the Club not later than **Monday, June 19.**

The price of tickets (exclusive of wines, etc.) is £1 1*s.* Members may also obtain tickets for their friends (including ladies) to the extent of the accommodation available.

In order to assist in the arrangements early application for tickets is requested.

COMMITTEE MEETING

A Meeting of the Committee was held on Wednesday, May 17, 1922, when there were present Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., in the Chair; Wing-Commander W. D. Beatty, C.B.E., R.A.F.; Lieut.-Col. John D. Dunville; Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S.; Lieut.-Col. F. K. McClean, A.F.C.; Lieut.-Col. Alec Ogilvie, C.B.E.; Lieut.-Col. M. O'Gorman, C.B.; Mr. T. O. M. Sopwith; and the Secretary.

Election of Members.—The following new members were elected:—

Carl Louis Breeden.
Flying Officer Gerard Stephen Oddie, R.A.F.
Thomas Hornby.
Malcolm Norman Smith.
Major Jack Stewart.
Lieut.-Col. John Edward Tennant.

Racing Committee.—The report of the Racing Committee on the arrangements for the Whitsuntide Race Meeting was received and adopted.

F.A.I. Legal Commission.—The report of Major R. H. Mayo, the Club's representative at the meeting of the F.A.I. Legal Commission held in Paris on May 8, 1922, was received. A vote of thanks was passed to Major Mayo for representing the Club at the Conference.

21st Anniversary Banquet.—The arrangements for the Club's 21st Anniversary Banquet to be held at the Savoy Hotel on Tuesday, June 27, 1922, were approved.

Cartographic Committee.—The questions to be discussed at the meeting of the F.A.I. Cartographic Committee to be held at Brussels on May 26, 1922, were considered. It was decided not to send a representative, but to forward the Club's recommendations to the Chairman of the Conference.

International Air Conference, 1923.—The report of the Club's representatives at the Meeting held May 3, 1922, was received and adopted.

Aviators' Certificates.—The following Aviators' Certificates were granted:—

7925. Bryan Lillywhite. October 3, 1918.
7926. John Sills Charlton. April 28, 1922.

LE BOURGET MEETING, MAY 25-28

THE Aircraft Disposals Company have entered a D.H. 9 400 h.p. Liberty, pilot R. H. Stocken, to compete for the Lamblin Cup.

The course is Paris-Brussels, Brussels-London, London-Paris.

The London Terminal Aerodrome, Croydon, will be the London Control, and the Royal Aero Club will provide the officials.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

French Government Support for Aviation Companies

How France is helping in every way to push along commercial aviation, thereby strengthening the national air fleet, is evidenced by the latest proposal of M. Laurent Eynac, Under-Secretary of State for the Merchant Marine and for Military Aviation. The object of this proposal is to facilitate the raising of private capital for the development of national aviation. His suggestion is that the State should encourage the flow of private capital to aviation companies by guaranteeing a fixed rate of interest on similar lines to the guarantees given to railway companies. The proposal is strongly supported in the *Echo de Paris* by M. Henri De Kerillis, who publishes interesting figures on the present state of French commercial aviation.

The prosperity of air traffic on the various lines in operation is, he points out, steadily increasing, as is shown by the following figures:—Number of passengers carried, exclusive of personnel: In 1919, 1,184; in 1920, 6,419; and in 1921, 15,241. Postal traffic: In 1919, 466 kg.; in 1920, 6,039 kg.; and in 1921, 10,808 kg. Tonnage of parcels carried: In 1919, 14 tons; in 1920, 122 tons; and in 1921, 192 tons.

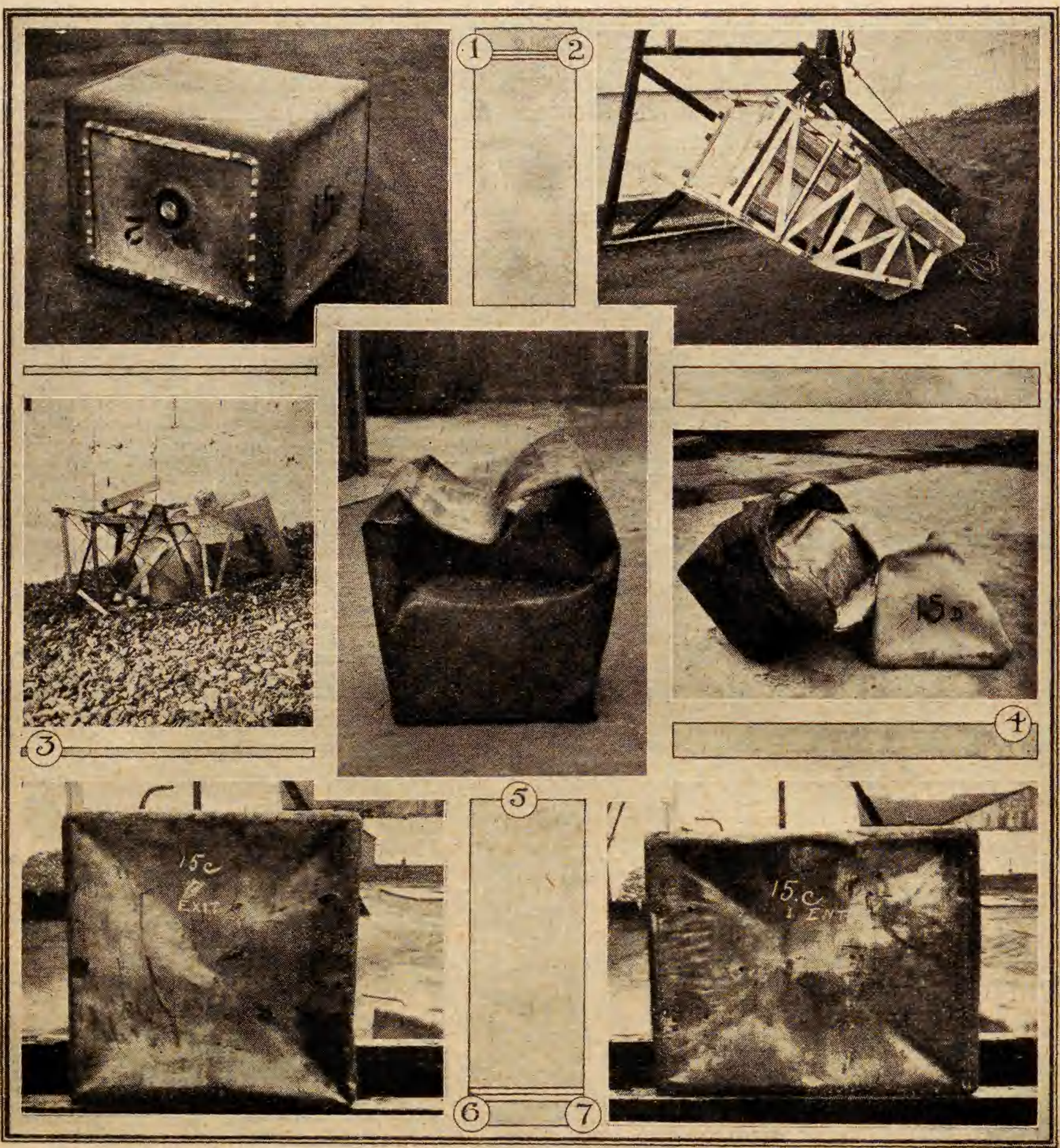
AIR MINISTRY TANK COMPETITION

The Winner of First Prize

SOME PARTICULARS OF THE SILVERTOWN TANK

In our issue of May 4, 1922, we published details of the three tanks which won First, Second and Third Prize in the Air Ministry Competition for safety fuel tanks for aircraft, and reference was also made to the nature of the tests. It may be remembered that in the preliminary tests the tanks were crashed by being mounted in the nose of a dummy *fuselage*, behind a dummy engine made of concrete. The final tests included also crashing tests as well as acceleration tests and firing tests. Twenty-six entries were received for the competition, and 18 different types of tanks were actually submitted for the tests.

It will be remembered that the First Prize (£1,400) was awarded to the India-Rubber, Gutta Percha and Telegraph Works, Ltd., of Silvertown, London, E. 16. We understand that arrangements have now been made for the Silvertown tank to be marketed by Messrs. The Palmer Tyre, Ltd., of Shaftesbury Avenue, W.C. 2, whose reputation in the aviation world is such that anything handled by that firm is certain of



(R.A.F. photographs, Crown Copyright.)

The prize-winning Silvertown tank of the India-Rubber, Gutta Percha and Telegraph Works Co., Ltd. : 1 shows the tank complete with Silvertown detachable cover. In 2 the tank is shown mounted behind a dummy engine, ready for crashing tests. 3, tank after crashing. 4, tank and cover after crashing. 5, tank with cover removed showing that the steel shell with welded seams, even after crashing, does not leak. 6 and 7 show the tank after firing tests, indicating the holes made by bullets on entering and leaving the tank.

being received with due attention. We have been fortunate enough to obtain from The Palmer Tyre, Ltd., photographs of the tanks tested at Farnborough during the competition, and a few particulars relating to the development and construction of the Silvertown tank.

It will probably come as a surprise to many to learn that the idea of protecting a tank or any vessel against leakage by an external covering of rubber is not new. Yet we are informed that such an arrangement was suggested as long ago as 1877 by Col. C. V. Fosbery, and that experiments were carried out by the Silvertown Co. in that year. The idea at that time was to cover the hulls of ships with sheets of rubber, because it was found that the perforation made in this material by a bullet or similar projectile closed automatically after the bullet had passed through. The high cost of putting this invention to practical use for the purpose suggested was probably the main reason why the idea was not carried beyond the experimental stage until in recent years in connection with aircraft fuel tanks.

Mr. S. C. Mote, for many years chief of the experimental staff at Silvertown, has carried out a number of experiments on self-sealing petrol tanks, some in connection with the Board of Invention and Research, and some independently. He soon became convinced that success could not be attained until an alteration to the tanks themselves was made. This was not permitted during the early experiments, and it was not until some time later that redesigned tanks, in which the metal shell was made much thinner, were tested and found to be better than the original thick-walled tanks. It was found that the greater the resistance of the metal shell, the greater the damage done by projectiles. Then followed experiments with thin metal tanks covered with india-rubber, and these were found to be a great step forward. The earlier tanks, however, had the rubber covering vulcanised on *in situ*.

For the Air Ministry Tank Competition, however, the Silvertown Co. designed a new type of tank, consisting of a thin shell of sheet steel, covered with a loose cover of india-rubber. The advantage of the detachable cover is that it can be stored and issued as required. Also in case of damage to a tank, a new tank, or the old one repaired, can be inserted in the cover without damage. Another advantage of the loose cover would appear to be the avoidance of heating the metal shell when the rubber cover is being vulcanised *in situ*, while one avoids sending the metal shell to be covered and can, instead, send the cover to the place where the tank is being made.

The Silvertown tank, which incidentally is patented both at home and abroad, has a very thin shell of sheet steel, the edges of which are welded together. This shell was made to the Silvertown Company's specification by Messrs. Brown, Lenox and Co., of Millwall, and it is a splendid testimonial to the skill of this firm in welding thin sheet steel that after the crashing tests the metal shell, although badly buckled, did not leak at all, the seams having withstood the shocks successfully. Also in the firing tests the tank came out very well indeed, and it was found that after several shots, including incendiary bullets, had passed through, with the incendiary projectiles still burning after passing through, there was no sign of deformation of the tank, showing that the metal shell had stood up well to its function as a supporting frame for the rubber, thus allowing it to continue its purpose as a tank.

While thus satisfied that the Silvertown tank was crash and fire proof, there was still some doubt as to the way in which very low temperatures, such as might be met with at great altitudes, would affect the rubber. Extensive tests were consequently carried out, and a covered tank was subjected to the low temperature of − 30° F., and to firing tests, when it was found that the rubber stood the test perfectly.

Apart from the composition of the rubber cover, which is, of course, the secret of the makers, much of the success of the Silvertown tank is due to the manner of securing the loose cover, which is made in one piece, to the main jacket. One of the accompanying photographs gives some idea of how this cover is secured, the edges being fastened in such a manner as to be leak-proof, and to prevent any escape of petrol between the main jacket and its detachable cover.

There appears to be little doubt that the new fire-proof tank represents a very real step forward, and as the weight is but very little in excess of that stipulated as a maximum for the competition (1·9 as against 1·75 lbs./gallon capacity), the fitting of Silvertown tanks should not entail an undue addition to the weight of an aircraft, considering the very great advantage of having tanks which are extremely unlikely to leak and cause a fire in anything except an accident so severe that it would matter but little whether or not the machine caught fire, as far as saving the occupants was concerned. It might be mentioned that the Silvertown tanks were heavier than any of the other two which won Second and Third Prizes, and that, therefore, it must be presumed that the judges awarded First Prize on other merits which more than outweighed the extra weight of the Silvertown tank.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN MAY 14 AND May 20, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	48	94	13	31	43	3 0	D.H. 34 G-EBBQ (2h. 5m.)	B. (4), D.H. 4 (2), D.H. 9 (2), D.H. 18 (3), D.H. 34 (4), G. (6), H.P. (1), H.P.W8B (2), Sp. (4), W (1).
Paris–Croydon	42	84	9	26	37	2 44	D.H. 34 G-EBBS (2h. 9m.)	B. (3), D.H. 4 (1), D.H. 18 (3), D.H. 34 (4), G. (5), H.P. (1), H.P.W8B. (2), Sp. (5).
Croydon–Brussels ...	5	15	2	3	4	2 9	D.H. 34 G-EBBR (2h. 6m.)	D.H. 18 (1), D.H. 34 (2).
Brussels–Croydon ...	4	10	—	2	4	2 49	D.H. 34 G-EBBR (2h. 35m.)	D.H. 18 (1), D.H. 34 (2).
Croydon–Rotterdam–Amsterdam.	8	4	5	7	8	2 26§	Fokker H-NABD (2h. 19m.)	F. (6).
Amsterdam–Rotterdam–Croydon.	9	6	9	6	7	3 0§	Fokker H-NABI (1h. 7m.)	F. (7).
Totals for week ...	116	213	38	75	103			

* Not including "private" flights.

† Including certain journeys when stops were made *en route*.

‡ Including certain diverted journeys.

§ Rotterdam.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc. :—Co. des Grandes Expresses Aériennes ; Daimler Hire, Ltd. ; Handley Page Transport, Ltd. ; Instone Air Line ; Koninklijkie Luchtvaart Maatschappij ; Messageries Aériennes ; Syndicat National pour l'Étude des Transports Aériens ; Co. Transaérienne.

Incidental Flying.—During the week Capt. Stocken made test flights on five D.H. 9's for the Aircraft Disposal Co.

ROUND-THE-WORLD FLIGHT

Farewell Luncheon to Aviators

MAJOR WILFRED BLAKE, Captain Norman Macmillan and Lieut.-Col. L. E. Broome were entertained at luncheon at the Hotel Victoria, Northumberland Avenue, by the proprietors of the *Daily News* on May 22. Lord Montagu of Beaulieu presided, and with him sat the three aviators and the Director of Civil Aviation, Maj.-Genl. Sir Sefton Brancker. Lord Montagu read a telegram from H.R.H. the Duke of York, regretting his inability to be present, and adding that he sent the three aviators his best wishes for success.

In proposing the health of the three "very gallant English gentlemen," as he described them, Lord Montagu said he took special pride in Maj. Blake because he was a Beaulieu boy. He was now setting out upon a far greater adventure than any which he had ever had in the woods at Beaulieu as a boy. With regard to the expedition Lord Montagu stated that it was a purely sporting effort, and was not being carried out in order to advertise any commercial object. The entire money for the expedition was being provided by a private individual whose name he did not know, and Lord Montagu also referred to the assistance which was being received from the Air Ministry and from India. It was hoped, he said, that the aviators would be back in this country by September 7.

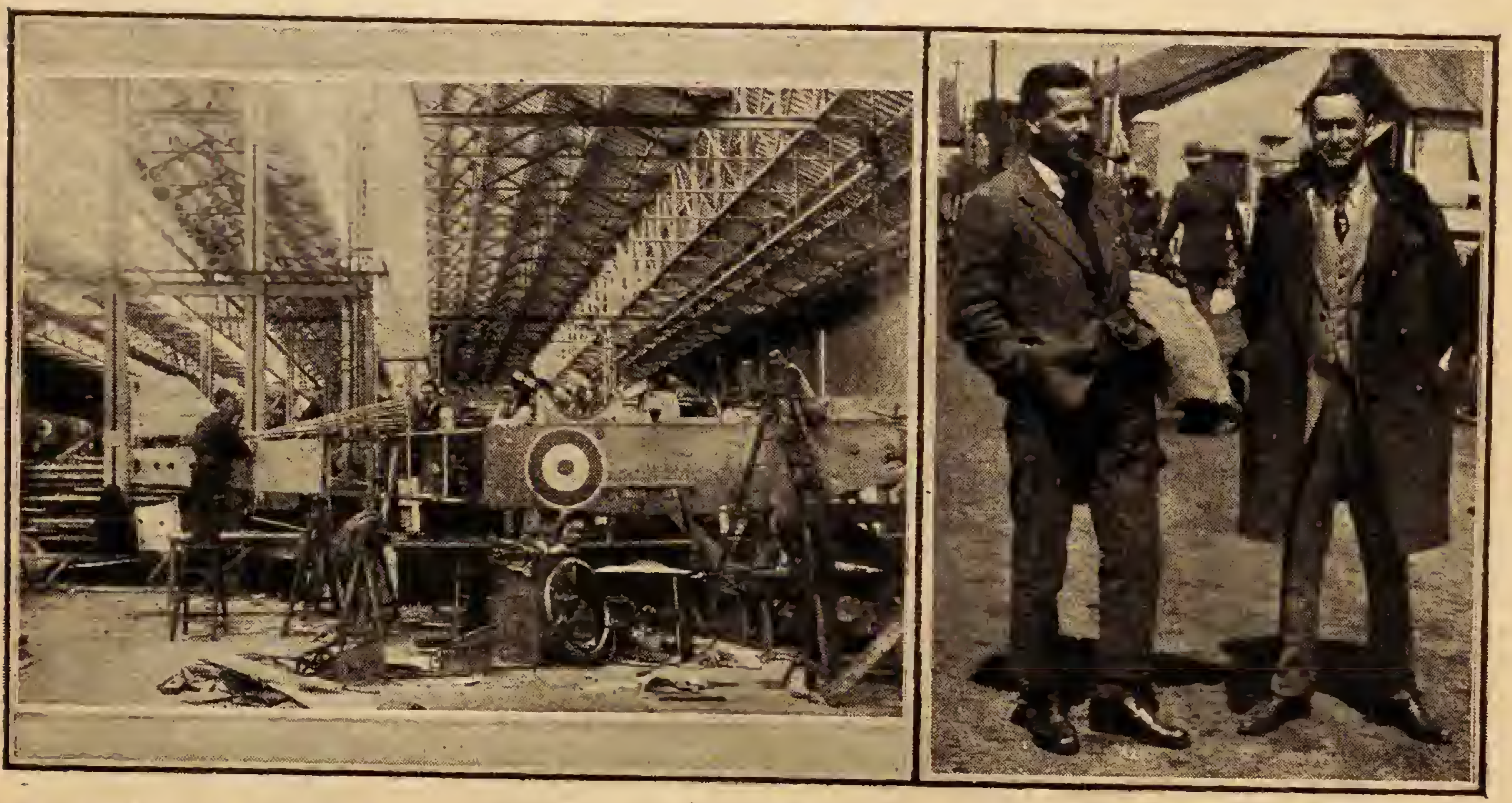
Sir Sefton Brancker, in seconding the toast of the aviators, remarked that Sir Ross Smith had intended to start towards the end of April, when the best climatic conditions obtained. When Sir Ross met his tragic death, Maj. Blake resolved to attempt the flight, and it was a remarkable fact that within a month he was ready to start. The Director of Civil Aviation concluded by advising the aviators to take no foolish risk, and said their motto should be "Safety First."

Maj. Wilfred Blake stated that if it had not been for the generosity of one man, whose name he did not wish to announce, and who was not known to either Capt. Macmillan or Lieut.-Col. Broome, the flight could not have taken place. He paid a glowing tribute to Capt. Macmillan's skill as a pilot, and expressed the opinion that when they got home—he would not say if, because they were going to get home—the success of the expedition would be primarily due to Capt. Macmillan. When Lieut.-Col. Broome, whom he had known for a number of years, offered his services, he (Maj. Blake) jumped at the opportunity of having a man with a special knowledge of the Aleutian Islands and Alaska, who would also act as navigator, engineer and photographer. Maj. Blake also referred to the help given or promised by the Air Ministry, the R.A.F. and various Governments. Canada had promised to erect for them a D.H. 9 at Vancouver and an F. 3 flying boat at Winnipeg. The Aircraft Disposal Co. had worked day and night for a fortnight to get the machine ready for the start on May 24, and he thought it was nothing less than a miracle that the machine had been got ready. They hoped, he said, to make a trial flight that evening.

Lieut-Col. Broome said that they did but follow the road that Sir Ross Smith had shown them, and reminded the guests that the word Blake rhymed with Drake.

Capt. Macmillan also made a short and modest speech, but he is evidently very much less nervous when starting out for a tour round the world than he is when faced with the task of speaking in public.

Maj. Egbert Cadbury, D.S.O., D.F.C., who was introduced by Lord Montagu as "the only living Englishman who had brought down two Zeppelins," thanked them all for coming to wish the aviators God-speed. He thought that they would find that the most difficult part of their journey would be from America to England in their F.3, referring to a way this type of machine has of keeping on bouncing in anything but a calm sea.



THE FLIGHT AROUND THE WORLD: On the left is seen the fuselage of the D.H.9 on which the aviators are to attempt the flight from London to Calcutta. The photogaph was taken at the Aircraft Disposal Co.'s works at Waddon on Thursday of last week, indicating that no time was lost in getting the machine ready in time. On the right is a snapshot of Capt. Macmillan and Maj. W. Blake, taken at Croydon.

Lord Riddell said that so far as he knew the *Daily News* was the only paper which had to its record the honour of having produced a man who had brought down two Zeppelins. That, he thought, was not a bad achievement for a pacifist organ, and only showed that it did not matter what an Englishman's views might be, if you touched him on the raw he would hit back. Lord Riddell then proposed a vote of thanks to Lord Montagu for having presided at the gathering.

Among the guests were Lord Ashfield, Mr. G. Balfour, M.P., Capt. Wedgwood Benn, M.P., Sir Robert Bird, M.P., Sir F. Bowater, Mr. C. W. Bowerman, M.P., Maj.-Genl. Sir Sefton Brancker, Sir Harry Brittain, M.P., Maj. Egbert Cadbury, Mr. J. R. Clynes, M.P., Viscount Curzon, M.P., Brig.-Genl. Festing, Sir Walter de Frece, Sir Charles Higham, M.P., Sir George Lawson Johnston, Mr. Artemus Jones, K.C., Lieut.-Comdr. the Hon J. M. Kenworthy, M.P., Sir George Lewis, Sir Hedley Le Bas, Maj.-Genl. Sir Fred. Maurice, Sir E. M. Mountain, Sir Frank Newnes, Lord Riddell, Sir A. Robbins, Mr. Lyle Samuel, M.P., Maj.-Genl. Sir Fred. Sykes, Mr. George Terrell, M.P., Sir Percy Thompson, Brig.-Genl. Sir H. W. Thornton, Sir Charles Wakefield, and Sir Samuel Waring.

WIRELESS POSITION-FINDING FOR AIRCRAFT

THE Air Ministry announces that regular facilities for wireless direction-finding are now offered to the Cross-Channel Air Services. Since October of last year a wireless "position-finding" system has been under trial to enable air pilots to ascertain their position when flying on the Cross-Channel Airways. This system has, on several occasions, proved to be of particular advantage in adverse weather conditions, and has been introduced as a regular feature of the civil aviation wireless service. It is a further development of wireless direction-finding which, during the past two years, has proved of such great value to air navigation.

Until last October direction-finding work was carried out only by the Civil Aviation Wireless Station at the London Air Port of Croydon, and was limited to giving a pilot his compass bearing from that station. The direction-finding station at Pulham Airship Base, Norfolk, has been successfully operated as the second station of the system during the past six months, thus enabling two bearings to be taken simultaneously upon a single aircraft, and its position determined by plotting the bearings upon a chart, the point of intersection giving the aircraft's position.

Direct intercommunication between Croydon and Pulham is effected by radio-telephony, and the pilot can be informed of his position with a high degree of accuracy under normal conditions. The radius of action for giving position is approximately 200 miles from the control station, which in this case is Croydon. Although primarily designed for radio-telephony, the system is equally adaptable for radio-telegraphy, the change over being carried into effect by a simple switch in a few seconds. The position can normally be given within two minutes. Similar facilities can be afforded from Croydon to aircraft engaged on inland flights and services.

Several instances have already occurred in cases of fog and storm where pilots have been informed of their position and enabled to reach their aerodromes in safety. The most noteworthy occasion was in February last, when an aeroplane, flying over the airway between Paris and London, was navigated entirely by wireless, the pilot seeing the ground only on one occasion for a few minutes.

Pilots and navigators have been strongly urged in a Notice to Airmen which has just been issued explaining the working of the system, to make a practice of utilising on every flight this important aid to navigation, as the experience gained in the use of position-finding in good weather, when pilots should be able to check the accuracy of the positions, will add to their confidence and proficiency in using the system when flying in bad weather.

It is therefore hoped that they will take full advantage of the opportunity thus offered of increasing the security of air navigation.

LOCALISED RADIO LANDING SIGNALS FOR AEROPLANES*

RADIO direction-finders and other radio devices have been in use for some time to assist aircraft to land during the night, during fog, or at other time of poor visibility. The most usual method is to transmit from an ordinary elevated antenna, at the landing field, radio signals which are received on a direction-finder located on the aeroplane. This method gives the direction of the landing field, but does not give accurate information as to its distance when the machine is near the landing field.

Several years ago the U.S. Bureau of Standards was called upon to develop a method to assist aircraft accurately to locate the landing field when the machine was quite near. It was desired to develop a method which would give a good signal, easily audible over a large area from comparatively high altitudes, but which would be localised within a small area when the machine was near the ground—an important point.

A method of induction signals was first tried, using 500-cycle alternating current, which flowed through a large horizontal, single-turn coil, 600 by 800 ft., at the landing field. Reception on the aeroplane was made using horizontal coils wound on the lower wings. It was found that this method gave a signal which was audible over a wide area when the machine was near the ground, but was confined to a small area at elevations of about a mile.

This was not satisfactory, so the use of radio frequency waves was therefore undertaken. Two horizontal coils identical in construction were placed one above the other so that their axes coincided. The current in one coil flowed in a direction opposite to the current in the other coil. A fairly high radio frequency, suitable for direction-finding work, such as 300 kilocycles, was used. A calculation was made which indicated that the signals radiated from the two coils would be strongest for an aeroplane flying in a given horizontal plane, whenever the machine was inside a comparatively small ring-shaped area located above the landing field.

A careful experimental investigation was made under actual flying conditions, and the results of this calculation were verified. Signals were received on the aeroplane only when it was nearly above and in the immediate vicinity of the landing field.

The Bureau of Standards has just published a paper giving the theory of the radiation from an antenna consisting of two horizontal coils, as used in this work. It is found that if a vertical coil antenna is used for reception on the aeroplane, and if the latter flies horizontally, the maximum signal is received when a line joining the aeroplane to the transmitting coils makes an angle of 30 degrees to the vertical, assuming that the effect of the earth is negligible. The region of space within which the signal can be detected by receiving instruments of given sensibility has nearly the form of the space between two inverted co-axial vertical circular cones of finite length having their common apex at the transmitting station. The upper limit of the region within which the signal is audible depends on the sensitivity of the receiving apparatus, and is not as clearly defined as the bounding conical surfaces. The signal vanishes when the aeroplane is directly over the transmitting station, and vanishes rather soon after the aeroplane passes over the region of maximum signal and flies away from the station. The effect on the transmission of having a perfectly conducting earth directly under the transmitting coils has also been investigated, and it has been found that in this case a maximum signal is obtained when the line joining the aeroplane to the transmitting station makes an angle of 26 degs. 34 mins. with the vertical.

It is expected that these theoretical studies will be very useful in the design of radio transmitting stations for sending localised landing signals to aeroplanes. The results of these investigations are given in Bureau of Standards Scientific Paper No. 431: "The Field Radiated from Two Horizontal Coils," by Gregory Breit. A copy may be obtained (price 5 cents.) from the Superintendent of Documents, Government Printing Office, Washington, D.C., U.S.A.

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* Extract from the *Radio Service Bulletin* (U.S.A.).

THE ROYAL AIR FORCE IN INDIA

Sir John Salmond's Mission

FOR some time now it has been known that all was not well with the R.A.F. in India. A very serious shortage of spare parts has interfered with the efficient working of the force, and it has been alleged that, to all intents and purposes, there is not a spare propeller in the whole of India, so that if a propeller be damaged the entire machine is out of commission. From Simla it is now reported that an additional allotment of money has been made to the R.A.F., and probably in the same connection, it is of interest to note that Air Vice-Marshal Sir John Salmond is leaving at once for India, accompanied by Group Captain J. A. Chamier and Wing Commander F. E. T. Hewlett. It is understood that these three officers will form a committee of investigation to look into the re-organisation of the R.A.F. in India.

On October 1, when these investigations have been completed, Sir John Salmond will proceed to Irak to take up his command there, when the administration of that region will pass, as promised in the House, from the Army to the R.A.F. In the Air Estimates provision was made for two Air Marshals, and it was generally believed that the second of these (Sir Hugh Trenchard already held that rank), would be the officer taking over the command in Irak. Thus, probably when Sir John Salmond takes over his new post, he will do so as Air Marshal.

LONDON TERMINAL AERODROME

Monday evening, May 22, 1922

THERE was quite an influx of passengers on Saturday, although, taking the week as a whole, there has been no sign of any great improvement, and there was still accommodation in the numerous machines to and from Paris for three or four times as many travellers as were actually carried. Weather conditions have been against punctuality on several days during the week.

In spite of good flying weather at Croydon, with visibilities ranging up to 20 miles, there has on several days been drifting fog in the Channel and along adjacent coasts. On Wednesday Mr. Bradly, piloting the Instone D.H. 18 G-EARO, was *en route* from Croydon to Le Bourget when he ran into thick fog in the Channel. After flying round in the fog for something like two hours, he eventually landed at Dymchurch, proceeding to Paris the following day.

The same evening one of the K.L.M. monoplanes, *en route* from Amsterdam to London, and piloted by Mynheer Warnaar, was forced to descend by weather when over the English coast. From reports made by people in the district, the visibility was apparently about 25 yards, and those on the ground could hear the machine, although they could not see it. Finally Mynheer Warnaar was compelled to descend, and, in doing so, crashed the monoplane, and slightly injured his passenger. It appears that he crashed through two trees, which afterwards looked as though they had been struck by lightning, and landed perilously near a house on one wing-tip—which, so Capt. Leverton informs me, evidently saved the pilot. The interesting part about the whole affair was the cool way in which the pilot took the catastrophe. He was, according to all accounts, not in the least shaken, and evidently regards a difficult and dangerous forced landing as all in the day's work.

A French Statement on the Fare Question

WITH regard to the rumour of fare-cutting, which has appeared in certain newspapers, and was mentioned in these columns last week, I have it on no less an authority than that of Mr. Hyat, the London manager of the Grands Express—who tells me he is speaking also for Mr. Grosfils, of the Messageries Aériennes—that the French air companies have not the slightest intention of cutting the fares, and that they intend, in fact, making no alteration whatever unless British companies take the lead in this matter.

Speaking of the Grands Express, the Goliath, which was so skilfully repaired, after having its nose knocked off in contact with one of the shed walls, flew back to Paris in quite good time, despite the handicap of the temporary square and foreshortened nose. The whole matter reflects great credit on the skill of the mechanics and pilot concerned.

The Instone Air Line have been running the new Brussels service with commendable regularity, although they are not as yet receiving much support in the way of passengers. Gen. Brancker travelled over in one of the D.H. 34's during the week, occupying the seat outside with the pilot.

I understand there is now a regular consignment for the Instone line's early morning machine to Paris, which amounts to a minimum of at least 1,000 lbs. weight, and, with the ordinary goods traffic in addition, the weight of goods on this machine daily is in the neighbourhood of half a ton.

Further Experiments with Parachutes

SOME very interesting experiments with new forms of parachutes are being made with the Royal Aero Club's Avros, piloted by Capt. Muir, of the Surrey Flying Services. These parachutes are the invention of two Egyptian enthusiasts, and the main idea appears to be to make it possible to vary the rate of descent of the parachute not only by an adjustment before it is released, but also while actually descending earthward. I understand that very exhaustive tests—including tests to destruction—are to be made with this new parachute.

In order to be in keeping with the general gay appearance of the offices on the aerodrome, the model aeroplanes on the traffic-movement board are now being painted with the "house" colours of the various air lines, and a key to these colours has also been painted on the side of the board. Some of the newly-painted models are already in use, and the board presents a study in "jazz" when there are a number of machines *en route*.

Daimler airways are maintaining a high standard of efficiency in the running of their machines, and are with few exceptions—due mainly to weather—keeping three services a day in each direction going with only three machines. This calls for a very high pitch of organisation, and is a tribute to the work of all concerned. I notice also that the number of passengers carried by this line is increasing steadily, if somewhat slowly.

An Object-Lesson in "Wind Reading"

THE meteorological section have now got their wind indicator working, and this is proving of great interest to pilots, being much more reliable than the old wind-sleeve. It is also an object-lesson in the variation that occurs with even the most steady wind, the automatic pen registering every fluctuation, and showing how the wind is made up of constant gusts and lulls, while the direction shifts backward and forward within a radius of several degrees constantly. The notice-board on which the map of the weather is displayed has also been re-erected.

Handley Page Transport have been running their new W. 8 B's constantly during the week, and have had quite good loads, although they have been by no means full. The wonderful inherent stability of these machines was demonstrated when Mr. Wilcockson, piloting the "Princess Mary" from Paris to London, flew from above Beauvais until he arrived over Croydon without touching any controls other than the rudder, which of course was necessary to steer the machine.

A new motor "fire engine" has made its appearance on the aerodrome, and is the pride of the air-station fireman, who spends much time and energy keeping its bright red paint spotless. It is equipped with chemical extinguishers, and has been allotted a position alongside the ambulance—so that, as some caustic wits say, "all visitors to the aerodrome can have the horrors of flying duly brought home to them."

Trans-European Pilot's New Tour

MR. ALAN J. COBHAM, piloting one of the De Havilland Aircraft Company's D.H. 9 c's, landed at the air station on Thursday in order to pass through Customs on his way to Paris on another European air-tour. This time he is carrying a South American, Mr. W. S. Gosling, who intends to visit Paris, Dusseldorf, Berlin, Prague and Vienna, and be back in London within a week. Mr. Gosling told me that he has business in each place, and that, owing to having to catch a boat for South America on June 3, and having still some business to clear up in London, he had to do his Continental trip in a week, and that an "air-taxi" was the only machine making such a thing possible. Mr. Gosling, by the way, is an enthusiastic aviator, and has his own Renault-Avro in South America, which he pilots himself. He is a friend of Major Kingsley, who has done so much to promote aviation in the Argentine.

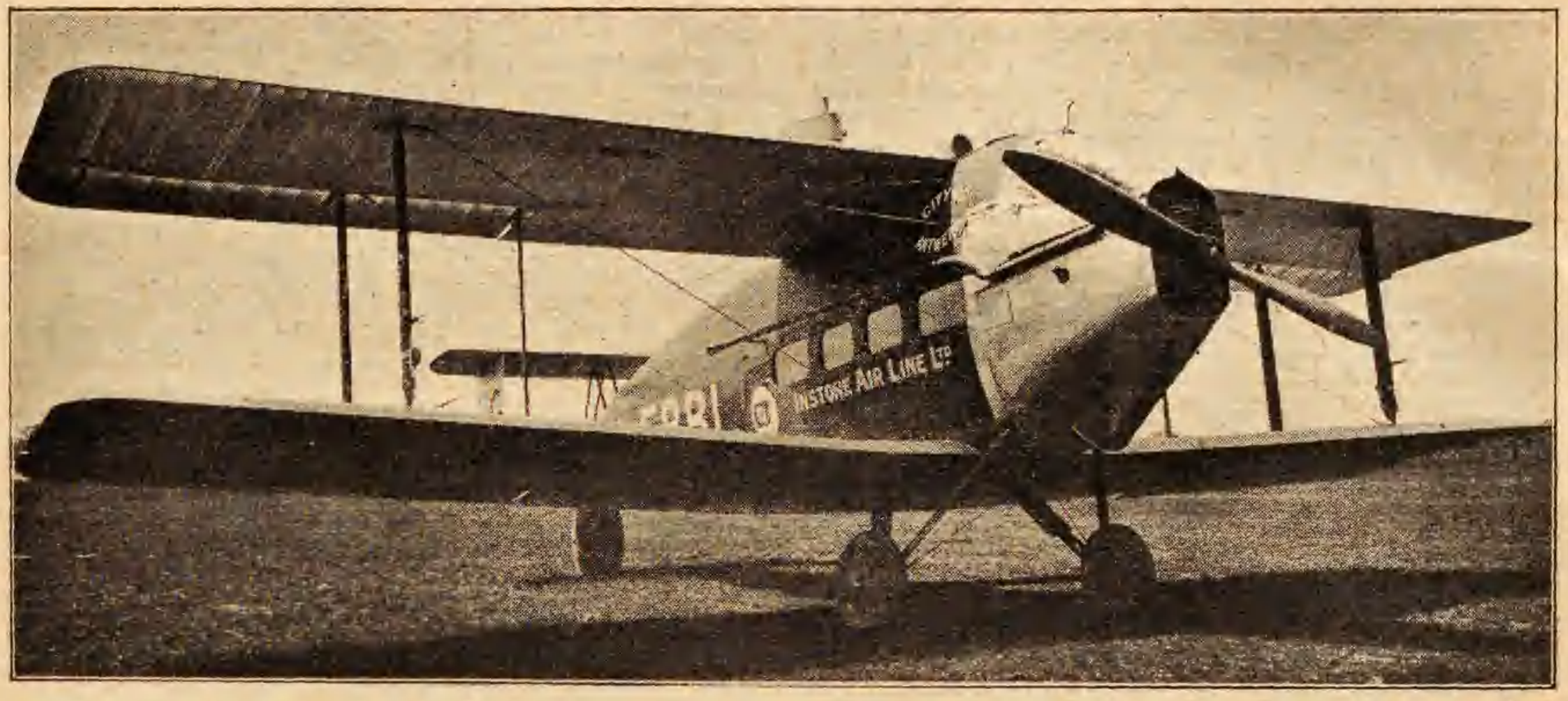
The double service of the K.L.M. is proving quite a success as far as the goods traffic is concerned. This is even larger than last year, and on occasion Capt. Leverton is hard put to it to find accommodation for the volume of merchandise consigned to Holland by the K.L.M. The difficulty of the load from Holland has not, however, been solved yet, and the loads on the machines arriving at the air-station from Amsterdam and Rotterdam still, generally speaking, remain disappointing.

An Air-Special which Vanished

ON Saturday morning at 8 a.m. Mr. Barnard, of the De Havilland Company, who was carrying a passenger in a D.H. 9 to Le Touquet, started off from Croydon, but made a temporary halt at Lympne. Starting away from there again at 10 a.m., he vanished so to say "into the blue," and nothing more was heard of him again until Monday morning. Great anxiety was, of course, felt as to what had happened. When much-delayed tidings did come through, it transpired that he had alighted at a remote point on the French coast with engine-trouble.

On Sunday Mr. Keys, a new Instone air-line pilot, left for Brest in the D.H. 4A carrying a correspondent of a London newspaper, who was travelling there by "air special" in order to send a descriptive cable in connection with the lamentable sinking of the liner "Egypt." Mr. Keys was duly reported as having reached Brest on Sunday evening.

There has, by the way, been quite an epidemic of under-carriage trouble. On Saturday a Handley Page W. 8 damaged an under-carriage coupling when getting off for Paris, and it was not until the machine was nearly at Lympne that the wireless people established communication with the pilot, Mr. Olley, and told him what had happened. He returned to Croydon and made a clever landing. Many critics blame the state of the aerodrome for these mishaps, declaring it to be much too "bumpy" in parts.



THE VICKERS "VULCAN," 360 H.P. ROLLS-ROYCE "EAGLE" ENGINE.—This machine was described and illustrated in detail in our issue of May 4, 1922, but photographs have not been available until now. The machine carries eight passengers in a roomy cabin, and will shortly be put on the London-Brussels service by the Instone Air Line.

THE ROYAL TOURNAMENT

FOR this year's Royal Tournament, which was opened at Olympia on Thursday of last week by H.M. the King, who was accompanied by Queen Mary, the organisers have followed the lines of the pre-War tournaments, two of the most popular features being the musical drive by the Royal Horse Artillery (O Battery) and the musical ride by the 1st Life Guards. Royal Navy and Royal Marines vie with each other in their deft handling of a field gun, and the Royal Engineers build a bridge in double quick time, while rope climbing seems absurdly easy after you have seen the men from the R.N. School of Physical and Recreational Training at Portsmouth go through their wonderful show. Guard mounting a couple of centuries ago is acted by the Brigade of Guards, and this, together with the combats and tussles, not done in too serious a style, by the Army P.T. Staff with broadswords, daggers, rapiers, quarterstaffs, etc., give suggestions of what the good old days may have been like. The Navy's pageant, "Past and Present," is well organised and carried out, and it should stimulate the R.A.F. to work out an item for future displays. As it is, the R.A.F. is only represented in the competitions, the heats for which are carried out in the mornings. But of course, the R.A.F. cannot very well be cabined and confined in Olympia, and in any case we shall see it playing its part in helping to swell the Service charities at the R.A.F. Pageant later on in the season. In the meantime, the Royal Tournament well merits a visit, and a double visit.

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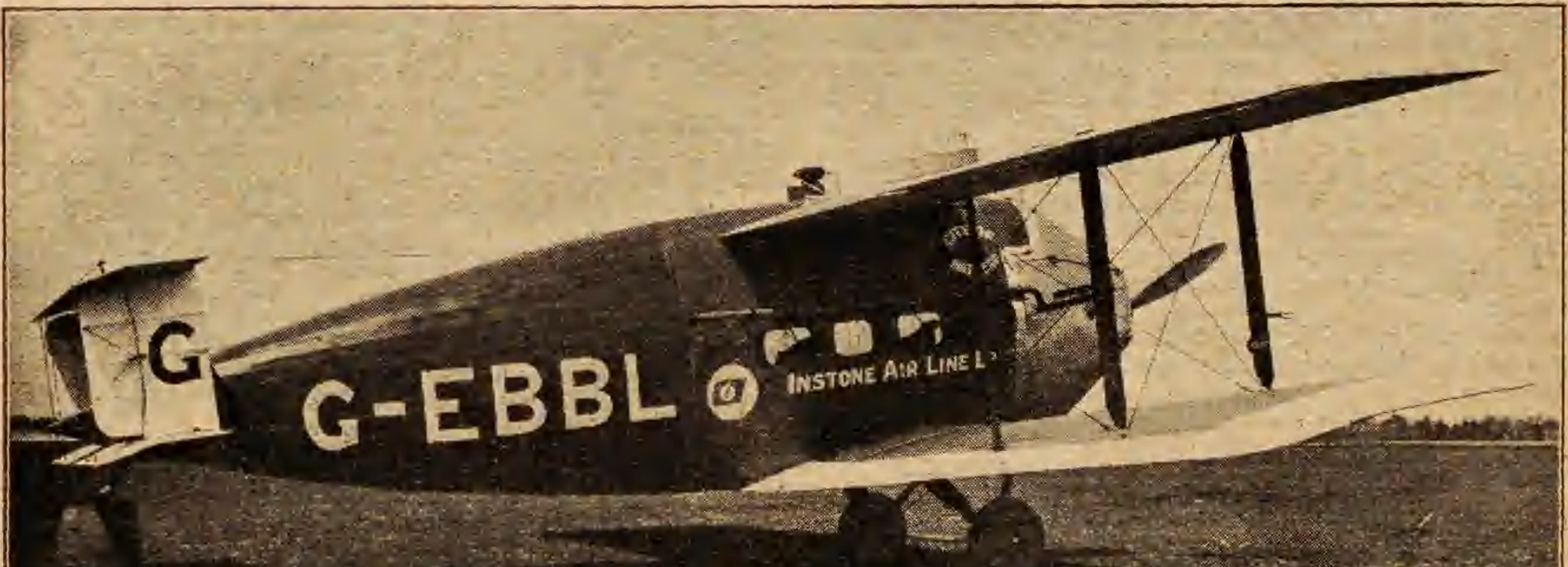

THE VICKERS "VULCAN" COMMERCIAL MACHINE: Three-quarter rear view. A feature of this machine is the exceptionally low landing speed of 40 m.p.h., and the quick pull-up after touching. The "Vulcan" also gets off after a very short run, and climbs steeply. The power expenditure is only 45 h.p. per passenger carried, so that the machine should be very economical.

AERIAL WARFARE AT FARNBOROUGH

In the presence of the King and Queen, who were accompanied by Lady May Cambridge, Lady Trefusis, Miss Morland, Gen. Lord Cavan, Gen. Sir T. L. M. Morland, Sq.-Ldr. C. H. B. Blount, M.C., Sq.-Ldr. R. M. Hill, M.C., A.F.C., and Mr. Sydney Smith (Superintendent, R.A.E.), a magnificent military display by aircraft was carried out at Farnborough last Saturday. After inspecting the Tank Corps at Pinehurst, and the R.A.F. aerodrome on Cove Common, their Majesties took their seats in the Royal enclosure on Cove Hill, from where they had an excellent view of the wonderful displays put up by a variety of types of aircraft. In the centre of the aerodrome—where in the early days S. F. Cody made his first flight—two lines of flags were set out, representing infantry. Four Bristol Bombers, piloted by Flt.-Lieut. H. G. White and F.Os. B. R. Harris, J. F. McBain, and C. H. Harrison, first circled over the Royal party in diamond formation, and then, changing into column formation, swooped down upon the "infantry" and one by one discharged their bombs. Nearly all the latter found their mark, and the remainder were sufficiently close to do considerable damage.

After this one of the latest tanks set out with the object of destroying a stronghold, the locality of which was unknown to the tank commander. Circling above, however, was an aeroplane, piloted by Flt.-Lieut. King, who spotted the stronghold and directed the tank on to its target by means of wireless telephone. Once found the tank "sat" on the stronghold to flatten it out, revolved several times upon its own base just to grind things up a bit finer, and then returned to its base. Incidentally, some very interesting demonstrations in wireless telephony in connection with aircraft were investigated by their Majesties, conversations being carried on with Flt.-Lieut. V. H. Tait piloting a machine several thousand feet above.

Officers of the Experimental Section, R.A.E., then gave a remarkable and thrilling display of aerial manœuvres vulgarly known as "stunts." An S.E. 5A and a Nieuport Nighthawk had a competition to see who could remain out of normal flying position the longest. Then a D.H.10 (two 400 h.p. Liberties), returning from a "raid," was very much worried by a swarm of smaller fry (or "fly") which was doing its best to obstruct the "raider's" return.

At the conclusion of the display the King and Queen passed down along the line of machines and congratulated and chatted with the pilots. They then inspected the anti-aircraft guns on Cove Hill.

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A BRITISH FLYING BOAT IN THE MEDITERRANEAN

Fine Performance by Air-Commodore Samson and His Crew

To those who, like ourselves, believe in the seaplane as a means for linking up the various parts of our far-flung Empire, the reports, meagre as they are, of the splendid performance of a British flying boat in the Mediterranean give a very welcome indication that active work is being done, although little enough is heard of it, by the sea-going sections of the R.A.F. Working with the Navy, much is done of which the outside world is not allowed to learn, but now and then a flight is made which, by its very nature, cannot well be kept a secret. A case in point is this flight of Air-Commodore Samson's.

It appears that a flying boat, of which no particulars are available beyond the fact that it was built in this country, sent out to Malta and erected there, the Neptune, under Air-Commodore Samson, Chief Air Officer at Malta, who had with him Squadron-Leader Gordon, Lieut. Scriven and two engineers, left Malta on May 16 *en route* for Gibraltar. The Neptune left Malta at 6.35 a.m. on May 16, and arrived at Algiers at 9.45 p.m. Next morning, May 17, she left Algiers at 7 a.m. and arrived at Oran, Algeria, the same day. On May 19 she left Oran at 4.55 a.m., arriving at Gibraltar at 9.52 a.m. The average speed on the trip is stated to have been 60 knots.

The return trip was started at 2.25 p.m. on May 20 against a strong easterly wind. When about 30 miles west of Oran she developed engine trouble and was obliged to descend. She is reported to have been towed into Oran, but no information is available concerning her condition after being towed 30 miles against a strong easterly wind. The crew is, however, reported safe.

Although thus being unable to complete her journey as planned, the flight of the Neptune is a very fine one, and gives an indication of what might be done with proper organisation in the way of speeding up mails to and from the East by means of seaplanes. It is to be hoped that more flights of a similar nature will be heard of in the near future.

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ROYAL AERONAUTICAL SOCIETY NOTICES

Election of Members.—The following members were elected at a Council Meeting held on Tuesday, May 16:—

Associate Members.—H. V. Bullbrook, E. C. Gaccon, F. W. Gaccon, P. Hoggins, P. E. Williams; James Hamilton (Scottish Branch).

Student.—W. K. Mackenzie.

Wilbur Wright Lecture.—The Annual Wilbur Wright Lecture will be delivered at 5.30 p.m. on June 15, at the Royal Society of Arts, John Street, Adelphi, when Lieut.-Col. A. Ogilvie, C.B.E., F.R.Ae.S., will read a paper on "Some Aspects of Aeronautical Research."

Committees.—The following is the full list of Committees appointed for the year ending April, 1923:—

Candidates' Committee.—Prof. L. Bairstow, Prof. B. Melvill Jones, Wing Commander T. R. Cave-Browne-Cave, Sqdn.-Ldr. R. M. Hill, Prof. C. F. Jenkin, Mr. W. O. Manning, Dr. N. A. V. Piercy, Dr. A. J. Sutton Pippard.

Finance Committee.—Mr. Griffith Brewer, Lieut.-Col. A. Ogilvie, Mr. A. E. Turner (Hon. Treasurer), Mr. F. P. Walsh.

Publications and Library Committee.—Prof. L. Bairstow, Major F. M. Green, Sqdn.-Ldr. R. M. Hill, Major A. R. Low, Mr. J. D. North, Lieut.-Col. H. W. S. Outram, Dr. A. J. Sutton Pippard, Mr. J. L. Pritchard (Editor), Maj. R. V. Southwell.

The Chairman (Lieut.-Col. M. O'Gorman) and Vice-Chairman (Air Commodore H. R. M. Brooke-Popham) are *ex-officio* members of all the Society's Committees.

W. LOCKWOOD MARSH,
Secretary

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UNVEILING BRITISH FLYING SERVICES WINDOW IN WESTMINSTER ABBEY

By the generous gift of Mrs. Louis Bennett, of West Virginia, U.S.A., whose son, Lieut. Louis Bennett, was killed in 1918 while serving in France as a pilot with No. 40 Squadron, Royal Air Force, a window to the memory of all officers and airmen of the British Flying Services who fell in the Great War (1914 to 1918) has been erected in Westminster Abbey.

The unveiling ceremony, which takes place in the Abbey at noon Friday, May 26, will be carried out by Capt. the Right Hon. F. E. Guest, C.B.E., Secretary of State for Air. The dedication service will be conducted by the Very Rev. the Dean of Westminster, assisted by the Abbey Staff. The Air Council and Air Officers Commanding R.A.F. Areas and Commands will attend the ceremony, together with a representative party of the Royal Air Force.

Friends and relatives of members of the Flying Services who lost their lives during the War are invited, and are asked to regard this announcement as an official invitation. No tickets of admission are required, and entry to the Abbey can be made by any door except the Great West Door.

The Central Band, Royal Air Force, under the Director of Music, Flying Officer J. H. Amers, will be in attendance.

The window is the design of Mr. H. Grylls, of Messrs. Burlinson and Grylls.

IN PARLIAMENT

Aircraft Synchronising Gun Gear

Viscount Wolmer, on May 17, asked the Secretary of State for Air whether he is aware that Mr. A. Heane, of Frimley Road, Ash Vale, applied in 1916 to the Admiralty for their sanction for a patent in connection with guns for aircraft, whereby, by means of a synchronising gear, it was made possible to fire through the propeller of an aeroplane; that this invention was submitted to the Ministry of Munitions, and examined by the Air Board in 1917; that the invention was subsequently adopted by the Air Ministry; and, seeing that Mr. Heane has been refused any award for this invention, and has even been refused his out-of-pocket expenses in connection therewith, that his claim in respect of an award has been tried in secret, and that he has been refused an open hearing, will he order a public enquiry to be made into the matter?

Mr. Young: The answer to the first part of the question is in the affirmative. During the year 1917 Mr. Heane was in communication with the Air Board concerning a form of synchronising gear invented by him. It is not the fact that his invention has been adopted or used by the Air Ministry; the Scarff-Dibowski gear, which, with improvements suggested by others, has been used, and which appears to have most resemblance to that submitted by Mr. Heane, was submitted by Major Scarff to the Admiralty in November, 1915, and was actually tried on January 19, 1916. Mr. Heane has been heard in person by Mr. Justice Sargant and the Secretary of the Royal Commission, to whom the original dated plans and suggestions for the Scarff-Dibowski gear were produced in Mr. Heane's presence; they were satisfied that his application had no reasonable chance of success if heard by the Royal Commission as a body. I am not prepared to order a public enquiry to be made.

Indian Air Mail Service

Sir H. Brittain asked the Under-Secretary of State for India to what extent aeroplanes are now being made use of for the purpose of carrying mails; and what encouragement, if any, is being given by the Indian Government for the development of this service?

Earl Winterton: Mails are, I believe, not yet being carried by aeroplane in India. The Government of India have decided to prepare an air route from Bombay to Calcutta and Rangoon, and, when the route or a section of it is completed, to invite tenders for an air mail service over the completed section or sections. In view of the present financial situation the preparation of the route is, I fear, likely to be delayed.

Royal Air Force in India

Sir H. Brittain asked the Under-Secretary of State for India whether he is satisfied that the Royal Air Force, which is in India, is sufficiently supplied with planes and spare parts necessary for the adequate carrying out of the service?

Earl Winterton: I am satisfied that the present provision of funds by the Government of India is sufficient to maintain the full establishment of reserves and spare parts which are necessary to enable the Royal Air Force in India adequately to carry out their service.

Aeroplanes and Parachutes

Sir W. Joynson-Hicks asked the Secretary of State for Air whether there are any fighting aeroplanes fitted with a parachute; whether flying officers have received any orders in reference to the use of parachutes; and whether he can make a statement as to the position which has been arrived at in regard to the use of parachutes and their reliability in the prevention of accidents?

Captain Guest: With reference to the first part of the question there are no fighting aeroplanes at present fitted with parachutes. As regards the second part of the question, a number of training aeroplanes are so fitted and instruction in the use of parachutes is being given, but at present no live drops for practice or experimental purposes are to be made from heavier-than-air craft. In reply to the third part of the question, the position in regard to parachutes is as follows: About 140 parachute sets have been issued for the equipment of Avro aeroplanes, which is the type employed for flying training purposes. These sets are being used for service trials, and reports are now being received making suggestions and recommendations regarding modifications and improvements found necessary. It is the intention to bring parachutes into general use as soon as they have reached a stage of development which warrants action involving some considerable expenditure.

Sir W. Joynson-Hicks: Is there any truth in the rumour—it cannot be more than that—that the Research Department on Parachutes has been very largely depleted in the last month, and that officers have been leaving?

Captain Guest: I hope not. I will make enquiries.

Navy, Army and Air Force Common Services

Mr. Malone asked the Prime Minister what are the terms of reference of the Committee, presided over by the Minister of Health, which is considering the question of amalgamating certain common services, such as the medical, accountant, audit, and chaplain branches of the three fighting Services; what is the constitution of the Committee; and is the Committee in a position to recommend the creation of a Ministry of Defence should it appear to them to be desirable?

Mr. Chamberlain: The terms of reference of the Committee are as follows: That a technical Committee should be set up at once to make definite proposals for the amalgamation, or, if this appeared impossible or undesirable, for the co-ordination, so far as possible, of the common services of the Navy, Army and Air Force, such as intelligence, supply, transport, education, medical, chaplains, and any other overlapping Departments, in order to reduce the cost of the present triplication. The Committee should consider each branch separately, and submit interim reports to the Cabinet as soon as possible.

The Committee consists of:—
The Minister of Health (*Chairman*).
The Right Hon. the Lord Weir.
The hon. Member for Moray and Nairn.
The hon. and gallant Member for Howdenshire.
Sir G. L. Barstow.
Sir Arthur I. Durrant.
Major-General Sir F. A. M. Nash.

As I stated in reply to questions on Monday last, a separate Committee will investigate the practicability of a Ministry of Defence.

Mr. Malone: In view of the fact that the question of the establishment of a Ministry of Defence and the amalgamation of the services mentioned are so closely connected, would it not be best to have the same Committee to make the same investigation?

Mr. Chamberlain: If the Government thought so they would have appointed one Committee to enquire into both questions. The Government take a different view. Of course, it is not a matter that can be settled by question and answer.

Royal Aircraft Establishment

Mr. Raper, on May 18, asked the Secretary of State for Air what is the total personnel of the Royal Aircraft Establishment; and what are the numbers, respectively, of technical staff, clerical staff, skilled mechanics, and unskilled labourers?

Captain Guest: The total personnel is 1,316, of whom 270 represent scientific and technical staff (including Royal Air Force officers), 85 clerical staff, 626 skilled mechanics (including apprentices), and 335 labourers and general workers.

Imperial Airship Service

Mr. Raper asked the Secretary of State for Air whether his attention has been drawn to the letter issued by the Agent-General for Tasmania regarding Commander Burney's proposal for establishing an Imperial airship service; whether His Majesty's Government have come to any definite decision regarding this proposal; and whether, in the event of this or any similar scheme being adopted, it will be stipulated that the Air Ministry shall maintain adequate technical control?

Mr. L. Malone asked what action His Majesty's Government intend to take regarding the proposal put forward by Messrs. Vickers, Ltd., and the Shell Co., to develop airship communications?

Captain Guest: I am familiar with the letter referred to by my hon. friend, and have been in close communication with the Agent-General of Tasmania in regard to Commander Burney's proposal for establishing an Imperial Airship Service. Although I am unable at this stage to make any statement regarding the financial aspect of the scheme, Commander Burney has been informed that, in the opinion of the Air Council, his scheme constitutes a notable advance on previous proposals of this kind, and that if certain additional safeguards are provided, it offers reasonable prospect of satisfactory operation between India and this country. This statement is subject to the definite qualification that the commercial success of an undertaking depending upon the regular use of airships as a means of transport must, at present, be highly speculative. In the event of this or any other similar scheme being adopted, the question of adequate technical control by the Air Ministry will receive full consideration.

German and Russian Air Services

Mr. Malone asked the Secretary of State for Air what information he had concerning the German Berlin-Moscow air service; and whether any proposals are under consideration for a Berlin-London air service either by Britain or Germany?

Captain Guest: With reference to the first question, it is understood that as a result of negotiations carried out between the Soviet Government and a German company known as the Aero-Union Aktien-Gesellschaft, the operation of an air mail service between Königsberg and Moscow was begun on May 1 last by a subsidiary company founded by the German company mentioned above, and entitled the "Deutsch-Russische Luftverkehrs-Gesellschaft." According to a German air route time-table, there are two flights a week in each direction, and the aeroplanes connect at Königsberg with express trains to and from Berlin. The saving of time by the use of the air mail on a letter sent from Berlin to Moscow, or *vice versa*, is stated to be four days. It is believed that the aircraft employed are of Fokker type (with Rolls-Royce engines) which have been obtained from Holland and are owned by the Soviet Government. With reference to the second question, so far as is known, there are no serious proposals under consideration in Great Britain or Germany for a direct London–Berlin air service.

Civil Aviation Department Resignations

Mr. Malone asked the Secretary of State for Air whether the Deputy-Controllers of Information and Planning in the Department of the Controller-General of Civil Aviation have tendered their resignations, and, if so, why?

Captain Guest: The answer to the question is in the affirmative, but as these gentlemen have given no reasons I am unable to inform the hon. member of the cause of their resignations.

Wireless Apparatus on Passenger Aeroplanes

Sir H. Brittain, on May 22, asked the President of the Board of Trade what proportion of passenger-carrying aeroplanes trading between the Continent and Great Britain are fitted with wireless; and whether, for the greater safety of travellers, he is prepared to consider enforcing regulations in this regard with respect to every 'plane which carries passengers to and from this country?

The Secretary of State for Air (Captain Guest): This question should have been addressed to me. An agreement, which is being drawn up with the British aircraft companies operating on the recognised air routes between England and abroad under the Subsidy Scheme, will include a clause providing that all approved fleets of aircraft shall be equipped with wireless. The agreement containing this clause has not yet been signed, but at present all the large aircraft, 15 in number, trading regularly between London and Paris and London and Brussels, are fitted with wireless and communicate regularly with the Air Ministry ground stations. Two small aircraft, with accommodation for only two passengers each, are not fitted. As regards foreign machines on the London-Continental route, one French machine is at present fitted with wireless, and the French companies have agreed that all their large passenger-carrying aircraft on this service shall be similarly equipped by the middle of August. The Dutch are also arranging to equip with wireless their aircraft on the Holland-England route.

Sir H. Brittain: May we take it that before the end of the year all machines, British or foreign, travelling between this country and other countries, will be equipped with wireless?

Captain Guest: Yes. I hope they will be so equipped long before the end of the flying season.

R.A.F. Travelling Facilities

Captain W. Benn asked the Secretary of State for Air whether travelling concessions for officers and men have been abolished?

Captain Guest: The cheap travelling facilities which up to that date had been granted at the expense of public funds to personnel of the Royal Air Force were, in common with those granted to the other Services, discontinued as from April 1 last. This decision, which was in accordance with the recommendations of the Geddes Committee, was taken after unsuccessful efforts had been made by the Departments concerned to induce the railway companies to reconsider their unfavourable attitude towards restoring the concessions granted by them before the War.

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Insects Destroyed from the Air

Extremely important experiments have been carried out at Troy, Ohio, in which the services of the aeroplane were made use of, in helping to combat destructive plagues of insects. A grove of catalpa trees planted in the Palace Yard at Troy, was threatened with "rapid consumption" by caterpillars, and so an aeroplane, with a supply of arsenate of lead powder, flew low over the grove, spraying the latter with the powder, for a minute or less. Three days later, about 99 per cent. of the caterpillars were found dead on the ground.

We must try that on our roses!

NOTICES TO AIRMEN

Cross-Channel Air Routes : Position Finding Routine

CROYDON and Pulham D.F. stations, working in conjunction, will now keep a regular watch during the hours when flying is taking place on the Continental air routes for the purpose of providing pilots with information as to the position of their aircraft. The establishment of this system has been decided upon as the result of a series of tests carried out during the winter months.

Pilots and Navigators are strongly urged to make a practice of utilising on every flight this important aid to navigation, which has proved to be capable of determining the position of aircraft with a high degree of accuracy under normal conditions. The experience gained in the use of position finding in good weather, when pilots should be able to check the accuracy of the positions given by wireless, will add to their confidence and proficiency in using the system when flying in bad weather.

Details of the stations are given in the Notice, together with the Procedure.

(*No.* 50 *of* 1922.)

NOTICE TO GROUND ENGINEERS

Re-balancing of Propellers after Re-tipping or Repainting

1. GROUND engineers are reminded that when propellers are re-tipped or even re-painted, it is essential that they be properly re-balanced before being replaced on aircraft.

2. Such re-balancing can easily be carried out by fitting a metal or hardwood plug into the boss of the propeller, such plug carrying a 1-in. diameter steel spindle, which is, in turn, supported by two steel knife edges. The propeller should be balanced while under test by the application of additional paint or varnish as may be necessary.

(*No.* 6 *of* 1922.)

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

CANADA A PROMISING LAND FOR AVIATION

[2057] I have read with great interest and appreciation your various articles showing the aerial activities in Canada. I hope you will continue these.

Last October I went to Canada to see for myself the things I had been told about.

I came back fired with enthusiasm, and thoroughly decided that Canada had a huge future before it in aviation.

I have been dinning it into the ears of all I meet—and especially "the trade"—that there lies the immediate development. There is a "job of work" to be done—and *now*. The survey, for instance, is a vast work, and it has got to be done.

The aviation business in Canada simply doesn't exist. But now the demand is coming. They are about to require new aircraft, not war junk, gift steeds and "primitives."

So far I hear of little being done by British constructors to appropriate this market. It is a pity. I wonder if they really realise that one side of the St. Lawrence River is American ? Canada is already far too tinged with the colours of America to please a visiting Britisher. Will the S.B.A.C., or whoever are the responsible people, complete the reproach by presenting Canadian aviation to America ?

Canada will only buy internally, unless it is quite unavoidable to do otherwise. Who is going to set up those internal aircraft works ? It can be done and done easily, and Canada is ready.

Why struggle along on civil experiments in the worst flying country in the world, when one of the best is only just across the pond ?

I commend to your notice Canada. The aviation country of the immediate future.

It is perhaps proper to conclude with the remark that I am *not* a Canadian, so that any charge of patriotic bias falls to the ground. I have but seen for myself.

"D.C.M.H."

Air Mail Progress

THE Postmaster-General announces that from May 23 a third air mail to Paris (special fee 2*d.* per oz.) was started, to be closed at the General Post Office counter at 12.30 p.m. On the same date a second air mail commenced to Rotterdam and Amsterdam (special fee 3*d.* per oz.), which is also closed at the General Post Office at 12.30 p.m. Letters posted in London in the morning for transmission by the new dispatches should be delivered in Paris, Rotterdam and Amsterdam the same evening, even without payment of an express fee, and at places near Paris and throughout Holland by first post next morning. Letters sent by the third Paris despatch should, like those sent by the second Paris dispatch—for which the latest time of posting at the General Post Office counter is 11.10 a.m.—connect with the night mail trains from Paris, and so save up to 24 hours in time of transmission to Switzerland, Italy, Austria, Jugo-Slavia, Bulgaria, Salonika and Turkey. Arrangements have been made to allow of late posting for the new dispatches at certain Post Office counters in Central London up till the times shown below :—G.P.O., 12.30 p.m. ; Threadneedle Street, 12.15 p.m. ; Lombard Street, 12.15 p.m. ; Parliament Street, 12.5 p.m. ; Charing Cross, 12.10 p.m. ; West Central District Office, 12.15 p.m. ; Western District Office, 11.50 a.m. ; South-Western District Office, noon. Registered letters must be handed in five minutes earlier in each case.

London-Paris and Brussels Air Mail

THE Postmaster-General announces that the first Air Mail from London to Paris is now forwarded by aeroplane due to leave Croydon aerodrome at 8.30 a.m., and that a morning Air Mail from London to Brussels is now dispatched regularly.

The use of these dispatches offers particular advantages for letters posted in the provinces (the south-east of England excepted) during the latter part of the business day, *i.e.* too late for inclusion in the mails due to be forwarded to the Continent by boat the same night, but in time for the general night mail dispatches to London. By the use of the early Air Mail to Paris (special fee 2*d.* per oz.), such letters will normally be delivered in Paris on the morning after posting, if express, and on the afternoon after posting, if non-express, instead of by the last post in the evening. Further, delivery in places near Paris should be secured in the evening, instead of on the second morning after posting. Letters forwarded to Brussels (special fee 2*d.* per oz.) should be delivered the next afternoon after posting, even without payment of an express fee, instead of on the second morning, and delivery should be secured in most other parts of Belgium by the next evening after posting.

Letters posted in London between the night mail and midnight collections, and also, in the case of the Brussels service, letters handed in at the General Post Office counter up till 8.15 a.m., will normally be benefited to the same extent. The latest time of posting for the Air Mails in any locality can be ascertained from the local Head Post Office.

Rumania Opens Out in Aviation

THE importance of aviation from a national defence point of view is now, according to an *Observer* correspondent, appreciated by the Rumanian Government, and accordingly during the present month considerable development has taken place in the military air service. Sixty modern machines, mostly of the D.H. 9 type, have been purchased from a British firm, and delivery has already been taken of most of these, which are being distributed among the flying schools of the country. A British demonstration pilot brought over the first machine a few weeks ago, and astonished the King and the military chiefs by his feats.

Since that date, a batch of ten aeroplanes of the Brandenburg type has been manufactured by the National Aircraft Factory, near Bucarest ; these are the first native machines in Rumania, and their final tests, the correspondent states, have been entirely satisfactory. The cost price of these machines has been reduced to 285,000 lei with a 220 h.p. engine. The King was present at the baptism ceremony of this first batch of Rumanian aeroplanes, and the Metropolitan of Bucarest himself performed the necessary rites.

In the matter of civil aviation, July is to see the inauguration of the long-postponed Paris-Bucarest passenger air service. For the wedding of Princess Marie and King Alexander of Jugo-Slavia, a special advance service is to be run in connection with this line from Budapest to Belgrade. An airport, which, it is hoped, may become one of the most important in Europe, is in course of construction on the plateau of Boneasa, 2 km. from the best residential quarter of Bucarest.

THE ROYAL AIR FORCE

London Gazette, May 16, 1922

General Duties Branch

Flying Offr. J. M. Glaisher, D.F.C., is granted a permanent commn., retaining his present substantive rank and seniority; October 24, 1919 (*Gazette* October 24, 1919, appointing him to a short service commn., is cancelled). H. J. Hunter is granted a short service commn. as a Flying Offr., with effect from, and with seniority of May 4. The following are granted short service commns. as *Pilot Offrs. on probation*, with effect from, and with seniority of, May 1:—G. W. Dean, J. V. Holman, B. V. Reynolds, T. A. Verney-Cave.

Lieut. J. N. Jaques, R.W. Kent Regt., is granted a temp. commn. as a Flying Offr., with effect from, and with seniority of May 3, for four years' duty with the R.A.F. The following Pilot Offrs. on probation are confirmed in rank; May 1:—J. J. Comerford, S. S. Kirstein.

Medical Service

J. M. A. Costello, M.C., M.B., is granted a short service commn. as a Flight-Lieut., with effect from, and with seniority of, May 1. J. H. Wood, M.B., D.P.H., is granted a temp. commn. as a Flight-Lieut., with effect from, and with seniority of, May 1. The following Flight-Lieuts. relinquish their temp. commns. on ceasing to be employed, and are permitted to retain the rank of Capt.; April 8:—E. R. Bastard, W. F. Sheil, M.B.

Memoranda

Lieut. F. W. Garley relinquishes his temp. commn. on ceasing to be employed, and is permitted to retain his rank; May 9.

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Independent Force (R.A.F.) Re-union

THE Fourth Annual Re-union Dinner of the Independent Force, including all officers of army troops and other attached units, will be held at the Hotel Cecil, on Monday, June 19, 1922, at 7.45 p.m. for 8 p.m. Air Chief Marshal Sir H. M. Trenchard, Bart., K.C.B., D.S.O., A.D.C., will be in the Chair, and Group-Capt. H.R.H. The Duke of York, K.G., G.C.V.O., has signified his intention of being present. It is desired that this notice should be brought to the attention of any eligible officers who may not have received a circular. Tickets are priced at 15s. (excluding wines), and may be obtained from the Hon. Secretary, I.F. Dinner Club, Room 337E, Alexandra House, Kingsway, W.C. 2, to whom any alteration in address should be sent. Evening dress (with miniatures) will be worn.

Aircraft and the Russo-German Treaty

ASSUMING that the text of the Russo-German Secret Treaty, published in the *Daily Mail* last week, is correct, aircraft very naturally occupies a highly important place in the arrangements of these two would-be violators of the world's future peace. In connection with the clauses relating to the Russian Fleet reorganisation, one undertaking by Germany is that: "In addition to those already supplied, the German General Staff undertakes to deliver as soon as possible 500 more new aeroplanes of the Junker type, with a corresponding number of spare parts."

In regard to building new aircraft, the following clause is suggestive: "The General Staff of the Red Army guarantees to the German General Staff that the three German factories selected by the latter—that is to say, one for aeroplanes and aeroplane engines, one for asphyxiating gas and one for arms—can be equipped and started in Russia on condition that the Red Army is given full power to utilise the output of these factories. Furthermore, the General Staff of the Red Army will place no obstacles in the way of the German officers and experts in their duties at the new arms factory installed in Afghanistan."

With our nice tabloid little set of 12 air squadrons, the promise of the above developments from *one* quarter of this side of the world should be very comforting to our Government, and those who have the future welfare of our Empire at heart.

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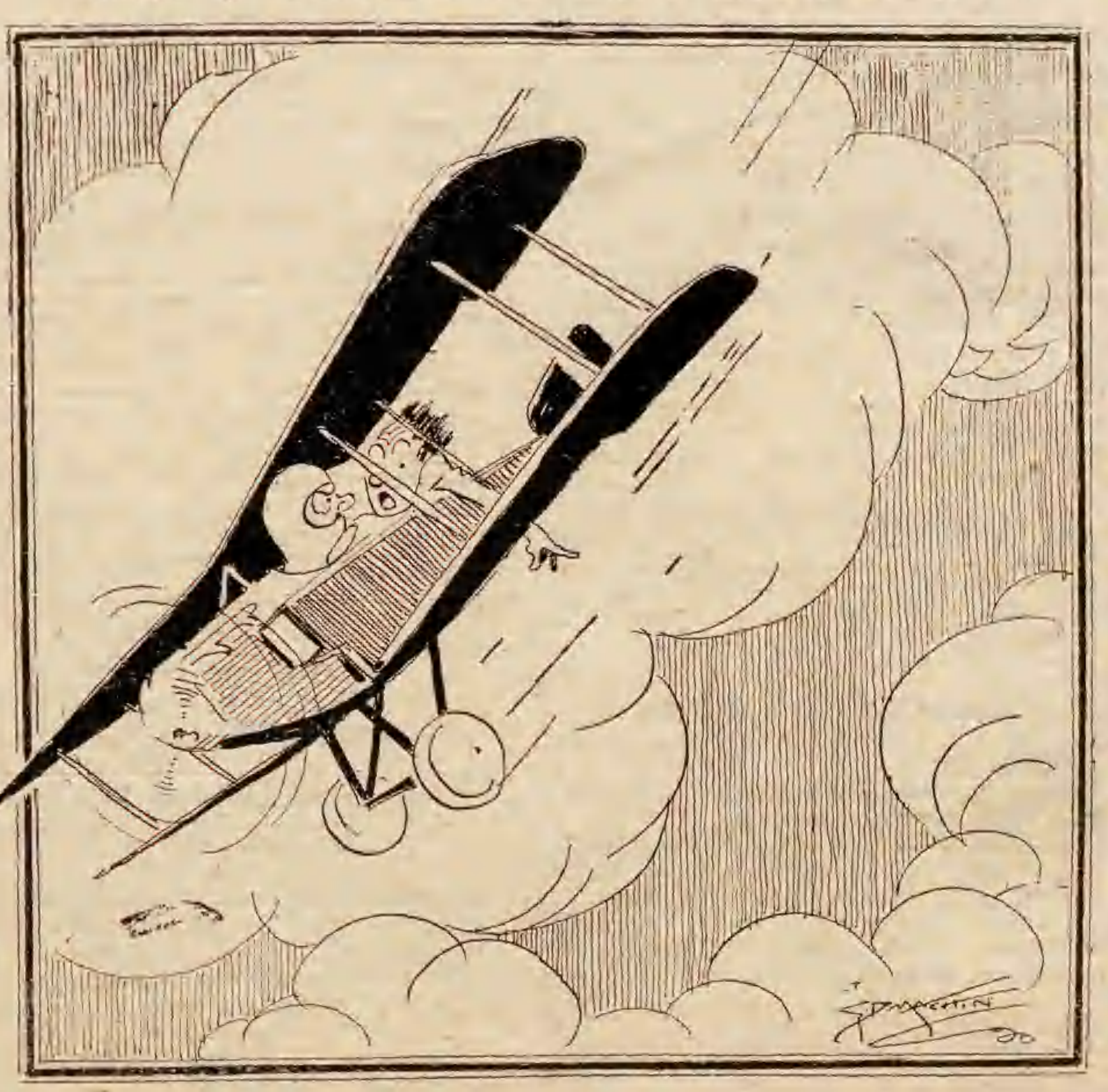
Silly questions we have been asked:



I.—"Oh, I say! I dropped my hat in that last loop. It fell in Hounslow somewhere. Do you mind planing down for it?"

Parcels for Brussels by Air Mail

THE Postmaster-General announces that arrangements have been made with Messrs. Instone Air Line, Ltd., whereby parcels may be posted at certain Post Offices for conveyance by air and delivery in Brussels by that Company at the same rates and under the same general conditions as for Paris. The scale of charges is as follows :—For parcels weighing up to 2 lb., 1s. 9d ; 3-5 lb., 3s. ; 5-8 lb., 3s. 9d. ; 8-11 lb., 4s. 3d.

Parcels are normally dispatched by aeroplane on the morning following the day of posting but at certain London offices parcels may be posted in the morning in time for dispatch the same day. The parcels are cleared through the Belgian Customs immediately after arrival at Haren (Brussels) by the air transport company, and are normally delivered to the addressees on the day of arrival. The saving in time of transmission afforded by the use of the air service and by the rapid clearance of parcels through the Belgian Customs is considerable. A small fee for delivery, as well as a fee for Customs clearance will be levied by the company.

Further details of the conditions of the service may be obtained on application at any accepting Post Office. The names of the accepting offices and the latest times of posting in the chief provincial towns, where the acceptance of parcels for conveyance by air is authorised, may be ascertained from the local Head Post Office.

Air Education for the Young Generation

MR. W. J. HASLAM, writing from New College, Harrogate, says if, as seems likely, the air is to play as important a part in the future as the sea has done in our past history, it is essential that the boys of today should become familiar with it. At present they do not realise how enormously air transport has developed since the War. "With this object in view, I arranged on our recent Continental trip that the whole party (twenty) should return from Paris by air, and the arrangements for our comfort were so admirable that I have every confidence in passing on the suggestion to others."

The French Grand Prix (Balloons)

ALTHOUGH at the time of writing the official announcement of the winners in the French Grand Prix has not been made, it appears probable that, as regards distance, the competitors will be placed as follows :—1. Blanchet on Fernande, distance 409 km. ; 2. Ferrero on Aero 1, distance 407 km. ; 3. Cormier on Anjou, distance 406 km. ; 4. Kapferer on Ville-de-Paris, distance 405 km. ; 5. Dollfus on Globevolant, distance, 403 km. ; and Demuyter on Belgica, 305 km. It will be seen that the distances covered are so nearly identical that a re-arrangement may be found in the official results. The duration record of the 1922 competition would appear to have gone to the Belgian Demuyter, whose time in the air is stated to have been 23 hours. If Blanchet is declared the winner of the distance, it will be the fourth time, he having won the Grand Prix in 1908, 1909 and 1910.

The Air Conference at Brussels

AT the Air Conference which is being held at Brussels between representatives of Great Britain, France and Belgium, it is understood that, among other important items, the question of "rules of the road," on the London-Paris route was discussed and a series of rules laid down. So far as can be ascertained, these rules follow, in the main, those already agreed to by the conference of pilots at Croydon, shortly after the lamentable collision at Thieuloy. It is believed that the carrying of wireless telephones of British type is to be made compulsory. During the conference, it is stated, Sir Sefton Brancker indicated that Great Britain will ratify the International Air Convention during the course of the next month or so, and in that case, the International Air Navigation Commission should be constituted sometime during the latter part of July.

* * * *

PUBLICATIONS RECEIVED

Vom Fliegen. Verlag R. Oldenbourg. Gluckstrasse 8, Munich. Price 150 Marks.

Printing. Supplement to the "Manchester Guardian." The Cloister Press, 3, Cross Street, Manchester.

Technical Note No. 97. N.A.C.A. Control Position Recorder. By F. H. Norton. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Rendiconti dell' Instituto Sperimentale Aeronautico. Series 2a, Nos. 1 and 2. February and April, 1922. "Rendiconti" Libreria di Science e Lettere, Piazza Madama 19-20, Rome.

Report No. 140. Lift and Drag Effects of Wing-Tip Rake. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 142. General Theory of Thin Wing Sections. National Advisory Committee for Aeronautics, Navy Buildings, Washington, D.C., U.S.A.

THE LONDON AERO-MODELS ASSOCIATION

AT the weekly meeting held at Headquarters on Thursday, the 18th inst., Mr. A. Wilson in the Chair, it was announced that Dr. A. P. Thurston, D.Sc. (Lond.), F.R.Ae.S., M.I.A.E., A.M.I.M.E., had accepted the presidency of the Association. Dr. Thurston has promised to edit all lectures to be read before the Association.

An excellent concert was given by Mr. J. Louch and his artistes on Saturday last at Headquarters, and greatly appreciated ; a hearty vote of thanks being passed to all taking part, and also to Mr. and Mrs. Rees for the accommodation provided, and to Mr. and Mrs. Graves for the excellent arrangements made.

On Sunday a special demonstration was held on Parliament Hill Fields, there being approximately 40 models flying. It is impossible to refer to any individual machine, all members working with a will to make the meeting a success.

At Headquarters on Thursday next, the 25th inst., a discussion will be opened on "The Construction of Built-up *Fuselages.*"

An Aerial Golf Competition will be held on Hackney Marshes on Saturday, June 3, at 4.30 p.m., as announced last week, with exception that it is to be an open competition. Non-members' entrance fee, 1s. All names to be sent to Mr. C. A. Rippon (Competition Secretary), 52, Fairbridge Road, Holloway, N. 19.

Report from Research Committee.

The propeller-testing apparatus was set in motion, and worked quite satisfactorily. A few propellers of various diameters were tried, and it was noted that they affected the speed of the motor very considerably. The calibrated scale was tested by means of a pulley and weights, and was found to give accurate readings.

The motor will be made reversible before further tests are carried out, so that right-hand and left-hand propellers can be tested under similar conditions. In the absence of a revolution counter no records of propeller tests could be made. Hon. Sec. (*pro tem.*) for Research Committee, W. E. Evans.

Meetings are held at Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, every Thursday evening at 7.30 p.m. Intending members cordially invited. Particulars of the Association may be obtained from A. E. Jones, Hon. Sec., 48, Narcissus Road, West Hampstead, N.W. 6.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : cyl. = cylinder ; I.C. = internal combustion ; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published May 25, 1922

36,241. M. PARDO Y COSIO. Means for control of aircraft. (155,844.)

APPLIED FOR IN 1921

Published May 25, 1922

2,759. H. BOLAS and G. PARNALL. Aircraft. (178,912.)
3,921. M. PARDO Y COSIO. Means for control of aircraft. (159,139.)
4,104. SOC. DES AEROPLANES H. and M. FARMAN. Brakes. (159,141.)
5,854. MARQUIS OF PATERAS PESCARA. Helicopters. (159,212.)
12,144. K. A. ENLIND. Airships. (179,069.)

NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

FLIGHT

The Aircraft Engineer and Airships

36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.
Telegraphic address : Truditur, Westcent, London.
Telephone : Gerrard 1828.

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xvi.)

INSULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C.1.
City 3115; "Vanduara," Cent. London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15.
Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5.
Dalston 1893.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
June 1	**Entries close for Schneider Cup Race**
June 3	**R.Ae.C. Whitsun Race Meeting, at Waddon**
June 19	**Independent Air Force, R.A.F., Dinner, Hotel Cecil**
June 23–25	**International Competition for Touring Aeroplanes, Brussels**
June 27	**Royal Aero Club 21st Anniversary Banquet**
July 29	**Aerial Derby, starting at Waddon**
Aug. 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT.

The Ministry of Defence Creation Bill

It is now some time since the formation of a Ministry of Defence, for the more efficient development and co-ordination of the three fighting services, was first suggested. It will be remembered that the subject was brought up during the discussion of the Estimates, but that it was intimated that this step, although receiving consideration, was too important, and involved too many changes, to make it possible to establish such a Ministry during the present financial year. Possibly, this position still obtains, but a step in the right direction has been taken in the introduction of a Bill (Bill 106), to be cited as the Ministry of Defence Creation Act, 1922, to establish a Ministry of Defence consisting of a Principal Secretary of State, who shall be President of the Ministry of Defence, and an Under-Secretary of State for each of the three departments, Admiralty, War Office and Air Ministry respectively. The Bill, which has been brought in by Rear-Admiral Sueter, Sir Cecil Beck, Colonel Claude Lowther, Colonel Sir Thomas Polson, Major Christopher Lowther, Colonel J. Wedgwood, Mr. L'Estrange Malone, Lieut.-Comdr. Kenworthy, Brig.-Gen. G. Cockerill and Major-Gen. Sir John Davidson, proposes to empower the Government to appoint such service and civil members as may be necessary to form, under the Presidency of the Minister of Defence, the Defence Council, and to empower His Majesty, by Order in Council, to appoint such representatives of the Dominions as the Prime Ministers of the Dominions may select, to sit on the Council of Defence.

The Minister of Defence is to be, it is proposed, responsible to the Government for the proper consideration of all strategical and tactical questions bearing upon the defence of the realm, *i.e.*, on the surface of the water, under the water, on land, and in the air, and for the proper equipment and maintenance of all arms of the three fighting services in a state of readiness and efficiency. He is to arrange for the provision and regulation of an adequate supply of personnel to all three fighting services with a view to co-ordination, and to reduction of unnecessary services, and to maintain a balance as between one service and another in the expenditure required to carry out the general scheme of defence. He will be responsible to His Majesty's Government that the actual expenditure is the minimum that can attain its object.

The Bill is arranged in eleven clauses, to some of which we may now refer in detail. Clause 1, para. (6) provides that the Defence Council shall form the nucleus for an Imperial General Staff; it shall absorb the duties now performed by the Committee of Imperial Defence, and shall have power to co-opt representatives from other Government Departments. Para. (8) of Clause 1 provides that, in order to place the members who serve at the Admiralty, War Office and Air Ministry on a footing of equality, the members of the various boards are to be generally known as First Member of Naval Board, First Member of Army Board, First Member of Air Board, Second Member of Naval Board, etc.

According to Clause 2 the Minister shall, it is suggested, make such provisions as may be necessary to constitute a department to consider and co-ordinate the planning of future operations of all three fighting services, but after operational programmes have been approved by the Defence Council, they are to be carried out by the Admiralty, War Office and Air Ministry themselves, and, except in special circumstances, the Minister shall only issue executive orders to active units and commanders-in-chief through the operations departments of the three services.

Clause 3 provides that the construction, inspection and testing of new material shall be carried out by a department of the Ministry of Defence, so as to provide a nucleus capable of expansion in time of war into a Ministry of Munitions. Advisory bodies for research, scientific work, examination of inventions, etc., shall be formed under the Defence Council, and the Minister shall be responsible that each of the fighting services is equipped with the most up-to-date weapons that modern science dictates.

Of particular general interest is, naturally, Clause 6, which deals with Civil Aviation. This Clause reads:—

> "The Minister of Defence shall be responsible that civil aviation is developed and maintained, having due regard to the defensive requirements within the Empire, comparable with the development and maintenance of civil aviation by other leading powers and that subsidies as necessary are provided similar to those arrangements that have previously existed with armament firms, mercantile marine and cable companies. Air enterprise within the Empire shall be encouraged to allow a nucleus being ready for immediate expansion should the necessity of doing so arise."

If the Bill becomes law, the Act is to come into operation on October 1, 1922.

We have already, many months ago, expressed the view that, if the right man can be found for the post of Minister of Defence, the creation of such a centralised control of the three fighting services should result in co-ordinated action of the Nation's resources in all events, to the great gain of the Empire's defensive and offensive barriers. Moreover, and also highly important, considerable economies should be effected.

With three separate services working independently it is inevitable that there should be waste and overlapping, and a Minister of Defence would have to see to it that the claims of each service were carefully examined, and that no grant was made for any particular purpose unless the particular service could convince the Defence Council that it could fulfil that purpose more efficiently and economically than any of the other two services. Properly handled, the task of the Minister should not be outside practical politics, but the man chosen must be a strong man, a man of wide vision, a man who is able to sift and weigh evidence, and finally he must not be a man drawn from any of the fighting services, unless one can be found who has had deep experience of all three, otherwise there is the danger that he will not be impartial.

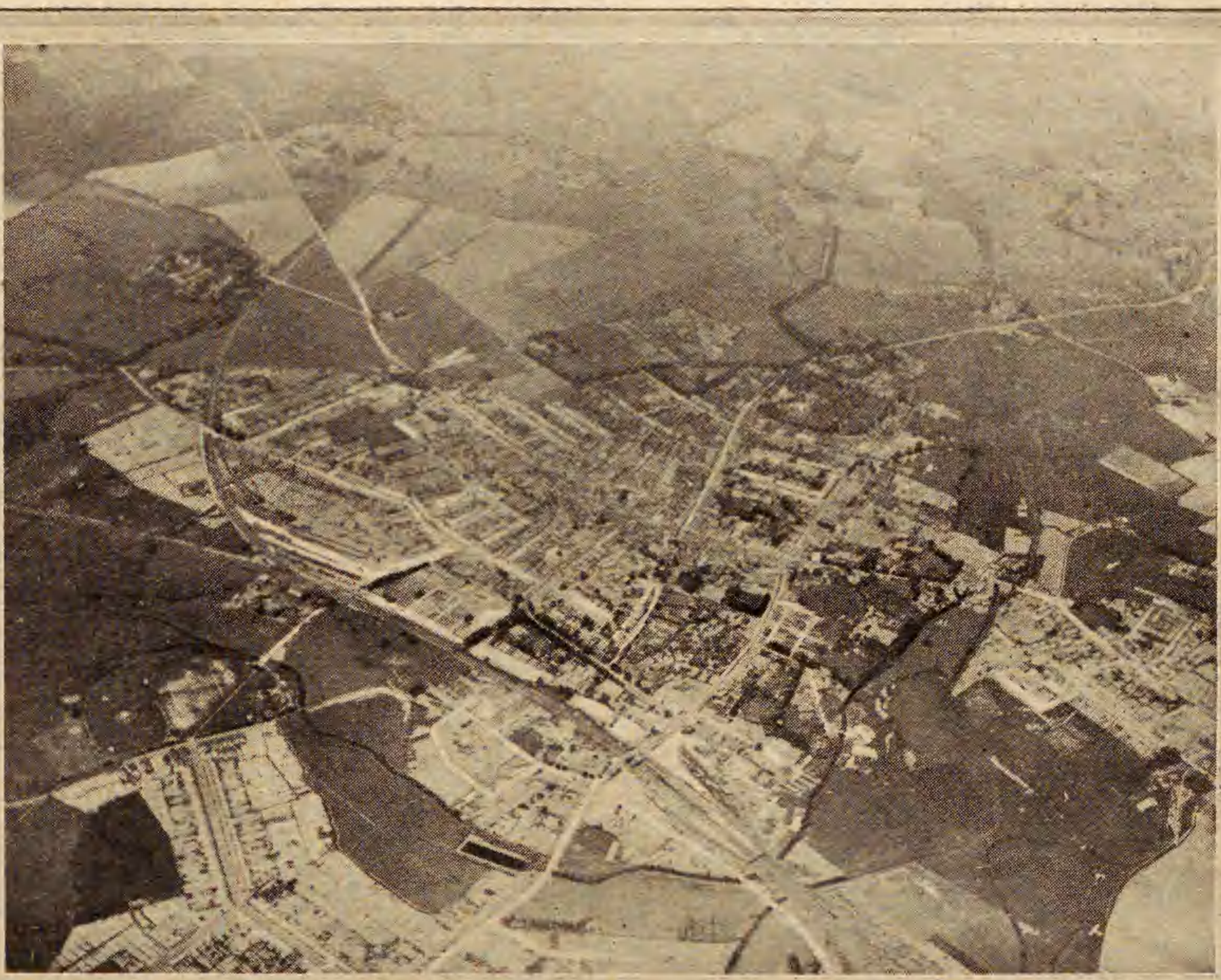
As regards the Clause dealing with Civil Aviation, we are glad to see such emphasis being given to the closest co-operation between Civil Aviation and the defence of the realm. Making the Minister of Defence responsible for giving Civil Aviation its proper support, in proportion to its value to the defences of the country, is a safeguard against turning Civil Aviation over to the Board of Trade, as was feared at one time. What chance the Bill has of going through need not, for the moment, be discussed. That it is sound upon general principles appears to us to be undoubted. In any case, the mere drawing up and presentation of the Bill should help to clear the decks for future official action.

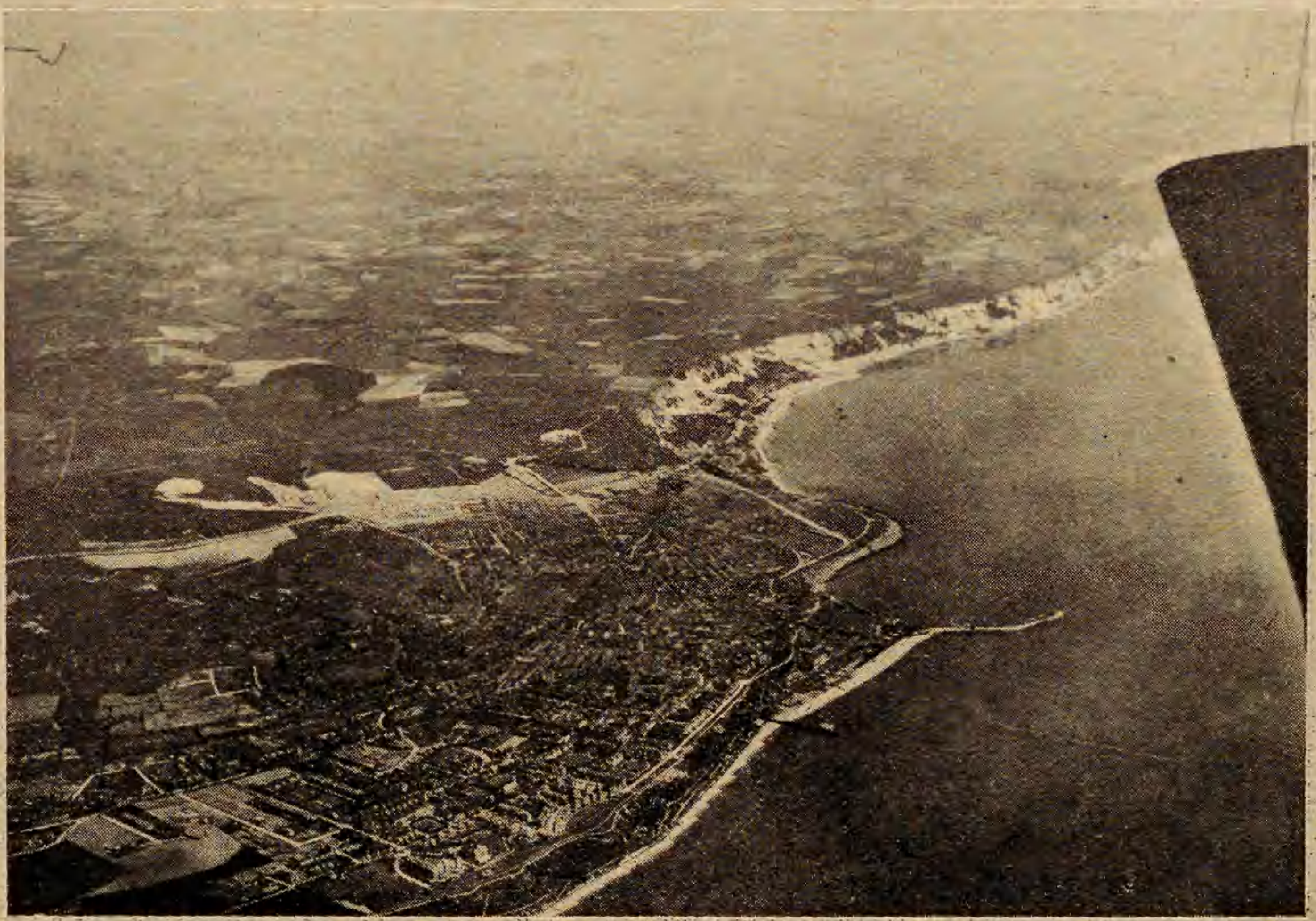
◆ ◆ ◆

The Royal Air Force Pageant

It is announced that, as in previous years, the R.A.F. Pageant will be held at Hendon, on June 24. Readers of FLIGHT will not need to be reminded that the Pageant is an integral and important part of the training of the Air Force, and fulfils the same function as does the Royal Tournament in the case of the Army and Navy. The experience of the two Pageants already held at Hendon has proved that the general public takes a great interest in service aviation, and for this year we understand that a programme has been arranged which will enable the public to appreciate even to a greater degree than last year the developments that are constantly taking place. Full details of the programme are not yet available, but it is understood that one of the more spectacular items is to be the destruction of a "desert stronghold" by bombing aircraft. In addition to this "star turn" there will no doubt, as in previous years, be plenty of events to keep visitors interested throughout the day, and nobody need fear having a dull time at Hendon on June 24. Stunting will be in evidence and formation flights of various sorts.

It is not too much to say that never, at any time in any country, has an aviation meeting been so well organised, the items run off so well to time, and the interest so well sustained throughout the day, as at the two previous Pageants. We, therefore, confidently predict that, large as were the crowds in previous years, they will be even larger this year. Full particulars of the Pageant and directions for getting to and from Hendon will be published in due course. And, by way of a last point, the whole profits go to the R.A.F. Memorial Fund.





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En Route **TO LE BOURGET MEETING : In upper picture Maidstone is seen from a height of about 6,000 ft., and the lower photograph, taken from a similar height, gives an excellent idea of the situation of Folkestone. Both photographs were taken from a D.H. 4A belonging to Handley Page Transport, Ltd.**

Le Bourget Meeting

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LE BOURGET : General view of machines, buildings, etc.

COMPARED with our own Aerial Pageant, the meeting at le Bourget was somewhat tame, but, in view of the fact that the meeting was an affair lasting four days, and was got up by the "Vieilles Tiges" to raise funds for their Society (consisting of pilots who obtained their "ticket" before the War), the competitions and exhibitions were quite creditable, and the attendance was fair, especially on the last day, Sunday, May 28, when large crowds visited le Bourget, not only from Paris but from other districts as well. To sustain the interest for four whole days was not, obviously, an easy undertaking, and one can therefore easily forgive certain shortcomings in the organisation. On the whole, however, the meeting must probably be classed as a success, and one hopes that the funds of the "Old Stalks" have received a very substantial and welcome addition.

The Daily Events

The programme which had been arranged included certain daily events run off in series, and a number of competitions for special prizes and cups. In case of any gaps between events it had been arranged that pilots should ascend and give exhibitions of stunt flying, while parachute descents were also to be the order of the day. Dealing with the daily and recurring events in the order in which they were described in the official rules of the meeting, the first was formation flying by "Old Stalks." For this machines were to be started in batches of five in a line, the next five to be started 30 seconds later, and so on. The duration of each flight was to be about 15 minutes, and landings were to be made individually. So far as we were able to ascertain this event did not materialise, but the manner of indicating the start of any event was so vague that we admit we may have missed it. Machines were constantly starting off or coming in, but as to the nature of the particular "concours" in which they were engaged, this was mainly a matter for conjecture. Scoring boards there were none, although megaphone men did certainly shout something unintelligible at the spectators.

The next civilian event was for quick get-away. The machines were lined up 250 metres behind the starting line, and at the drop of a flag they were to get away, and, crossing the starting line in flight, the winner was to be the pilot who first crossed the starting line and completed a circuit of the aerodrome. Number three on the programme was a get-off competition, in which the machines were placed at any desired distance behind a line marked by two posts with a rope secured at three metres above the ground. This line had to be cleared, and the winner was to be the pilot who managed to clear the line after the shortest run.

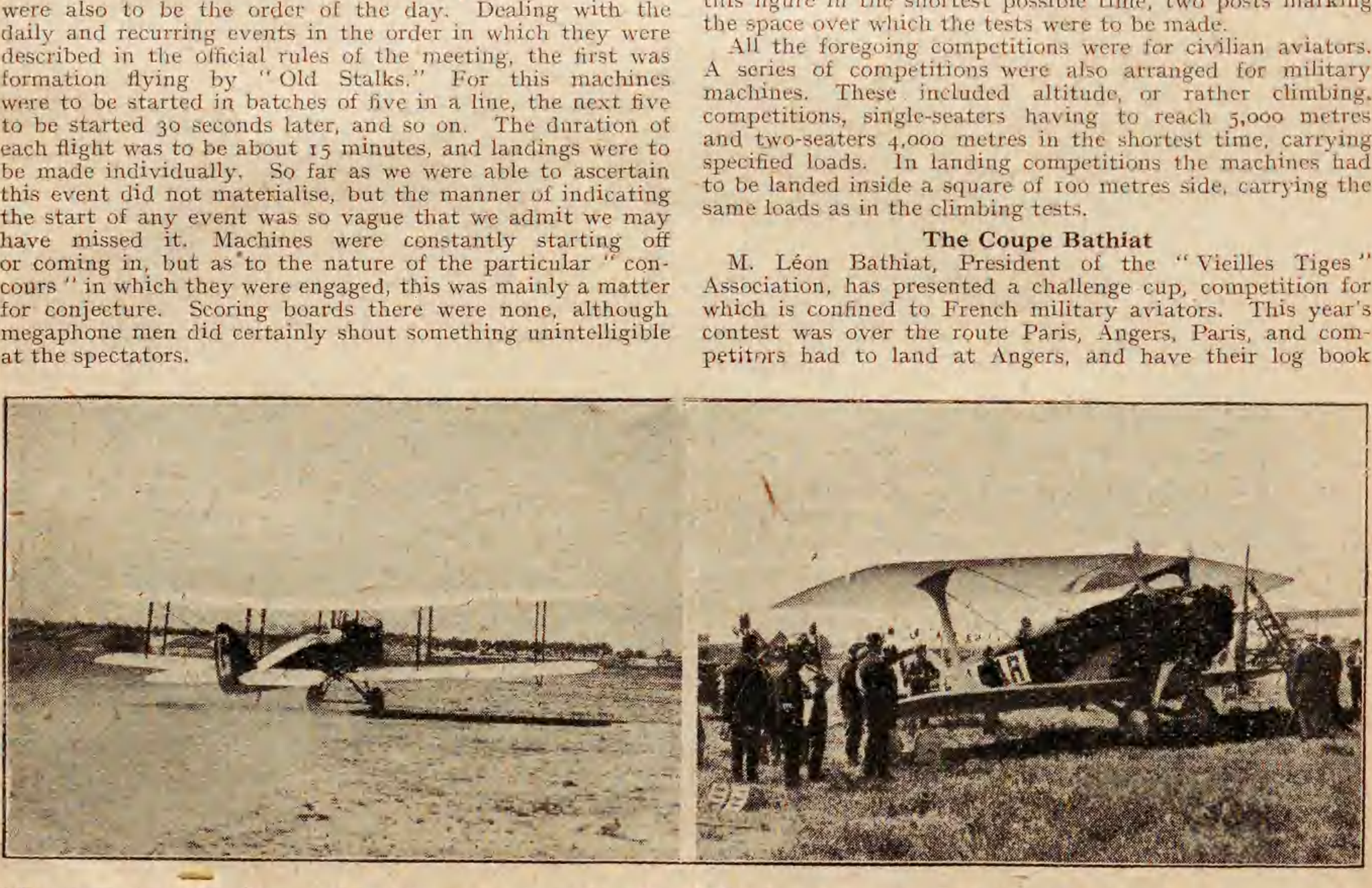
A daily event which certainly might be of practical value was one representing a forced landing in a clearing in a forest. The "forest" was represented by a square of 100 metres side, marked by four posts, joined by a rope secured at a height of four metres. Competitors had to clear the rope and alight inside the square without damaging their machines. The winner to be the pilot who "planted" his machine nearest to the point of intersection of the diagonals of the square.

The rules for the figure-of-eight test required pilots to do this figure in the shortest possible time, two posts marking the space over which the tests were to be made.

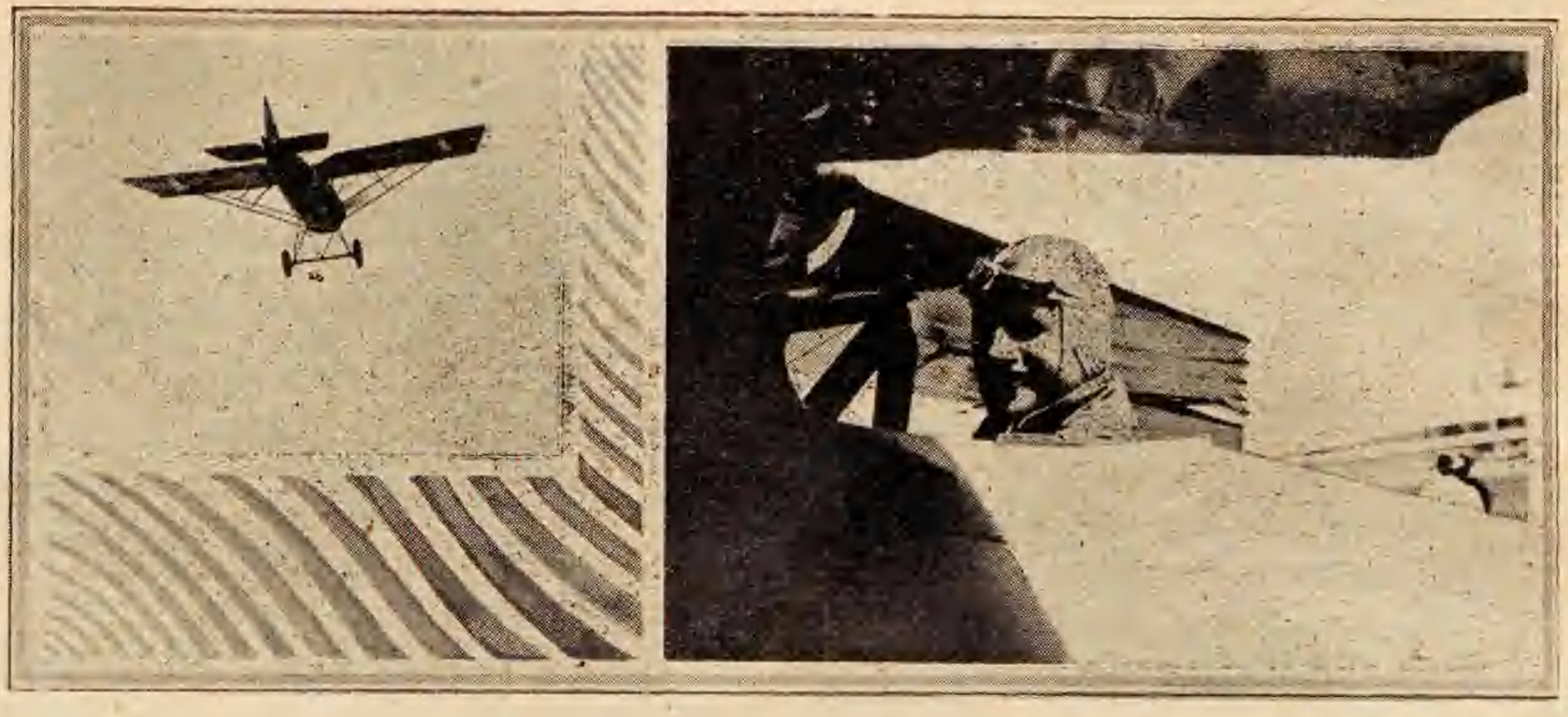
All the foregoing competitions were for civilian aviators. A series of competitions were also arranged for military machines. These included altitude, or rather climbing, competitions, single-seaters having to reach 5,000 metres and two-seaters 4,000 metres in the shortest time, carrying specified loads. In landing competitions the machines had to be landed inside a square of 100 metres side, carrying the same loads as in the climbing tests.

The Coupe Bathiat

M. Léon Bathiat, President of the "Vieilles Tiges" Association, has presented a challenge cup, competition for which is confined to French military aviators. This year's contest was over the route Paris, Angers, Paris, and competitors had to land at Angers, and have their log book



The race for the Coupe Lamblin was over the circuit Paris, Brussels, London, Paris. Our photographs show : On the left, Rex Stocken starting on the D.H. 4 C of the Aircraft Disposal Company, and, on the right, Jean Casale on a Spad-Herbemont. Note his engine being started by the aid of the Odier starter.



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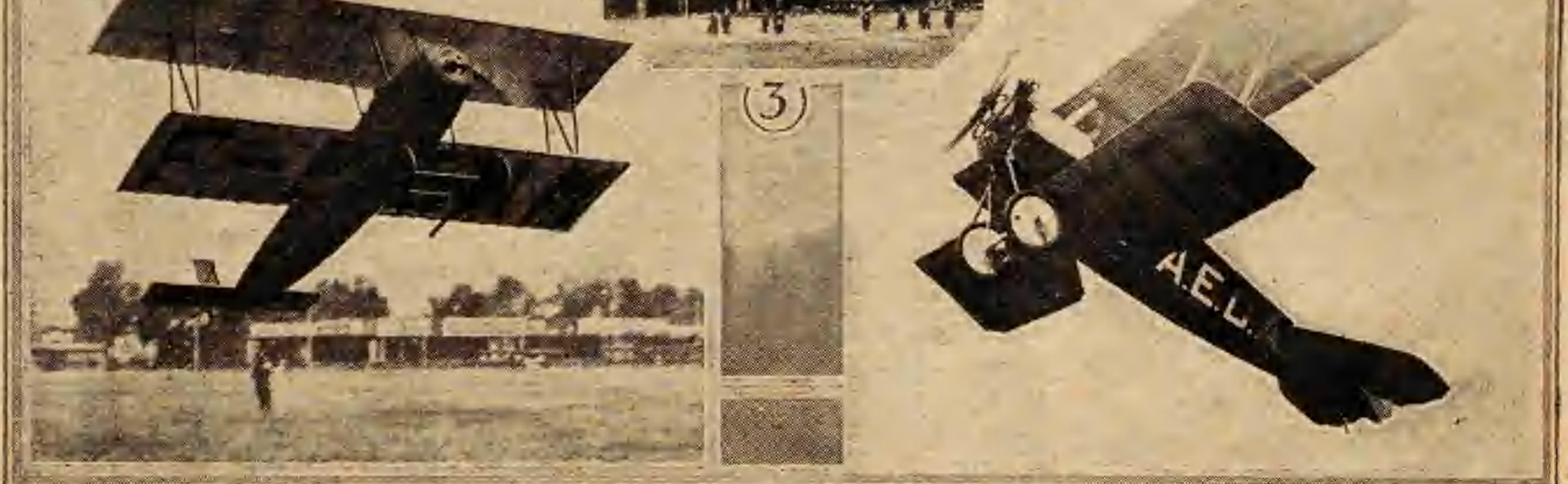
STUNT FLYING AT LE BOURGET : Most of the work of entertaining the spectators between events fell to Fronval, who handled his Morane Parasol with great skill. The machine, seen in the inset, was of the type having strut bracing below the wings.

signed by the representative of the "Vieilles Tiges." The exact route to be followed was not indicated to the competitors until just before the start for Angers, and for the return journey the route was again indicated immediately before the machines left. The squadron to which belongs the officer winning the cup retains it for one year, and the cup becomes the property of the squadron which has won it twice in succession.

The Coupe Lamblin

This cup has been presented by the designer and constructor of the famous Lamblin radiator, and is to be competed for during the next three years. For 1922 the course was over the route Paris-Brussels, Brussels-London and London-Paris. The cup is valued at 5,000 francs, and this year the prizes amount to 20,000 francs. The competition is international, and the entrance fee 1,000 francs per machine. Notice must be given four clear days before any intended attempt, and competitors may make their attempt any time (except Saturdays and Sundays) between May 25 and October 31. The following rules have been drawn up for this year's competition. The race is a handicap one over, as already mentioned, the Paris-Brussels-London-Paris route. The scratch man is started off at 10 a.m. It appears that single-seater machines with engines of 400 h.p. or more will be classed as scratch. The other machines will be started as follows, according to handicap: Single-engined machines with engines of 200 h.p. to 400 h.p. will receive 15 minutes' start. Single-engined machines with engines of less than 200 h.p. will receive 30 minutes' start. Twin-engined machines will receive 45 minutes' start, and multi-engined machines one hour's start.

As the competition is expected to attract a number of commercial machines, provision has been made in the regulations for making allowance for the carrying of passengers. According to the number of passengers carried (75 kilogrammes weight, or the equivalent in ballast), the time of starting will be put forward a number of minutes equal to the square of the number of passengers. Thus, if a single-engined machine of 300 h.p. carries five passengers, his time



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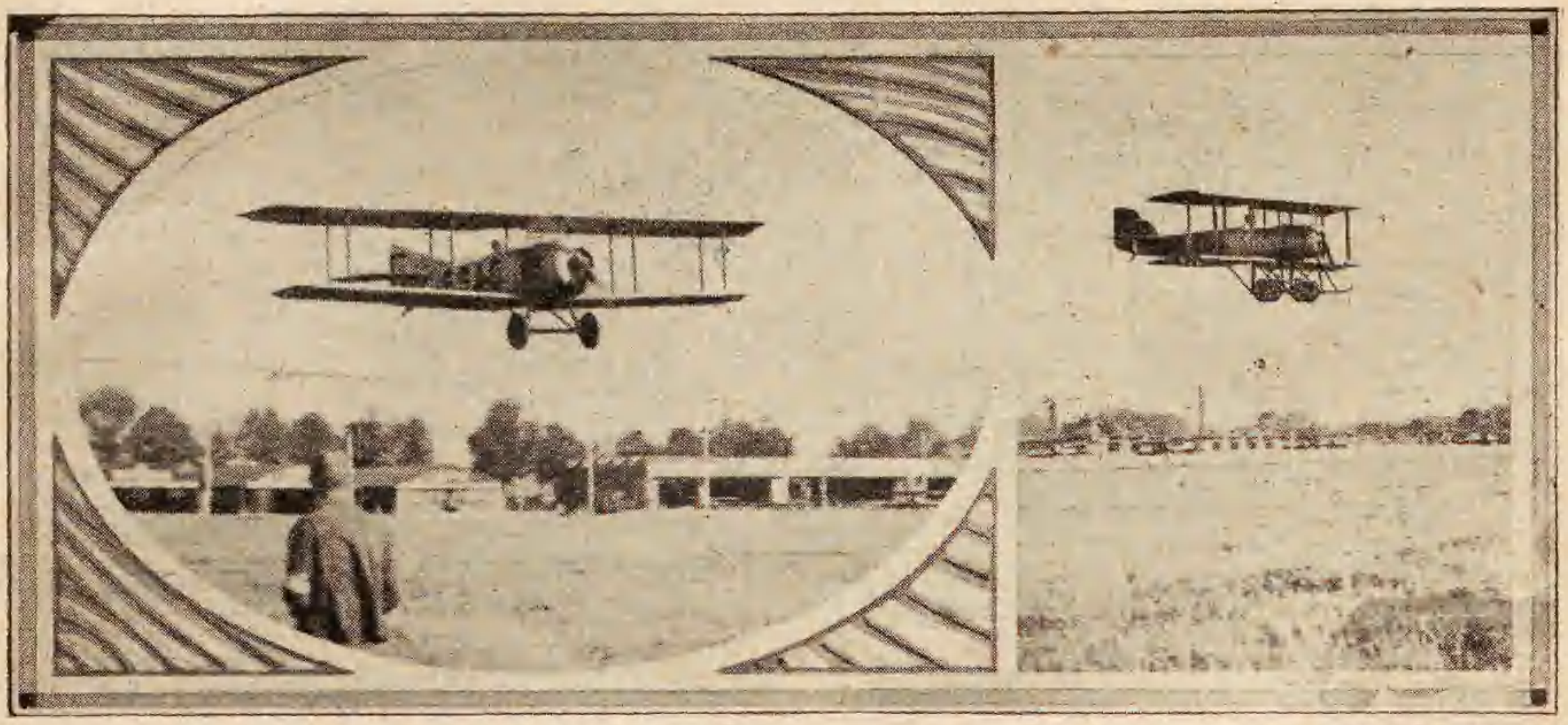
THREE MACHINES IN THE GET-OFF COMPETITION : On the left Bossoutrot on the Farman Sport does a "zoom." On the right Douchy "lifts" his Henry Potez into the air, and, inset, Goron pulls up his antiquated Caudron.



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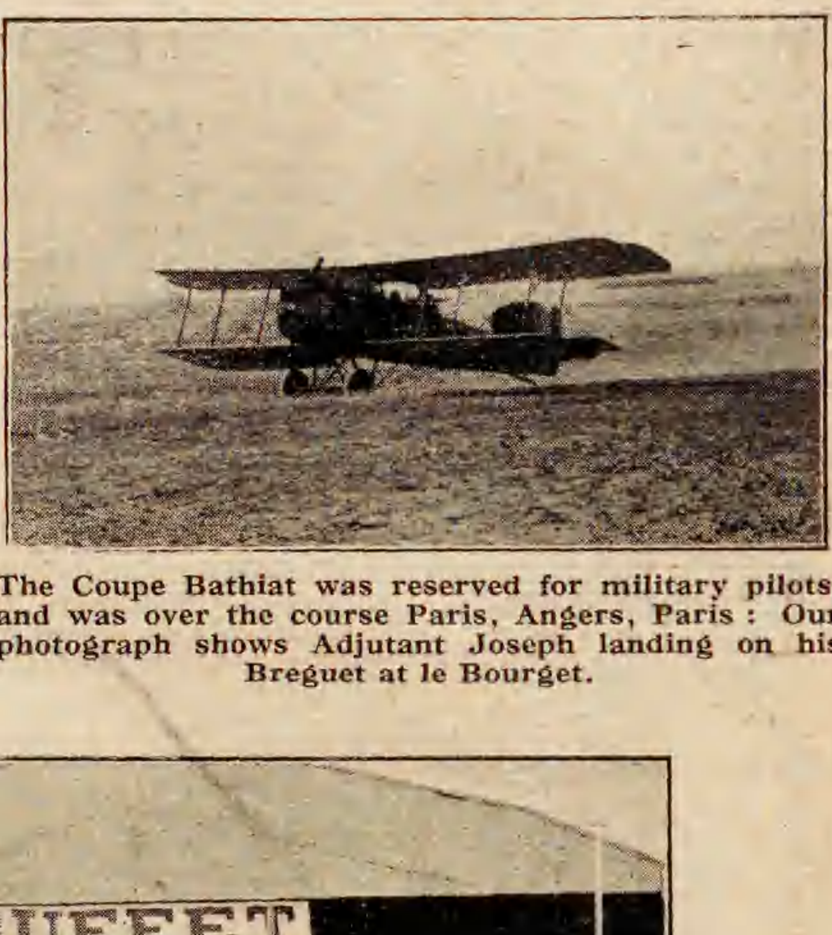
IMITATING FORCED LANDINGS : Peuillot, on the left, just clears the line on his Caudron. On the right Chevilliard floats in on the Farman.

of starting (the scratch man starting at 10 a.m.) will be 9.30 (*i.e.*, $9.45-5^2$). This rule, of course, puts a premium on the number of passengers carried, and should help to encourage the entry of large passenger machines. To take an example, if a twin-engined machine carries 20 passengers, it will be given 7 hours 25 minutes' start (*i.e.*, 45 minutes as a twin-engined machine and 400 minutes for the 20 passengers). It would, therefore, take a very fast single-seater machine to catch up with such a machine from scratch.

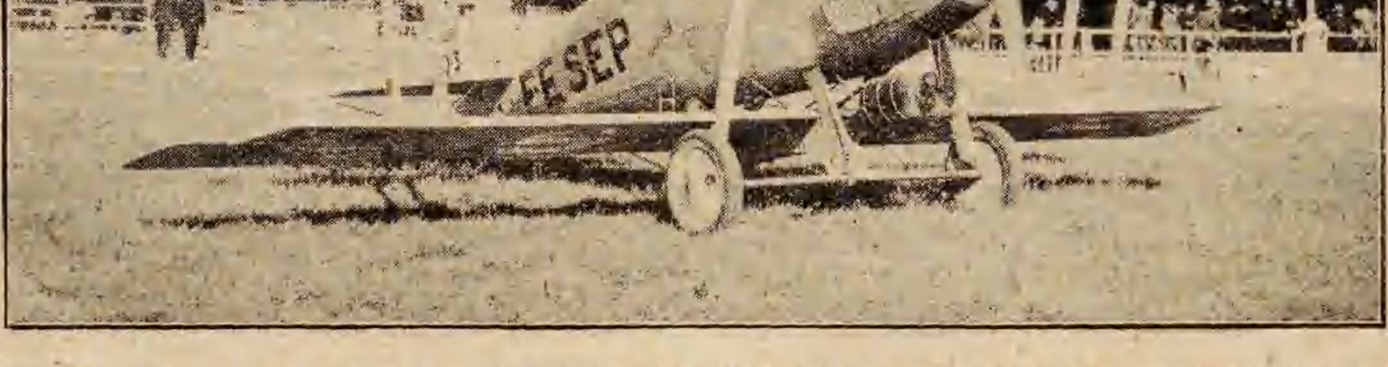
As regards the distribution of the 20,000 francs prizes for this year's competition, 3,500 were awarded for the race held during the le Bourget meeting, first prize being 2,000 francs, second 1,000 francs and third 500 francs. The balance of 16,500 francs will be awarded on November 1, 1922, to the three pilots having made the best times over the course, as follows : First, 10,000 francs, second 4,000 francs, and third 2,500 francs.

Other Competitions at le Bourget Meeting

In addition to the Coupe Bathiat already referred to, and the daily events indicated in the first part of these notes, a competition for touring machines had been arranged for Friday, May 26. This was confined to machines with engines of 60 h.p. or less. The contest included get-off, landing, climb to 1,000 metres, speed test over measured



The Coupe Bathiat was reserved for military pilots, and was over the course Paris, Angers, Paris : Our photograph shows Adjutant Joseph landing on his Breguet at le Bourget.



The Pierre Levasseur at le Bourget : This machine was exhibited at the last Paris Aero Show, and is remarkable for its unorthodox construction. It flies very well and sells at a very low price.

Mr. Rex Stocken, the only British representative at the le Bourget Meeting, wearing his usual happy smile.

course of 10 km., speed range, dismantling and erecting, followed by flight, and small space for garaging. Points were given for the various features. The prizes for this competition were: First, 1,500 francs, second 1,000 francs, third 500 francs.

For Saturday, May 27, the Coupe Dubonnet had been placed on the programme. This competition was a "Prix de l'Estafette," and was open to both military and civilian pilots. It consisted in six circuits of the course le Bourget, Chateau de la Queue, Tremblay-les-Gonesse, le Bourget. After returning to le Bourget the machines had to land and the pilot or his passenger obtain from the *Tribune d'honneur* a postal packet indicating his route on the next lap. This had to be done on each circuit, and the winner was to be the pilot, having covered the six circuits in the shortest time.

Mlle. Graby, who made a number of parachute jumps from Fronval's machine.

A Brief Visit to le Bourget

Having outlined above the main events which had been planned for the meeting at le Bourget from May 25 to May 28, we may proceed to a brief account of a short visit which we paid to the scene of the meeting. As a certain waste of time had been allowed for in connection with obtaining Press passes, etc., which are usually a source of considerable difficulty to a British Press representative in France, we wended our way to Croydon on the day before the opening of the meeting. A brief consultation with Mr. Cogni, of Handley Page Transport, soon resulted in our being seated under the "conservatory" roof of a D.H. 4A, carrying, besides ourselves, a lady passenger, and piloted by Major Foot. On getting away from Croydon, it was soon found that, even rushing along at high speed, the heat was uncomfortable, and so Foot pushed up to about 6,000 ft., where the air was less oppressive, and from which altitude we obtained a splendid view of the country below. Maidstone was passed at a height of about 6,000 ft., and before long the coast hove in sight and disappeared under us as we crossed the coastline just west of Folkestone. The flight across the Channel was soon accomplished, and we were impressed by the comparative absence of shipping in that busy thoroughfare. Coming into France near Boulogne, we sighted in turn Berck, Abbeville, Beauvais and le Bourget. We do not know whether it was out of consideration for the lady passenger, but Major Foot's descent was so gentle that it was quite imperceptible, and we touched without a jar.

The afternoon was spent in hunting up the address of the "Old Stalks," there to obtain the necessary armlet which should establish us as persons fit to go on the grass of le Bourget. The armlet was duly obtained, and how the rest of that day was spent does not concern this story.

May 25 was the opening day of the meeting, and the two big events were the Coupe Bathiat for military aviators, and the Coupe Lamblin for civilians. No less than 14 military pilots started for the former, which was over the course le Bourget, Angers, le Bourget, with compulsory landing at Angers. This race was won by Lieutenant Batelier, whose time was 3 h. 25 mins. $39\frac{3}{5}$ secs. For the Coupe Lamblin only three machines started. These were piloted by Bajac, Casale and R. Stocken, the A.D.C. pilot, who was the only British representative at the meeting. As indicated above, the Coupe Lamblin is a handicap race, and the best time was made on May 25 by Stocken on the D.H. 4C, with 400 h.p. Liberty engine, who started scratch. On handicap, however, the race went to Bajac, whose handicap time was 6 h. 18 mins. 15 secs. Stocken's handicap time was 6 h. 28 mins. 41 secs. Casale was forced to land at Esquennoy owing to fog, and was thus considerably delayed. His handicap time was 6 h. 42 mins. 14 secs.

Apart from these more important races, the first day of the meeting saw several of the minor events run off. As already indicated, it was a matter of some difficulty to follow the events, owing to the somewhat happy-go-lucky nature of the organisation. It appeared, however, that an attempt was to be made at doing the quick get-off, the fast get-away, and other events, and after waiting about for a considerable time these actually took place. The number of entrants was not great, but some of the get-offs were quite remarkable. We succeeded in obtaining several photographs which indicate the manner in which low-powered machines, if lightly loaded, can be "hoiked" off. Bossoutrot's "zooming" on the Farman Sport with 60 le Rhone was particularly impressive, as one of the accompanying photographs will show. The ingenious manner employed for ascertaining whether or not a machine had "cleared" the rope was rather

Two "Old-Timers" at le Bourget: On the left M. Gaubert, and, on the right, M. Louis Paulhan of London-Manchester fame.

amusing. Two poles were placed some distance apart, and on each, at the specified height, was a mark. An observer mounted one of the poles, holding his eye in line with the two marks. By sighting along these he decided whether or not any machine cleared the required altitude, the machines not actually flying over the "rope." This event was won by Douchy, who cleared a height of 7 metres in a distance of 60 metres. Poiree took 63 metres, and Chevilliard 65 metres. The "forced landing" in a small field caused several competitors to come to grief, in stalling their machines too violently into the 100 metres square after clearing the line. This event was also won by Douchy, who came to rest 10 m. 35 from the centre of the square. Goron on the Caudron was 38 m. 80 from the centre, and Fronval on the Morane Parasol 42 m. 60 from the centre. We heartily wished some of the pilots from last year's Pageant could have been present to demonstrate side-slip landings.

In the competition for quick get-away, including a circuit of the aerodrome, Bossoutrot on the Farman Sport was first in the first series, Canivet in the second, and Fronval in the third. In the aggregate, however, the placing was as follows: 1, Fronval; 2, Bossoutrot; 3, Canivet. In the figure-of-eight tests, which, according to the rules should be flown at a height of not more than 100 metres, but which was flown much higher by the majority of competitors, Douchy was first in $24\frac{1}{5}$ secs. In between events there were exhibitions of stunt flying by several pilots, notably Fronval on the Morane Parasol.

Friday morning, for some reason, did not show the same activity, and several of the numbers down on the programme were conspicuous by their absence. It appeared that several events were hours late in starting, and as we had to be back in London by Saturday morning we decided not to sacrifice the pleasure of flying back to a longer stay at le Bourget and a return journey by train and boat. Consequently, by somewhere about 2 p.m. we were seated in a D.H. 34 belonging to the Instone Air Line, and, piloted by Mr. Sheppard, were soon on our way. At Abbeville we ran into fog, and from there until we emerged into comparatively clear air at Croydon we saw but little of the ground.

To return to the events at le Bourget, these must, as regards the rest of the meeting, be summarised from other than personal observations. It appears that on the Friday afternoon the French President, accompanied by M. Laurent Eynac, visited the aerodrome, where he witnessed a number of flights by practically all the pilots present. Of the events of the day, the Coupe Bathiat race was won by Lieut. Rabattel in 2 h. 47 mins. $26\frac{2}{5}$ secs. The climb to 4,000 metres by Adjutant Cas in 12 mins. 19 secs. The get-away by Fronval in 250 metres in $13\frac{3}{5}$ secs. The landing test for touring machines by Rapini in 47 metres 70, and the get-off and speed over 10 km. in the touring machine competition by Douchy. Poiree, in the same contest, dismantled his machine in 4 mins. $30\frac{1}{5}$ secs, and re-erected it again in 4 mins. $33\frac{4}{5}$ secs. He afterwards flew it over the 10 km., taking 13 mins 10 secs. for the distance. Lecointe flew his Gordon-Bennett Nieuport over a kilometre course at a speed of 300 km. per hour.

The chief event, as regards public interest, of Saturday, May 27, was the Coupe Dubonnet, in which 24 machines took part, being started off 12 at a time, but at present the results have not been made known. The figure-of-eight was won by Poiree, the quick get-away by Haeglen, the speed range in touring machine event by Douchy, and the quick get-off by Bossoutrot. In the evening there was night flying.

Sunday, May 28, was largely a repetition of the previous days as regards programme, but the meeting on that day was attended by large crowds from Paris. There is little need to go into details, excepting to state that the Bathiat Cup was awarded for this year to Lieut. Rabattel.

Taking it all around, the Bourget meeting was fairly successful compared with other recent meetings in France, and the "gate" was reasonably good. On the Sunday the attendance was, of course, the largest of all, and it is to be hoped that the "Vieilles Tiges" will, after deducting expenses, have a substantial surplus left with which to do the good work for which the meeting was arranged.

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The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

WHITSUNTIDE AIR RACES
Waddon Aerodrome, Croydon

(*Saturday, 3rd June*, 1922.)

PROGRAMME

Third Club Handicap (16 miles). Prize £20. For machines with a speed not exceeding 120 miles per hour.

Entrant, Machine, Engine and Pilot :—

Lieut.-Col. Spenser Grey; Avro 504 k; 110 h.p. Le Rhone; Spenser Grey.

Major H. Petre; Avro 504 k; 110 h.p. Le Rhone; Petre.

De Havilland Aircraft Co., Ltd.; D.H. 9 b; 230 h.p. Siddeley Puma; Cobham.

Lieut.-Col. F. K. McClean; Avro Viper; 180 h.p. Wolseley; Hinkler.

Bristol Aeroplane Co., Ltd.; Bristol Monoplane; 100 h.p. Bristol Lucifer; Uwins.

F. P. Raynham; Sopwith Antelope; 180 h.p. Wolseley Viper; Raynham.

Exhibition Flying by J. H. James on the Gloucestershire "Bamel," the holder of the British Speed Record.

First Sprint Handicap (8 miles). Prize £20. For machines with a speed of not less than 110 miles per hour.

Entrant, Machine, Engine and Pilot :—

De Havilland Aircraft Co., Ltd.; D.H. 9 b; 230 h.p. Siddeley Puma; Cobham.

Major Grant (Aircraft Disposal Depôt); D.H. 9 a; 350 h.p. Rolls-Royce; Stocken.

Major Grant (Aircraft Disposal Depôt); Martinsyde F4; 300 h.p. Hispano-Suiza; Foot.

Major Grant (Aircraft Disposal Depôt); S.E. 5 a; 200 h.p. Wolseley Viper; Hayns.

Balloon Sniping Competition.

First Whitsuntide Handicap (24 miles). Prizes £70. For machines with a speed of not less than 100 miles per hour.

Entrant, Machine, Engine and Pilot :—

De Havilland Aircraft Co., Ltd.; D.H. 9 b; 230 h.p. Siddeley Puma; Cobham.

Lieut.-Col. F. K. McClean; Avro Viper; 180 h.p. Wolseley Viper; Hinkler.

Bristol Aeroplane Co., Ltd.; Bristol Monoplane; 100 h.p. "Bristol" Lucifer; Uwins.

Major Grant (Aircraft Disposal Depôt); D.H. 9 a; 350 h.p. Rolls-Royce; Stocken.

Major Grant (Aircraft Disposal Depôt); Martinsyde F 4; 300 h.p. Hispano-Suiza; Foot.

Major Grant (Aircraft Disposal Depôt); S.E. 5 a; 200 h.p. Wolseley Viper; Hayns.

F. P. Raynham; Sopwith Antelope; 180 h.p. Wolseley Viper; Raynham.

Parachute Demonstrations by W. Newell.

Exhibition Flights.

Surrey Open Handicap (16 miles). Prizes £40.

Entrant, Machine, Engine and Pilot :—

Lieut.-Col. Spenser Grey; Avro 504 k; 110 h.p. Le Rhone; Spenser Grey.

Flying Officer Alliott; Avro 504 k; 110 h.p. Le Rhone; Alliott.

De Havilland Aircraft Co., Ltd.; D.H. 9 b; 230 h.p. Siddeley Puma; Cobham.

Lieut.-Col. F. K. McClean; Avro Viper; 180 h.p. Wolseley Viper; Hinkler.

Bristol Aeroplane Co., Ltd.; Bristol Monoplane; 100 h.p. "Bristol" Lucifer; Uwins.

Major Grant (Aircraft Disposal Depôt); D.H. 9 a; 350 h.p. Rolls-Royce; Stocken.

Major Grant (Aircraft Disposal Depôt); Martinsyde F4; 300 h.p. Hispano-Suiza; Foot.

Major Grant (Aircraft Disposal Depôt); S.E. 5 a; 200 h.p. Wolseley Viper; Hayns.

F. P. Raynham; Sopwith Antelope; 180 h.p. Wolseley Viper; Raynham.

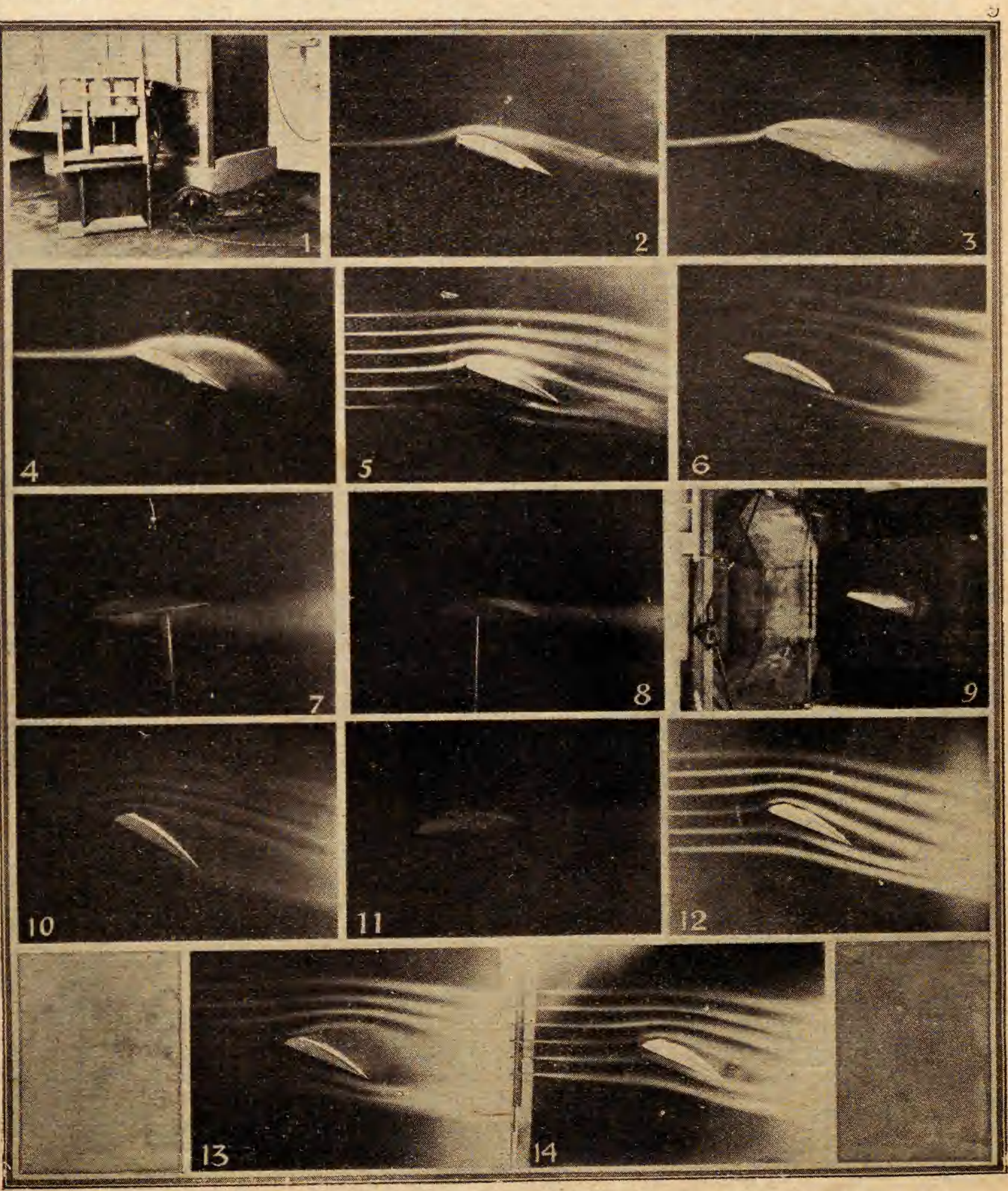
Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

FLOW TESTS ON SLOTTED AEROFOILS

Some Experiments Carried Out by Herr Lachmann at Göttingen

ALTHOUGH the action of the air over a slotted plane is understood in a general way, the theory of this type of aerofoil is not as yet susceptible of complete mathematical treatment, and a good deal of further research is required before we can claim thoroughly to understand what really takes place. In order to discover more about the nature of the flow, Herr Lachmann, who, it will be remembered, invented the slotted aerofoil in Germany at the same time as did Mr. Handley Page in this country, has carried out some tests at the Göttingen Laboratory on a slotted aerofoil. The tests were arranged to show, by means of sal-ammoniac smoke blown across the aerofoil, the behaviour of the eddies at various points and at various angles and velocities, and some very interesting results were obtained.

In Fig. 1 of the accompanying photographs may be seen the apparatus used for producing the smoke. The flask on the right-hand side contains hydrochloric acid, while the flask in the middle holds a quantity of ammonia. These two flasks stand in a bed of water warmed by a Bunsen burner to assist vaporisation. The flask on the left serves as a reservoir, and from it there is connection with a tube fitted with one or more jets through which the sal-ammoniac



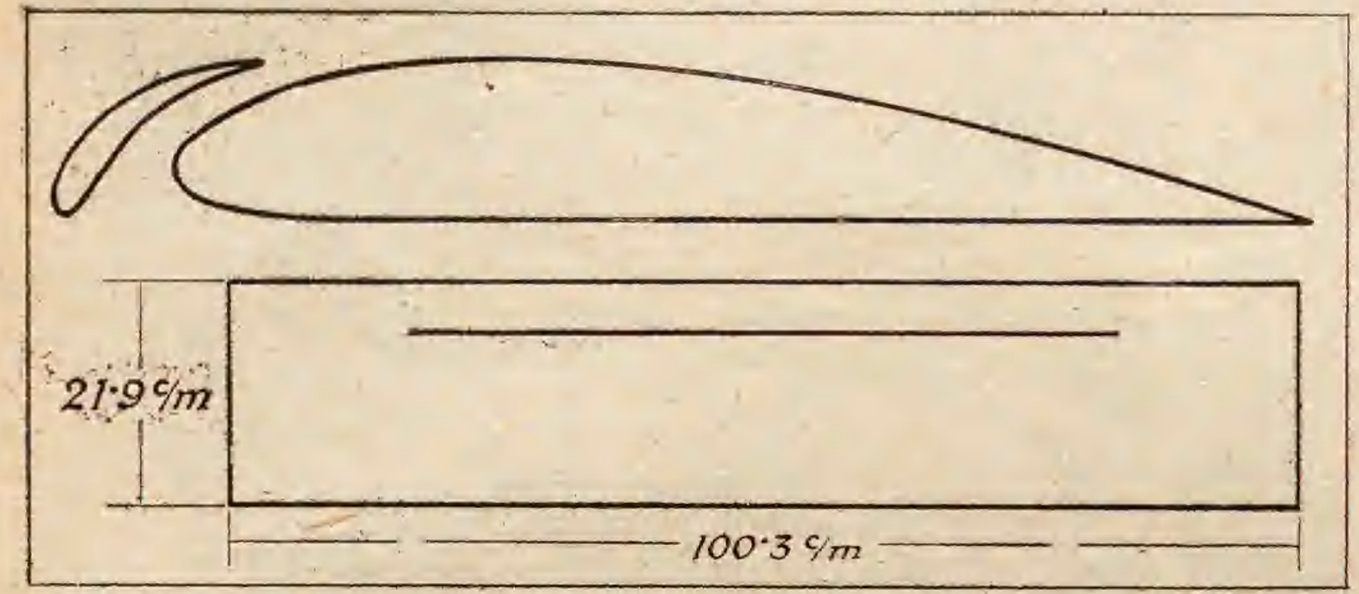
FLOW TESTS ON SLOTTED AEROFOILS : Photographs showing various forms of air flow over model tested at the Göttingen Laboratory.

vapour passes. The necessary pressure is supplied by a small pump driven by an electric motor, which can be seen on the floor in Fig. 1.

The section tested is shown in the accompanying diagram. The plan form was rectangular, measuring 100.3 cm. in span and 21.9 cm. in chord. The slot, it will be seen, did not extend the whole length of the model, but was confined to the inner portion, the two ends being left solid.

With regard to the tests themselves and the results, Fig. 2 shows the airstream over the slotted portion of the model at an angle of incidence of approximately 21 degrees. It will be observed that no burbling is indicated. The next illustration, Fig. 3, shows the model, again at 21 degrees, but with the smoke blowing over the unslotted portion at the tip. It will be observed that here burbling is clearly taking place. The same applies to 4, which was taken under the same conditions, but which shows the burbling even more clearly.

In the photograph No. 5 the model is at an angle of incidence of approximately 25 degrees, and several jets of smoke are being blown across it, some passing under and some over the model. The surprisingly small disturbances in the air flow, in spite of the large angle, are clearly brought out. By way of contrast, photo. No. 6 shows the unslotted portion of the model at the same angle of incidence. Here the burbling is very pronounced, and is of the appearance usually found in unslotted aerofoil sections. It might be noted, in this connection, that during the tests it was found that burbling occurred, as regards the slotted portion, at small velocities only, while at the ends it took place at large angles. It was also found that if the velocity was increased above 5 to 10 metres per second the burbling ceased and the "dead-water" region vanished. From these observations, it was concluded that burbling depends upon the Reynolds number, and that burbling starts first at the centre and moves towards the tips.



Flow Tests on Slotted Aerofoils: Diagram of the model with which the experiments were carried out.

In order to obtain information relating to the air flow at negative angles, a test was run with the model at an angle of incidence of 6 degrees. To show up the "dead-water" region, the smoke was let out of the rear edge of the auxiliary aerofoil. The burbling on the pressure side is indicated, and it will be observed that no smoke appears to flow over the upper surface. Photograph No. 8 was taken at an angle of incidence of + 1 degree. The smoke, as in the previous case, was let in to the pressure side from the rear edge of the auxiliary aerofoil. The photograph clearly shows that the smoke was sucked through the slot to the suction side of the main aerofoil. It will also be seen that the "dead-water" from the pressure side shown in Fig. 7 was cleared away with it.

The general arrangement of the tests is shown in the photograph No. 9. On the left can be seen the mouth of the wind tunnel, and, just in front of it, the tube through which are led the various jets of smoke. In the original photograph these can be clearly seen, although they have been somewhat lost in the reproduction.

In Fig. 10 the model is seen at an angle of incidence of 31 degrees, and a certain amount of burbling is taking place over the slotted portion of the aerofoil. In Fig. 11 the model is mounted at — 3 degrees, and burbling is taking place on the pressure side. It will be noticed that at this angle no smoke is passing through the slot. At + 1 degree (photograph No. 8), it will be remembered, smoke was clearly passing through the slot, so that it may be assumed that below about 0 degrees incidence no air flows through the slot. It has already been stated that the tests revealed the fact that at the tips burbling practically ceased at velocities above 10 metres per second. In Fig. 12 is shown a comparatively good flow around the unslotted portion of the model at an angle of incidence of 27 degrees and a velocity of 10 metres per second. The next photograph, No. 13, shows the model at 27 degrees, but at a velocity of only 3 metres per second. Here burbling is clearly taking place over the unslotted portion.

In the last photograph, No. 14, the air flow is comparatively good, although the angle is as large as 27·5 degrees.

In conclusion, we should like to acknowledge our indebtedness to Mr. Handley Page for permission to publish these very interesting photographs, which were, we believe, supplied to him by Herr Lachmann, to whom also our thanks.

THE SEAPLANE'S PLACE IN AVIATION*

I have taken my title because it has always seemed to me that the seaplane in this country has been, as it were, nobody's child.

The seaplane has suffered from ignorance: not the usually employed sense of that word, meaning want of knowledge, but its truer sense, meaning the ignoring of the subject. It is my hope to show why this should not be perpetuated.

Aviation, as we now know it, divides itself into two states, War and Commercial. The position of the seaplane in each is very different, and shall be considered separately for each. The seaplane itself has two divisions and a compromise: the float seaplane, the flying boat and the amphibian. They all have their uses in each sub-division of aviation. Let us take the disagreeable first and consider the seaplane in war.

In the equipment of an air fleet in war, the seaplane is required for all duties which are carried out over the water, other than scout fighting.

The idea of doing operations as things are, over the sea in any craft that will not satisfactorily float—not only when forced to, but also when desired—is to my mind foreign to logic and close to the culpable. The counter-argument which the seaplane enthusiast has to answer is, of course: "Granting your grouse, can you do the same job with a seaplane?" The answer is "Yes, with the probable single exception of high performance fighting." All war duties that ought to be done over the sea can be done by the seaplane. Bombing and spotting for submarines, fleet reconnaissance, long-range patrol, blockade, torpedo work and convoy duties. I do not say they can be done as easily from the designer's point of view. They call for a good deal of double-handed knowledge and some special show of ingenuity. The reasons supporting my reply of "Yes" above are that: (*a*) seaplanes can be built with very comparably the same structure weight as land machines to do the same job; (*b*) they can land faster, which means high loading and high useful load percentages—possibly at the expense of ceiling *per se*; but in general so far the seaplane has required to have less ceiling than a land machine. Though I am inclined to the opinion that the next war demand will be in the direction of pushing up the ceiling of seaplanes by superchargers, flap gears, or what not, this ceiling question will tell in the duty of bombing battleships by aircraft if that form of attack is persisted in. It is my own opinion, however, that the correct way to attack a battleship—being based on the desire to let water into it—is to torpedo it; but I am inclined to think that the whole controversy that we have witnessed of late on such subjects has warped its own perspective somewhat by omission of the perception that the introduction of aircraft has vastly increased the battle area of modern warfare and that in future the concentrated clusters of capital ships being less frequently effective will be so much the less important.

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* *Résumé* of Paper read by Major Hume before the Institution of Aeronautical Engineers on May 25, 1922.

The float seaplane in war is suitable for reconnaissance with self-defence, which can be made of a high order, and also for torpedo dropping by virtue of its under carriage form. It is only fair for carrier work because of its view, and indifferent for stunt fighting because of its necessarily distributed masses resulting in large inertia on all axes. Stunt fighting even on the sea is best carried out by small land scouts operating from a carrier ship. They are cheap, small, and "nippy," and the wastage—though probably high in percentage—is not so in net expenditure, and we are talking of war conditions now. The Flying Boat type is particularly suitable for long range, and all general reconnaisance bombing and spotting work; it is the right air tool to tackle submarines with. In small sizes it is good for deck landing if made amphibian. Being a seaworthy affair, it can survive well in difficulties and stay away from its base on occasion. It is usually a bad fighter. It is prone to blind spots, and is often slow to manœuvre. It lends itself, however, to development of size, and approaches nearer to a separate entity or command than anything so far available in the air, save perhaps the large airship, concerning whose claims to recognition I am not qualified to speak.

The earth's surface is bi-elemental—to use the tenets of Pythagoras for a moment—land and water. An island is therefore of some relation to this surface. The earth's air is mono-elemental—there is no such thing as an island from the air point of view. We must, now that we can fly, fight in the air. Two facts that regulate our air fleet, then, are: (1) Carry as much in the air as possible; (2) if descent has to be made, make it as safely and profitably as possible. To my mind the seaplane affords a mechanism to these ends. There is weight to be carried, which means high loading—or, at any rate, long runs to get off; there are safe landing surfaces required. There is twice the water on this earth than there is land, which one fact takes us a long way toward our argument.

Nevertheless, we are based upon a surface island, and any aggression on our part has to be firstly over the sea; retreating attacks by air have to be pursued over the sea. We have to cross the sea to do every little stunt we conceive. Surely the seaplane is our necessity.

Seaplanes of either class can be loaded up to 11½ lbs./sq. ft., and got off at 20 lbs./h.p., and I may say that the seaplane which recently flew the Atlantic was flying when throttled down and with flap gear at 10 degrees at about 40 lbs./h.p. The North Sea Patrol was done at about 15 lbs./h.p. on seaplanes that were evolved rather than designed.

Now let us turn to a few ruminations on the commercial position of the seaplane. Here are a totally different set of requirements—a fact that with the aftermath of the great war glooming upon us it has been hard to grasp. Just as war duty is of the air airy, so is commercial duty of the earth earthy. We have to put up machines that will carry the maximum weight most economically: height is of secondary importance except so far as it affects economic flight. Reliability is essential; insurable losses must be rendered exceptional; time-keeping and regularity must be studied; in other words, we must pay. My predilection for such duties is the large boat seaplane. It can carry a large weight, if required. Its structure weight can be produced at from 32-34 per cent., lessening with size very slightly. A seaplane is so much faster than any surface craft that the speed bogey may be severely discouraged. This means more payable load. I have in mind a twin-engined boat, value, say, £13,000, loaded to 20 lbs. h.p.; its payable load on 6½ hours' fuel at full power at 90 knots is 33⅓ per cent. Cut the fuel by half, retaining a range of about 350 sea miles, and the payable load is 41 per cent. The landing speed is about 54 knots at 11½ lbs. sq. ft. These figures are very approximate, as they are worked out on an existing machine. One built for the work would probably have greater range for the same payable load. It is not part of my policy in this paper to present a number of problematical and mythical aircraft; they do not necessarily lead us anywhere, and may only confuse the issue.

A flying boat is either pushed off by its step or pulled off by its wings. A proper compromise of these two effects the ideal condition for taking off a maximum load. The speed of get-off is usually immaterial; there is plenty of sea. The speed of landing presents no difficulties in the way of increase, provided the seaplane is not one largely pushed off by its step—in which case some serious porpoising or "ballooning"—for want of a better term—may occur; but this can only be through faulty design, as facilities exist for thoroughly testing the hull in model form at the N.P.L. and elsewhere. There is no need to be afraid of high landing speeds. We know the order of impacting forces, and they are not alarming. We can also command in our Empire the best boat building in the world in this particular class of craft.

The high-lift wing section is going to receive great attention from seaplane designers, I fancy. Information is at present a little meagre. But always I think will the cry to the designer be, "Carry more weight." The large boat can even now be built of such a size that it can begin not only to carry finicking valuables, luxuries and notoriety-seeking nobodies, but real cargoes of perishables, urgent ponderables, and things people want in a hurry. But as yet, in fact, the commercial possibilities of the seaplane have been left untried. Commercial aviation has apparently been bent on proving itself out on the world's worst route from the hardest country to do consistent flying in—England. A laudable ideal and a creditable experiment, but not necessarily of the propagandic utility it deserves. While it takes as long on the road to reach and drive away from the international aerodromes as it does to do the actual flying between countries, that fly in the ointment is apt to protrude. Perhaps before long the seaplane may save that actually small but psychologically large deterrent from obtruding itself before the prospective passenger and user. But even that will have its limitations. It's a hard job adapting an old world to new conditions.

To the post office I think the seaplane can be of great service. Outlying parts of the Empire can be mailed quickly and more frequently, in some cases. Express work can be carried on where hitherto impossible. As a concrete example, take Canadian mails. Land is sighted some two days before the liner is actually berthed. In half that time the mails could be collected by flying boats and distributed to Quebec, Montreal, Toronto, and Ottawa by parachutes. The famous F-boat—a machine produced under the purely local genius of a gifted pioneer, Commander J. C. Porte, and, with all its shortcomings, proving of great value to the country. In 1917 these seaplanes had made such a strong impression on the minds of the powers that were, that the fiat went forth: "Please design a seaplane in the light of all the accumulated experience to date to do the same duty"—and the result was a machine 20 ft. less in span, 1,000 lbs. lighter, 10 knots faster, and with twice the climb. This machine was designed by a member of this Institute.

My remarks may strike those particularly concerned with land machines as being somewhat coloured by enthusiasm. But I should like to make it quite clear that I do not in any way oppose the land machine. We have achieved veritable wonders in that direction, and I am most anxious to discount any idea of bias in enthusiasm. All I claim is each to his trade, and good luck to both of us. Each class has its appropriate use, and the main idea of my observations is to indicate to what duties the seaplane is appropriate.

The commercial seaplane has one great business advantage: it need not be run in any way as a competitor to existing transport services, but rather as a super-service in connection therewith. That way progress lies.

The seaplane, however, requires somewhat specialised personnel, in all its branches, and particularly in the matter of pilots. The seaplane pilot has to know rather more than the land machine pilot.

The seaplane was started in France, continued in England, and advanced in America, and perfected again in England, and I claim that we can build the best seaplane in the world, and it is now up to us to see also that we use it to the best advantage as our national characteristics, geographical world distribution, and unique opportunities naturally permit us.

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Cabral and Coutinho to make Third Attempt

FROM Lisbon it is reported that a third Fairey seaplane, Rolls-Royce "Eagle" engine, is being sent out to Fernando Noronha in order to allow the two Portuguese officers to make a third attempt at completing their flight from Lisbon to Rio. The other two machines, it may be remembered, were wrecked through alighting on a rough sea.

LONDON TERMINAL AERODROME

Monday evening, May 29, 1922

A BANK of fog which has hung persistently over the French coast, extending inland as far as Beauvais, has caused pilots on the London-Paris route much inconvenience during the past week. The weather has, on the whole, been as favourable for flying at Croydon as during the wonderful flying weather of last summer, and the visibility has been as great as from 40 to 50 miles. It is, therefore, a matter for surprise and comment to passengers who arrive at Croydon and find that, though the weather is perfect there, no movement of machines takes place, owing to this vast distant fog-bank.

Intimately connected with this question of localised fog is the matter of compass swinging. Pilots are now beginning to have sufficient faith in their engines to fly above localised fog-patches when they know that the weather is clear and practically cloudless beyond; and this has brought up, again, the question of accurate compasses. It would appear that there is nobody now to swing compasses, and that the instruments on some of the machines have not been swung for months, and are hopelessly out. Directional wireless has, of course, made this compass question less important, but last week not only were the compasses untrustworthy, but "atmospherics" disorganised the wireless.

A Strange Mishap on the 'Drome

A REMARKABLE accident occurred on Tuesday, when two of the Daimler D.H.34's collided with one another when only a few feet above the ground. A new Daimler pilot, Mr. Dickenson, was making a trial flight on one of these machines, and was on the point of landing, when the last Daimler "air express" for the day arrived over the aerodrome from Paris, piloted by Mr. Robinson. Mr. Robinson banked over to make a left-hand turn in order to land, and, with his vision obscured by the slope of his machine, apparently failed to see the other aeroplane, and landed on the top of it. Both aeroplanes were wrecked, and the three passengers in the machine from Paris were shaken, but luckily the greatest injury was a cut lip, sustained by a woman passenger. Both pilots, and the wireless operator and cabin-boy on the incoming Paris machine, escaped with bruises. This accident has left the Daimler Airways with only one machine. In spite of this, however, they are managing to run their services with but little dislocation.

The Instone D.H.4A, which Mr. Keys flew to Brest with a newspaper representative who wished to arrive rapidly at the scene of the collision between the P. and O. boat "Egypt" and a French steamer "Seine," had the misfortune, it is now learned, to crash on landing; but neither Mr. Keys nor his passenger were injured.

The Instone Air Line are making good use of the two Westland machines they have purchased, using them as "reliefs" for their larger machines, and employing them also in cases where there is not a sufficient load to warrant sending a large machine.

Night Flying on the London-Paris Route

MAJOR-GENERAL SIR W. S. BRANCKER intends to make a night flight along the London-Paris "airway," starting from Croydon at 10.15 p.m. on Wednesday. He will be accompanied by Colonel Blandy, who is in charge of the night-flying arrangements. As the aerial lighthouse at Tatsfield is not yet completed, a temporary light is to be installed. Captain Roach will pilot the machine, which is to be one of the R.A.F. Handley Page 0-400's from Biggin Hill.

On Wednesday Captain Macmillan started on an attempt to fly round the world. He was piloting the D.H.9 which has been assembled by the Aircraft Disposal Company at the Waddon Factory. Major W. T. Blake, who is the organiser of the trip, and Lt.-Col. Broome occupied the two passenger seats. Mechanics were working on the machine right up to the last minute; in fact, the start had to be delayed for a couple of hours in order to get the machine finished. Owing to the haste which Major Blake insisted upon on the matter of getting away, the party actually went off before Captain Macmillan had been given an opportunity of testing the 'plane, and he found in his first flight—in which he got as far as Paris—that the machine was tail heavy; with the result that a mechanic had to be dispatched to Paris to put this right. Another D.H.9 was to have accompanied the round-the-world adventurers as far as Athens, to accommodate Press representatives and cinema camera-men, but this met with a series of mishaps which prevented it reaching Paris until Friday. Mr. Barnard, of the De Havilland Aircraft Company, started away from Croydon as early as 3.55 a.m. in an endeavour to catch up with the other machine, but was obliged to descend at Penshurst owing to fog and mist, and did not arrive at Paris until the evening.

Flowers by "Air Express"

AN interesting experiment is being made by a large firm of flower-growers in Holland. They have picked two separate lots of flowers simultaneously, and have packed one lot in a sealed box, despatching them by air to Croydon, with instructions that they are to remain unopened and to be returned to Holland by air the next day. The other lot has also been packed in an identical box and sealed, but has remained at the offices of the company in Holland. The idea is to see what effect the air journey in the cabin of one of the Fokkers, with the traces of hot exhaust gases, which inevitably find their way into the best aeroplane saloons, has on the flowers. If it is found that there is little or no deterioration, large consignments will be dispatched by air.

On Friday a flight which Captain Leverton describes as "from duckpond to duckpond" took place. A consignment of ducks left Holland on the 2 p.m. machine, and, on arrival at Croydon, were given a drink of water, and then dispatched per passenger train to Norwich, where it was expected that they would be testing the Norfolk worms ere nightfall.

Continental Racers Pass Through Croydon

ON Thursday the competitors in the Coupe Lamblin race from Le Bourget to Brussels, on to Croydon, and thence back to Paris, landed at the aerodrome. M. Bajac, flying a Gourdou monoplane with a 180 horse-power Hispano, was the first to arrive, followed by Mr. Stocken on the Disposal Company's D.H.9A with the 400 Liberty. M. Casale, piloting a "Spad" with a 400 Lorraine-Deitrich, arrived shortly afterwards. Just as Mr. Stocken was leaving again a terrific rain-storm swept over the aerodrome, and he took off right into this.

On Saturday evening Mr. Alan J. Cobham returned from his latest tour of Europe. Since May 18 he has visited by air Paris, Cologne, Hanover, Berlin, Vienna, Munich, Strasburg, and Calais, covering a distance of nearly 2,500 miles in a little over 24 hours' actual flying time. He made a non-stop flight of four hours between Berlin and Vienna, and flew from Munich to London in the course of a single day, being in the air for 7½ hours.

Captain Muir, of the Surrey Flying Services, has had a very busy week-end. On Saturday he left the air-station as early as 5.30 a.m. to fly with the jockey Donoghue to various training stables where he was riding trials.

By Air-Taxi "from Door to Door"

AFTER his return to Croydon Captain Muir flew down to Brockenhurst in the New Forest, and, alighting on the lawn of an hotel, set down his passenger at the very entrance-door, a distinct improvement on the old method of landing miles away from the destination and having to make a final journey by motor. After arriving back again at Croydon in the evening, Captain Muir had several joy-riders awaiting his return, and was kept busy taking these up. On Sunday the rush of joy-riders commenced soon after noon, and Captain Muir was constantly in the air until a late hour.

Messrs. Handley Page now report a very welcome increase in passengers so far as they are concerned. This last week their figures have shown a decidedly upward trend.

On Monday a Nieuport racing machine started away from Le Bourget in an attempt to improve the figures obtained hitherto in connection with the Coupe Lamblin. After reaching Brussels, however, and while on the way to Croydon, the machine force-landed at Lympne owing to petrol trouble.

Mr. McMullin, well-known as a pilot on the London-Paris route in "Airco" days, made his appearance at the aerodrome on Monday, having just returned from China, where he has been acting as instructor at flying schools. Mr. McMullin, mentioned to me the interesting fact that he had made the journey home from China right across Siberia—being, he believed, the first Englishman to make such a trip since the revolution in Russia.

On Monday evening Miss Gladys Cooper, the well-known actress, travelling by Handley Page, landed at the aerodrome from Paris after a lightning trip to the gay city, between rehearsals, in order to provide herself with new costumes.

◆ ◆ ◆ ◆

Air Command Change

THE Air Ministry announces the appointment of Air Vice-Marshal J. F. A. Higgins, C.B., D.S.O., A.F.C., from R.A.F. Depot (Inland Area), to Headquarters (Inland Area) for duty as Air Officer Commanding *vice* Air Vice-Marshal Sir J. M. Salmond, K.C.B., C.M.G., C.V.O., D.S.O., to date May 26.

THE ROYAL AIR FORCE

London Gazette, May 23, 1922

Air-Marshal Sir H. M. Trenchard, Bart., K.C.B., D.S.O., Principal Aide-de-Camp to the King, is promoted to the rank of Air Chief Marshal; April 1.

General Duties Branch

Flying Offr. W. H. Markham, Lieut., Manch. R., is granted a permanent commn., retaining his present substantive rank and seny.; Nov. 17, 1921. Lieut. J. G. Hannay, A. and S. Hrs., is granted a temp. commn. as a Flying Officer, with effect from and with seny. of May 6, on seconding for four years' duty with the R.A.F. Wing Comdr. R. G. Blomfield, D.S.O., is transfd. from half-pay, scale A, to Scale B; May 5. Flying Offr. A. D. L. Carroll is transfd. to the Reserve, Class A; May 17. Flying Offr. J. H. H. Prout relinquishes his short service commn. on account of ill health, and is permitted to retain the rank of Lieut.; May 24. Flying Offr. R. E. Dean, A.F.C., resigns his short service commn., and is granted the rank of Capt.; May 18. Pilot Offr. G. W. Selby Lowndes resigns his short service commn.; May 24. Pilot Offr. G. H. Marshall resigns his short service commn.; May 24.

Stores Branch

The temp. commn. of Flying Offr. H. F. Law is terminated on cessation of duty; May 24.

Medical Service

The following are granted short service commns. as Flying Offrs., with effect from, and with seny. of, May 8:—W. E. Barnes, C. A. Lindup. Flight Lieut. C. P. Barber is granted a short service commn., retaining his present substantive rank and seny.; May 2.

Memoranda

Lieut. A. H. A. Gem, M.C., relinquishes his temp. commn. on ceasing to be empld., and is granted the rank of Maj.; Aug. 25, 1919. The permission granted to Lieut. D. Martin to retain his rank is withdrawn on his joining the Army; April 18.

London Gazette, May 26, 1922

Wing Commander H. M. Cave-Brown-Cave, D.S.O., D.S.C., is appointed Deputy Director of Design, Air Ministry; May 29. (Vice Group Capt. E. F. Briggs, D.S.O., O.B.E.)

General Duties Branch

The following Pilot Officers on probation are confirmed in rank, with effect from the dates indicated:—K. R. Boulton, C. McL. Reid, M. V. Ward; May 1. F. Beesley, J. F. Blythell, W. T. D. Windham; May 2. T. C. Dodd; May 3. H. W. Beck; May 8. A. R. M. Brain; May 15.

Observer Officer R. Nicholson is placed on half-pay, Scale A; May 20.

BRITISH FLYING SERVICES WINDOW IN WESTMINSTER ABBEY

THE ceremony of unveiling a window in Westminster Abbey to the memory of the officers and men of the Flying Services—a beautiful piece of work by Mr. Harry Grylls—a preliminary announcement of which appeared in our last issue, took place last Friday, and was an exceedingly impressive one. Just before the ceremony a selection of music was played by the central band of the Royal Air Force, under the direction of Flying Officer J. Amers. In the presence of Mrs. Bennett, the American Ambassador, and with the heads of the Air Ministry, the Royal Air Force, and other distinguished men, Capt. the Hon. F. E. Guest, M.P., Secretary of State for Air, asked the Dean (Bishop Ryle), in the following words, to accept the window:—

"In the name of the Royal Air Force I ask the Right Reverend the Dean of Westminster to accept the custody of this memorial window, which has been erected to the glorious memory of the officers and airmen of the British Flying Services who fell during the Great War.

"This beautiful window has been erected entirely at the personal expense of Mrs. Louis Bennett of the United States of America, whose only son, Lieutenant Louis Bennett, was killed in action whilst serving with a British squadron in France."

In reply the Dean said:—

"The Dean and Chapter gratefully accept the gift which you have presented to us, and fittingly, as we think, this beautiful window, which is to commemorate the young officers and men of that distinguished force who fell in the Great War, looks down upon the grave of the Unknown Warrior. So far as lies in their power, the Dean and Chapter hope to keep it in safe custody throughout the years. We are not going to be unmindful of the great generosity of the donor, who has the assurance of the respectful sympathy, as well as of the deep gratitude, of all who are gathered within these walls today."

The Dean then dedicated the window, prayers and collects following, after which the buglers sounded the Last Post, and the ceremony concluded with the National Anthem.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN MAY 21 AND May 27, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying: Mails	No. of flights carrying: Goods	No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
						h. m.		
Croydon–Paris	63	139	29	42	59	3 7	D.H. 34 G-EBBS (2h. om.)	B. (5), Br. (1), D.H. 4 (2), D.H. 18 (3), D.H. 34 (5) G. (6), H.P. (1), Sp. (2), W (1).
Paris–Croydon	65	170	7	38	62	2 34	D.H. 34 G-EBBU (2h. om.)	B. (4), Br. (1), D.H. 4 (1), D.H. 18 (3), D.H. 34 (5), G. (8), H.P. (1), Sp. (4), W (1).
Croydon–Brussels ...	7	8	7	7	7	2 15	D.H. 18 G-EARO (2h. om.)	D.H. 18 (1), D.H. 34 (1), W. (1).
Brussels–Croydon ...	8	30	—	5	8	2 34	D.H. 18 G-EARO (2h. 26m.)	D.H. 18 (1), D.H. 34 (1), W. (1).
Croydon–Rotterdam–Amsterdam.	11	4	10	9	11	2 47		F. (7).
Amsterdam–Rotterdam–Croydon.	10	6	9	9	10	2 59		F. (7).
Totals for week ...	164	357	62	110	157			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijke Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

Incidental Flying.—Seven of the Aircraft Disposal Co.'s D.H. 9's were put through their paces at Croydon during the week, Capt. MacMillan, Capt. Muir and Capt. Stocken sharing them between them. Two of the De Havilland Co.'s D.H. 9's returned to Croydon from St. Inglevert.

At the Levée

AT the Levée held by His Majesty the King at St. James's Palace on May 29, there were present the following :—

Air Chief Marshal Sir Hugh Trenchard, Principal Air Aide-de-Camp (in attendance on H.M. the King), Commander Juan Leguia, Naval Air Attaché of Peru, Capt. the Right Hon. F. E. Guest, C.B.E., D.S.O., Secretary of State for Air, Major-General Sir Frederick Sykes, G.B.E., K.C.B., C.M.G., Squadron Leader Frederick Sowrey, D.S.O., M.C. The following were amongst those presented to the King :— Flight-Lieut. C. Hanson-Abbott, Flight-Lieut. L. J. St. G. Bayly, M.C., Flight-Lieut. F. H. Coleman, Flight-Lieut. I. Cullen, A.F.C., Squadron-Leader A. S. Glynn, the Rt. Hon. Lord Gorell, C.B.E., M.C., on his appointment as Under-Secretary of State for Air, Wing-Comdr. E. L. Gossage, D.S.O., M.C., Wing-Comdr. S. A. Hebden, O.B.E., Air Vice-Marshal J. F. A. Higgins, C.B., D.S.O., A.F.C., on appointment as Air Officer Commanding Inland Area, R.A.F., Flight-Lieut. R. M. Bankes-Jones, Squadron-Leader R. C. Lane, Flight-Lieut. A. S. G. Lee, M.C., Lieut. G. L. Lowis, A.F.C., R.N., Air-Commodore D. Munro, C.I.E., Flight-Lieut. C. H. B. Jenner-Parson, Wing-Comdr. M. Spicer, Squadron-Leader A. A. Walser, M.C., D.F.C., Squadron-Leader J. K. Wells, Flying Officer J. G. Western, M.B.E.

Parachute Research

IN reference to the question asked by Sir William Joynson-Hicks in the House on May 17, whether the rumour was true that the Research Department on Parachutes had been very largely depleted in the last month and that officers had been leaving, after making enquiries, the Secretary of State for Air has written to Sir William as follows :—

"The foundation for the rumour is that it has been necessary in the interests of economy and in order to keep within the limits of the estimates to retrench on all sides here, and it became impossible to preserve a separate department solely for the purpose of dealing with parachute research; but there is no intention whatever to abandon research work on parachutes, and with the express view of carrying it on sufficient officers with expert knowledge of the work have been retained in the experimental department, where their duties will include, *inter alia*, such research work on parachutes as may be required."

Dutch Parcels Air-Post

THE Postmaster-General announces that parcels addressed to any part of Holland may now be posted for conveyance from London to Rotterdam and Amsterdam by air and for express delivery by the Dutch Post Office. Parcels will be accepted at the Post Offices in London and in the larger provincial towns where air parcels for Paris and Brussels are already accepted. The scale of charges, inclusive of express delivery at the place of destination, will be as follows: For parcels weighing up to 3 lb., 4*s.*; 3-7 lb., 7*s.* 6*d.*; 7-11 lb., 10*s.* 6*d.* On parcels addressed "Poste Restante" the charges will be 6*d.* less.

There will be two dispatches by air each day. Parcels posted in London overnight, and, in the provinces, in time to be included in the night parcels mails to London, will normally be forwarded by air next morning and delivered in Rotterdam and Amsterdam the same evening, and in other parts of Holland by the second morning after posting. They should thus reach their destination two or three days earlier than if sent by the ordinary parcel service.

Further details of the service may be obtained on application at any accepting Post Office. The names of the accepting offices and the latest times of posting in the chief provincial towns where the acceptance of parcels for conveyance by air is authorised may be ascertained from the local Head Post Office.

French Posthumous Honours

ON the recommendation of the French Under-Secretary of State for Aeronautics, MM. Jean Mire and Gabriel Simonet, the pilot and mechanic who were killed in a collision near Beauvais on April 7, have been created Chevaliers of the Legion of Honour.

Stunting Through the Forth Bridge

IT is reported that a pilot of an aeroplane, on May 29, when trying to fly through the centre arch (1,710 ft. wide) of the Forth Bridge, Queensferry, near Edinburgh, apparently misjudged his distance and struck the water, the machine turning turtle.

The pilot was able to extricate himself and to keep afloat until picked up by a boat's crew. The machine, in a damaged condition, was towed to Hawes Pier, South Queensferry.

THE LONDON AERO-MODELS ASSOCIATION

(The Society of Model Aeronautical Engineers.)

ON Thursday last at Headquarters the discussion on "The Construction of Built-up Fuselages" proved to be very interesting, and was thoroughly enjoyed by all present. Mr. L. Grey occupied the chair.

A hearty vote of thanks was passed to Mr. F. de P. Green and Mr. L. Grey for the Cups they have kindly given to be competed for on June 3 (for particulars of Competition see last week's FLIGHT). On Thursday, June 1, a discussion will be opened on the "Construction of Wings." Members are requested to bring some wings along for demonstration purposes. On Thursday, June 8, at 7 p.m., at Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, the Association will be honoured by the presence of Dr. E. H. Hankin, M.A., Sc.D., who will read a paper on "The Possibility of Achieving Artificial Soaring Flight," which will be illustrated by lantern slides. Admittance will be by ticket only, obtainable from the Hon. Sec., A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6. Early application should be made, as accommodation is limited.

* * * *

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* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : cyl. = cylinder ; I.C. = internal combustion ; m. = motors

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(*Continued from* p. xiv.)

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SUMMER FLYING

It is in the summer when the sun blazes overhead and the hot sultry air clings to the earth's surface, when travelling by road or train is one long martyrdom of stuffiness and dust, that the man in the street longs to take to the air and to move in the cooler atmosphere of the clouds.

For the aircraft engine, too, it is a time of trial. Those troubles with the radiator and water-cooling system which have been annoying enough in the winter months become a three-fold trial as the thermometer rises. It was bad enough to have the machine out of service when aerial traffic was slow. Every day out of service now is a serious loss of revenue.

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First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
June 19	**Independent Air Force, R.A.F., Dinner, Hotel Cecil**
June 23-25	**International Competition for Touring Aeroplanes, Brussels**
June 24	**Royal Air Force Pageant, Hendon**
June 27	**Royal Aero Club 21st Anniversary Banquet**
July 29	**Aerial Derby, starting at Waddon**
Aug. 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT.

The Whitsun Race Meeting at Waddon

TWO outstanding facts were brought to light at the Third Croydon Aviation Meeting held on June 3. One is that people will not go to Waddon on a Saturday preceding Whit Monday in anything like the numbers which have been found to visit the aerodrome on a Bank Holiday or Easter Monday. The other is that, apparently, the racing interferes with the "legitimate" business of the aerodrome, and must, not unnaturally, await the arrival or departure of commercial machines. The attendance on Saturday was very far below that of Easter Monday. In fact, we should not think that the number was more than one-fourth or one-fifth of that of the latter day. Evidently people had set aside Whit Monday for their outing, and the idea of going to see the racing at Waddon on a Saturday afternoon preceding it did not appeal to them. At least that is the conclusion to which one must come, in view of the pronounced falling off in attendance. The moral is, of course, simple enough —Hold future meetings (of a minor character) on the Monday.

The second fact to which we have referred is not quite so easy to settle, although settled it will have to be if air racing is to continue. We have on several occasions questioned the desirability of holding race meetings at Waddon aerodrome, not only because the aerodrome is very far from being a good one for the purpose, but also because it is quite obvious that the regular traffic cannot, and should not, be interfered with by air racing. On Saturday the start of the first race had to be postponed on account of an incoming machine, which was reported to be approaching the aerodrome. It finally arrived, and the race started over half an hour late. Later in the day, another race was due to start, when it was reported that four machines were approaching Waddon.

Another wait followed, and in the end, after waiting more than half an hour, three machines did turn up, and the race could proceed.

In view of the fact that, by crowding the events, the organisers of the Whitsun Meeting were able to finish the last event according to schedule, the delays can in no way be ascribed to faulty organisation. As a matter of fact, the organisation was very much better than at the Easter Meeting. The machines had numbers painted on their rudders, and were thus much more easily identified. A representative of the Royal Aero Club had been told off to provide the Press with any information desired, and, generally speaking, the organisation was fairly good. A little closer *liaison* work between the various sections of the officials would do not harm, but we are not inclined to quarrel violently with the manner in which the Whitsun Meeting was handled.

With reference to the delays caused by incoming machines, these must always be expected, and we would strongly emphasise the point that the authorities did absolutely right in refusing to let the races start until these machines had arrived. At a time when we are doing our best to convince people that aviation is safe, and trying to get them to take commercial aviation seriously, it would obviously be unwise in the extreme to let a sporting event interfere with the regular working of the London–Paris air route. Already there are a great many machines flying regularly, and one must suppose that the number will increase as time goes on.

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Why Waddon at all?

The question that naturally arises, seeing that the Croydon aerodrome is bad, that it is difficult to reach for people who have to travel by train, tram, or 'bus, and that racing there is not wanted, is why use Waddon for these races? In the old days Hendon was quite good enough, and the fact remains that the gates at Hendon before the War were larger, on any ordinary Saturday, than was that at Waddon on Saturday last. Also Hendon is very much easier of access than is Waddon, the fares being approximately one-half from the centre of London, and the time taken being about one hour as compared with anything up to two hours if one travels by 'bus or tram. The aerodrome is at least as good; in fact, we think that, since the erection of the corrugated fence at Waddon, it is better, and at Hendon there is no one to interfere, or to be interfered with. Finally, when the tube is extended from Golders' Green to Hendon, as it will be fairly soon, one will be able to travel by tube direct to the aerodrome, which will mean getting there in about half an hour.

There is one reason for the retention of Waddon as the scene of the Royal Aero Club's air races, and one only, as far as we can see: A goodly proportion of the machines entered for the races are the property of, and are entered by, the Aircraft Disposal Company, to whom naturally Waddon is most handy. But we are convinced that Colonel Darby and Major Grant are far too good sportsmen to refuse to let their machines be entered just as often for races held at Hendon. The matter of flying the machines over would be nothing, and it is only in case of a breakdown that bringing the machines home would mean greater expense. The number of races in which, or as a result of which, this would be necessary would probably be quite small, and we hope that, with so many things in its favour, this point will not prevent the racing activities of the Club from being transferred to Hendon.

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The Night Flight to Paris

Another milestone in the progress of civil aviation was erected on the night between May 31 and June 1, when a twin-engined Handley Page, Rolls-Royce "Eagle" engines, made a night flight from Croydon to le Bourget, guided solely by the aerial lighthouses and by wireless. The machine was piloted by Flight-Lieut. Roche, R.A.F., who had with him as assistant pilot Flying Officer Traill, R.A.F. Two wireless operators were also on board to attend to their side of the navigation problem, and an engineer in charge of the engines. As passengers there travelled Major-General Sir Sefton Brancker, Director of Civil Aviation, Colonel Blandy, Controller of Communications, and Captain Biddlecombe, also of the Controller of Communications Branch of the Air Ministry. The machine left Croydon at 20 minutes past 10 in the evening, and arrived safely at le Bourget about 2 o'clock. Thus for the first time the entire journey between the two terminal aerodromes was made by night, and no difficulty was experienced in locating the various lighthouses at Tatsfield Hill, Surrey, Cranbrook, Kent, Lympne, Dover, Cap Grisnez, St. Inglevert, Berck, Beauvais, Abbeville and le Bourget. The weather was favourable, and it should not be concluded that night flying as a regular and commercial proposition is *immediately* possible. With improved wireless facilities and, if necessary, a few more intermediate lighthouses of minor capacity at various points over the French section of the route, there is, however, no reason why next year should not see the London–Paris services run as regularly by night as they do in the daytime. Even at present it might be possible to inaugurate a mail and parcels service to fly by night, which would add enormously to the value of the air mail, which at present offers but little advantage in point of time, owing to the times of departure, and to the delays at each end in collecting and distributing the letters sent by air mail. The flight must therefore be welcomed as one more step towards greater utility of air travel, and from that point of view it should be regarded.

◆ ◆ ◆

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THE THIRD CROYDON AVIATION RACE MEETING

Good Racing but Few Visitors

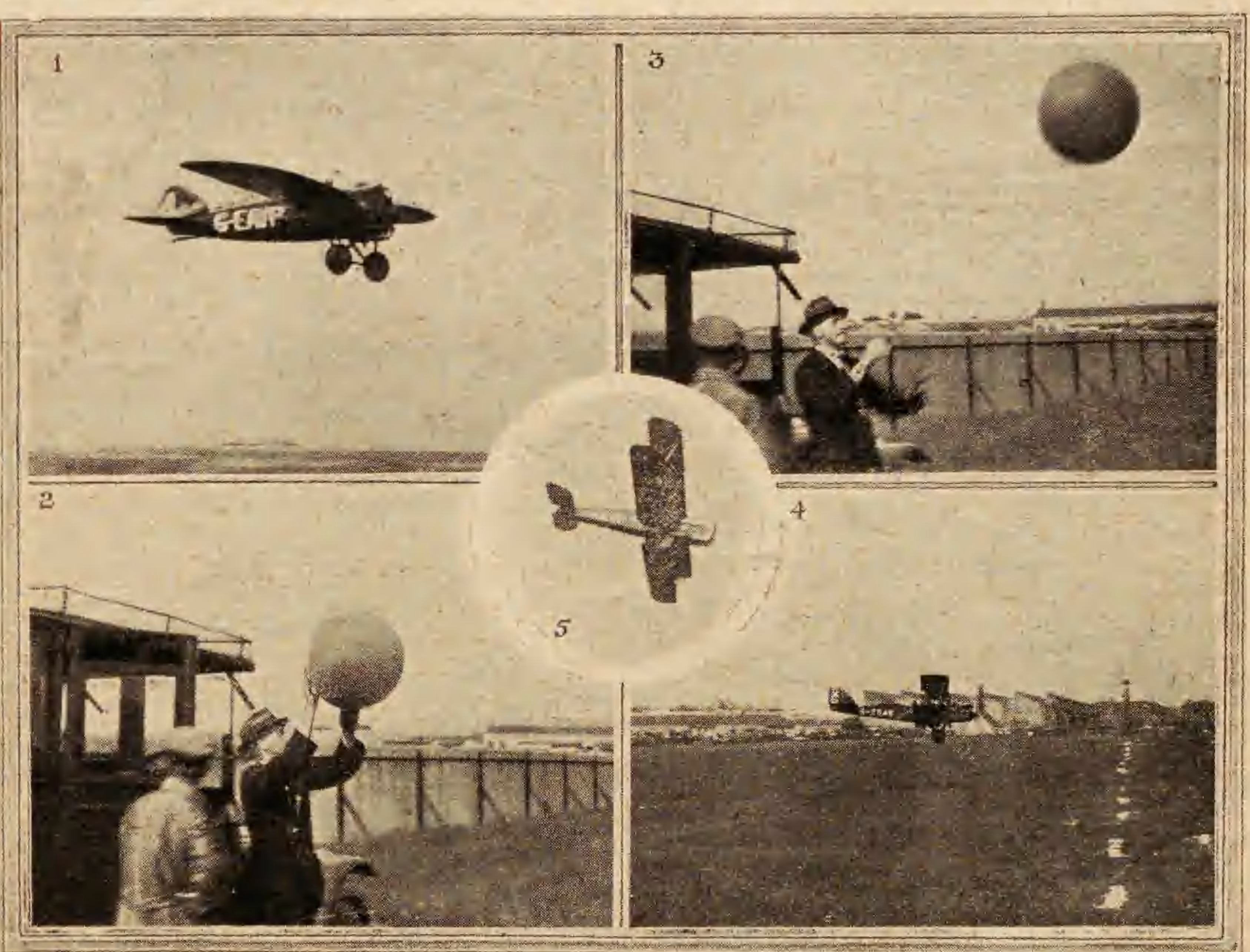
Either the somewhat threatening aspect of the weather earlier in the day kept down the numbers visiting Croydon last Saturday, on the occasion of the Royal Aero Club's Third Aviation Race Meeting, or else the multitude was reserving Bank Holiday for its day out. However, the fact remains that the attendance at Croydon was rather disappointing.

Weather conditions were, by the time the proceedings opened, ideal, a light wind blowing parallel with the enclosures, enabling the machines to start and finish to the best advantage from the spectators' point of view. Several improvements in the organisation were in evidence: numbers were prominently displayed on all the competing machines, and the officials made every effort to run off the events to time, only to be frustrated by the important but normal business of the airport. This arrival and departure of continental machines only points to the unsuitability of Croydon for these air races—but more of this, and other matters directly connected thereto, elsewhere in this issue.

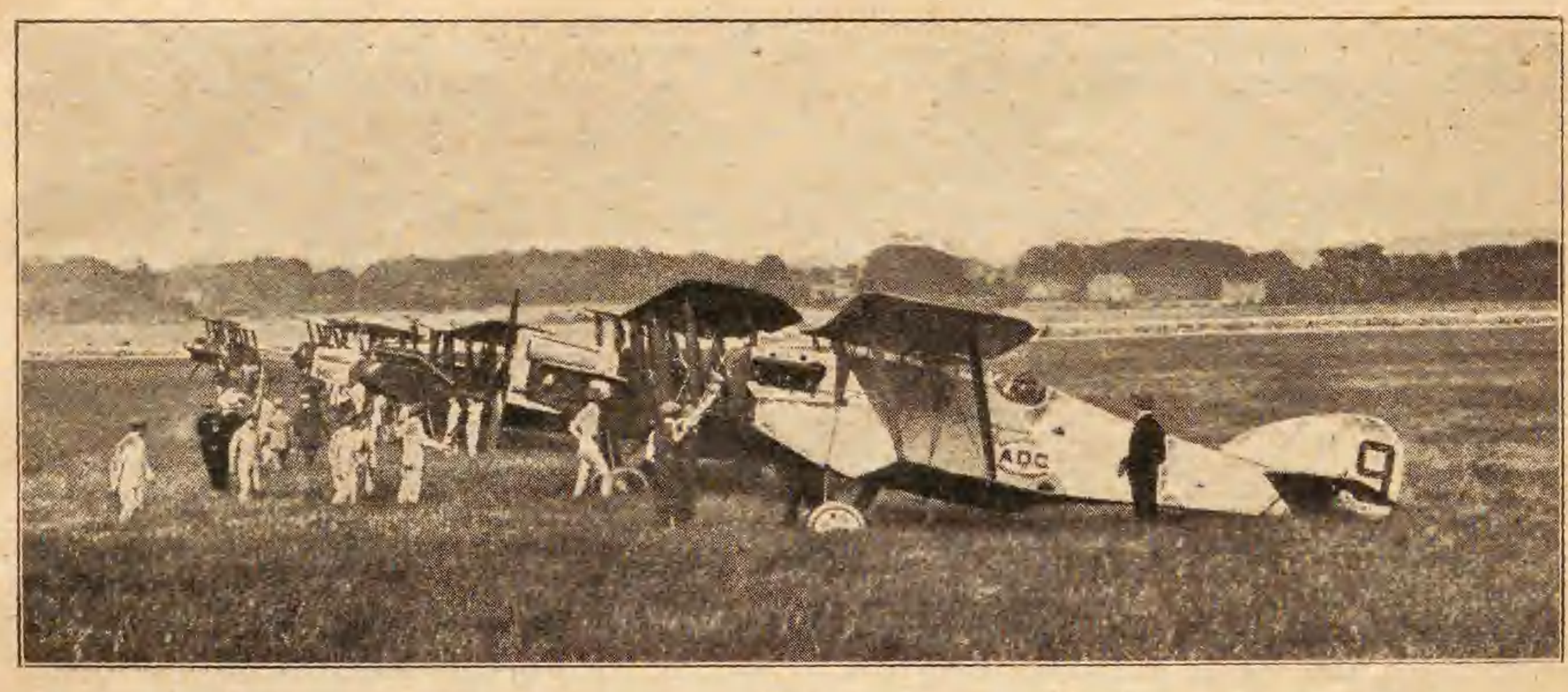
As usual, the "bookies" were very much in evidence, whilst during the afternoon a loud-speaking gramophone "broadcasted" selections from the opera intermingled with recitations on free insurance!

The first event down on the programme was the Third Club Handicap (first prize £20), for machines with a speed not exceeding 120 m.p.h., over a distance of about 16 miles, or two laps of the Waddon–Purley Downs Golf Club–Beddington Cement Works–Waddon course. It was timed to start at 3 p.m., and the machines were all lined up, ready to get away, when word came through that the Bristol 10-seater from Paris was due, and so the start was delayed for several minutes in consequence. There were five starters in this event when it did ultimately get going—the Bristol, by the way, arrived in grand style, and certainly gave an atmosphere of importance to the proceedings—and these were:—(1) Lieut.-Col. Spenser D. A. Grey on 110 h.p. Le Rhone "Avro" 504K (4 mins. 20 secs. handicap), (2) Maj. H. Petre on a similar machine (4 mins. 3 secs.), (6) F. P. Raynham on the 200 h.p. Wolseley Viper-Sopwith "Antelope" cabin 'bus with full load of air (1 min. 15 secs.), (4) C. F. Uwins on the pretty little Bristol monoplane with the 100 h.p. Bristol Lucifer (50 secs.) and (5) A. J. Cobham on the De Havilland Co.'s D.H.9B, 230 h.p. Siddeley "Puma," at scratch. Lieut.-Col. F. K. McClean had entered Bert Hinkler on a 200 h.p. Avro-Viper, but only Bert Hinkler was to be seen, looking something like Little Bo-Peep, only more so. All got away in good style, and at the end of the first lap Cobham had, it was seen, considerably shortened his distance from the limit man. It was a splendid finish, Cobham swooping in across the line only half a second in front of Spenser Grey, Raynham following some 22 secs. behind. Petre came in next, and Uwins finished up last.

After this J. H. James gave a spectacular demonstration of the capabilities of the Gloucestershire Mars I, fitted with the Napier "Lion." He flew up and down before the enclosures at a speed estimated at about 200 m.p.h., and obviously



AIR RACING AT WADDON: 1. Uwins, on the Bristol monoplane, 100 h.p. Bristol "Lucifer" engine, winning the First Whitsuntide Handicap. 2. and 3. Releasing the balloons for the balloon sniping competition, which was won by Admiral Mark Kerr. 4. Alan Cobham, on a D.H.9, Siddeley "Puma" engine, winning the First Sprint Handicap. 5. Stocken on a D.H.4, Rolls-Royce "Eagle" engine, belonging to the Aircraft Disposal Company, finishing in the First Sprint Handicap.



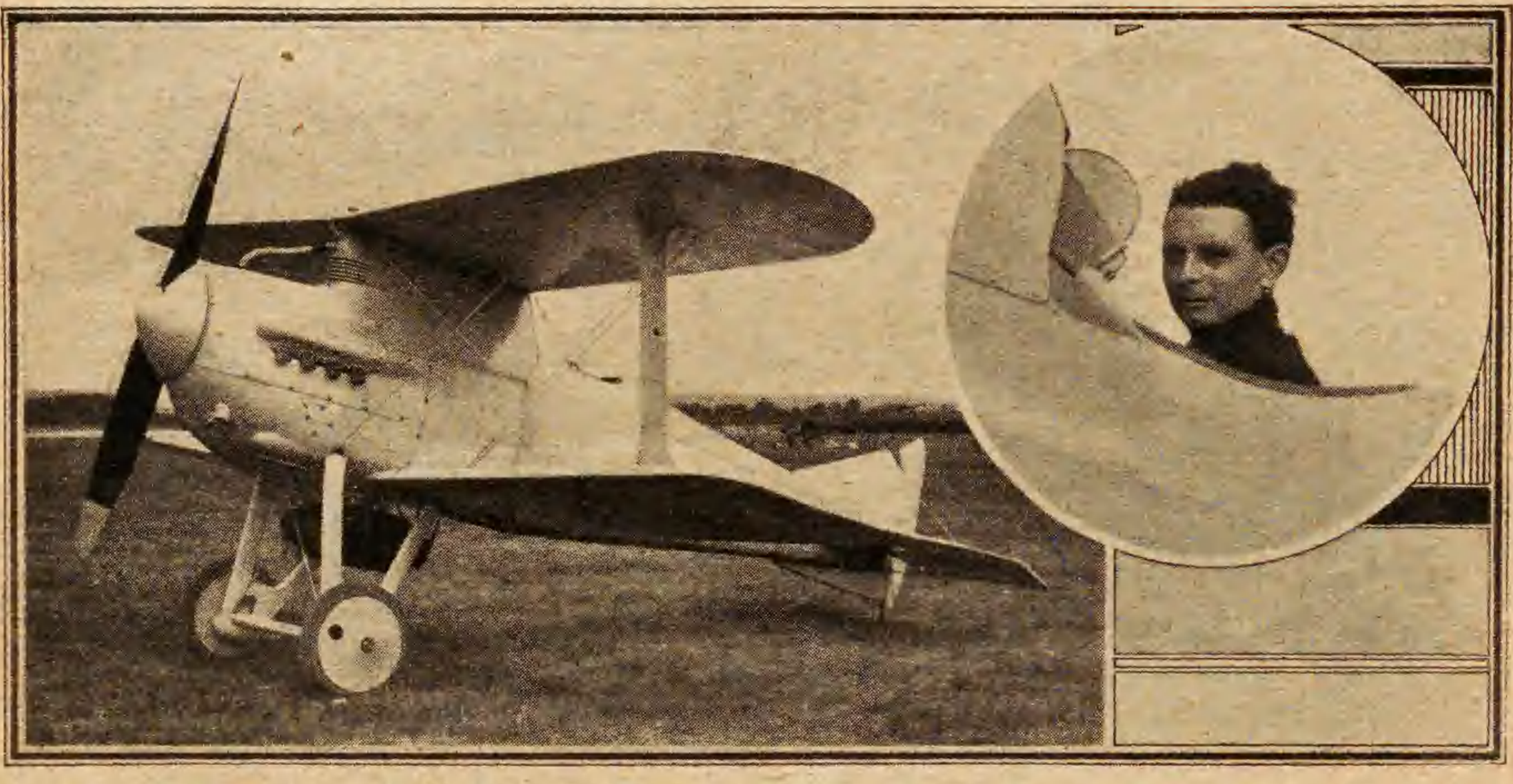
RACING AT WADDON : Machines lined up for the start of First Whitsuntide Handicap.

impressed the spectators. He also executed sundry sharply-banked turns, zooms, etc., and on one occasion flew past the enclosure, with the "Lion" muzzled, at what looked, in comparison, a remarkably low speed. As usual, his landing—on by no means ideal ground—was perfect.

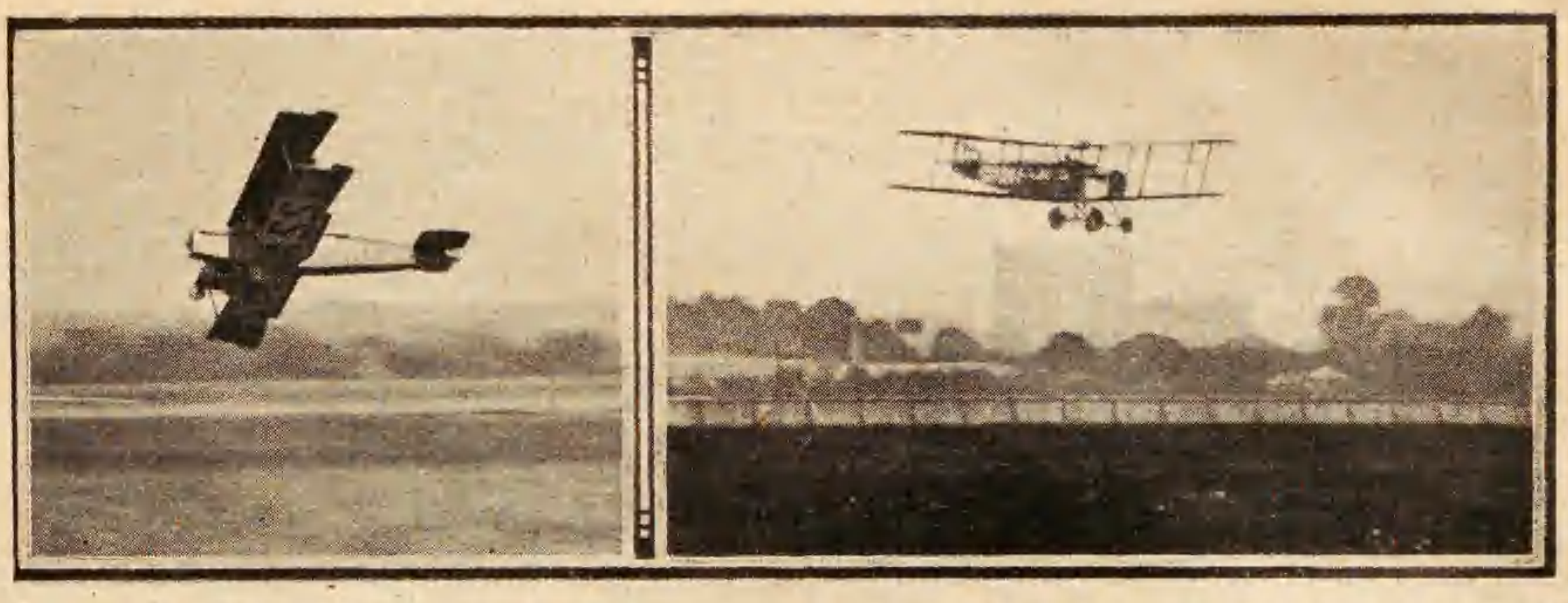
The next event was the First Sprint Handicap (first prize £20), over one lap of the same course. In this there were four starters, as follows:—(5) A. J. Cobham on the D.H.9B (1 min. 15 secs.), (7) S. H. Hayns on a 200 h.p. Wolseley "Viper"—S.E.5A (39 secs.), R. H. Stocken on a 350 h.p. Rolls-Royce D.H.9A (26 secs.) and E. L. Foot on a 300 h.p. Hispano-Suiza Martinsyde F.4 at scratch. The last three were all entered by Maj. Grant, of the Aircraft Disposal Co. In this event Cobham maintained the lead throughout, Hayns following fairly close behind. Foot came along next, zooming skywards over the line, and then Stocken.

After this the Balloon-sniping Competition was held, in which, after an Avro with a sniper as passenger had received a three-minute start, three balloons were released at two-minute intervals, and these had to be destroyed in the quickest time within 10 minutes. Admiral Mark Kerr, piloted by Raynham, the first competitor, did not waste much time in getting to work, and brought down the first balloon 3 mins. 10 secs. after taking off! He picked off the two remaining balloons almost as soon as they were released, thus securing a "possible." Two other competitors had a turn, but had difficulty, it appeared, in locating the balloons before it was too late, and neither secured a single hit.

By this time we were only ten minutes behind the hour fixed for the next event, having run off the previous events very smartly indeed; it was thus somewhat disappointing to learn that four Continental machines were due in at any moment, necessitating another delay in starting the next race. However, the opportunity was taken to make a parachute drop during the wait. Our old friend, Mr. Newall, was down on the programme for this event, but having outgrown the ordinary size Guardian-Angel, which lands him just a little faster than he likes, and as his larger-size G.A. was packed up ready for a drop up north on Bank holiday, his "understudy," Mr. R. G. Read, made the drop



THE GLOUCESTERSHIRE "MARS I," 450 H.P. NAPIER "LION," AT WADDON : Mr. James's flying on this machine was greatly appreciated, and coming down wind the machine must have been doing about 210 m.p.h. A remarkable feature of the "Mars I" is its slow landing speed, which is actually no higher than that of some commercial passenger aeroplanes in regular use on the London-Paris service. Yet its maximum speed is in the neighbourhood of 195 m.p.h. in still air, and its climb is simply marvellous.



RACING AT WADDON : On the left, F. P. Raynham is starting for the Surrey Open Handicap on his Sopwith "Antelope." On the right he is seen crossing the finishing line as winner.

instead. This was successfully and gracefully accomplished from an Avro, piloted by Muir, from an altitude of about 1,000 ft.

Eventually the start was made for the First Whitsuntide Handicap (first prize £50, second £20) over three laps of the course, a distance of about 24 miles. There were six starters for this event, viz.: (6) F. P. Raynham on the Sopwith "Antelope" (4 mins. 45 secs.), (4) C. F. Uwins on the Bristol monoplane (3 mins. 44 secs.), (5) A. J. Cobham on the D.H.9B (1 min. 25 secs.), (8) R. H. Stocken on the D.H.9A (57 secs.), (9) E. L. Foot on the Martinsyde F.4 (17 secs.) and (7) S. H. Hayns on the S.E.5A (scratch). At the end of the first lap all the machines crossed the line in the same order in which they started, but on the second lap Stocken and Foot both overhauled Cobham. At the finish Uwins obtained first place from Raynham, who came in second, whilst Stocken and Foot changed positions and Hayns got in front of Cobham, who came in last. Before landing Uwins executed one or two joyful loops and rolls in excellent style.

After this James gave another short but sweet exhibition on the Mars I, and immediately after Foot ascended on the Martinsyde and gave us a really beautiful selection of "stunts."

A parachute descent by Mr. R. G. Read was one of the "items" on the Waddon Whitsun Meeting Programme. Our photos. show : Left, the descent ; right, Major-General Sir Sefton Brancker, Director of Civil Aviation, congratulating Mr. Read. Behind General Brancker is Capt. Muir, who piloted the machine from which the parachute descent was made.

By much hustling the last event of the day was started very nearly to time; this was the Surrey Open Handicap (first prize £30, second £10) over two laps of the course—16 miles. This produced eight starters and a splendid finish. Some confusion was caused at the early stage of the race as regards the relative position of the competitors, as the last starters were met by the first machines returning from the first turning-point.

The starters were as follows:—(1) Spenser Grey on the Avro 504K and (2) E. H. Alliott on a similar machine, both having the same handicap allowance (6 mins. 4 secs.), (6) Raynham on the Sopwith (2 mins. 24 secs.), (4) Uwins on the Bristol monoplane (1 min. 48 secs.), (5) Cobham on the D.H.9B (1 min. 15 secs.), (8) Stocken on the D.H.9A (39 secs.), (7) Hayns on the S.E.5A (2 secs.) and Foot on the Martinsyde at scratch. Although Alliott lost a few seconds in getting away, he soon picked up, and managed to get ahead of Grey at the end of the first lap. The others finished the first lap in their relative positions except for Hayns, who was last. At the finish Raynham gradually overhauled Alliott, and passed him several lengths ahead on the line. Stocken came in next, followed by Foot, Hayns, Cobham, Grey and Uwins respectively.

A NEW LOW-POWER GERMAN RADIAL AIR-COOLED AERO ENGINE

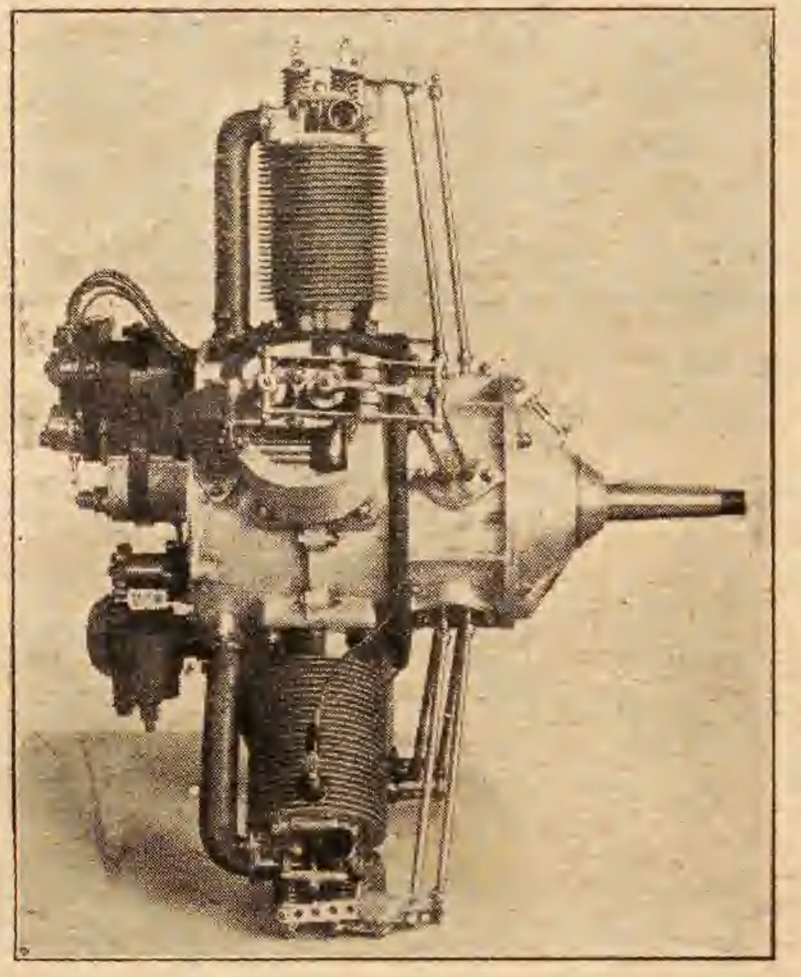
The 60 H.P. Five-Cylinder Siemens-Halske

LIMITED as Germany is to the use of engines not exceeding 60 h.p. for single-seater civilian aeroplanes, there is little doubt that the next two years, after which time the position is to be reconsidered, will see considerable progress made in the efficiency of German aircraft. The conditions imposed will force Germany, if she wishes to fly at all, to make such improvements in her aircraft as will enable it to do the work required with the limited power permitted. Thus, the restrictions may very easily turn out ultimately to be blessings in disguise. While other nations continue, in the main, to rely on power and more power, for increase in performance, load carrying or whatever purpose the particular design is being used for, Germany is prevented from taking this short cut, and will, of necessity, have to effect the necessary improvements by more efficient structural and aerodynamical design.

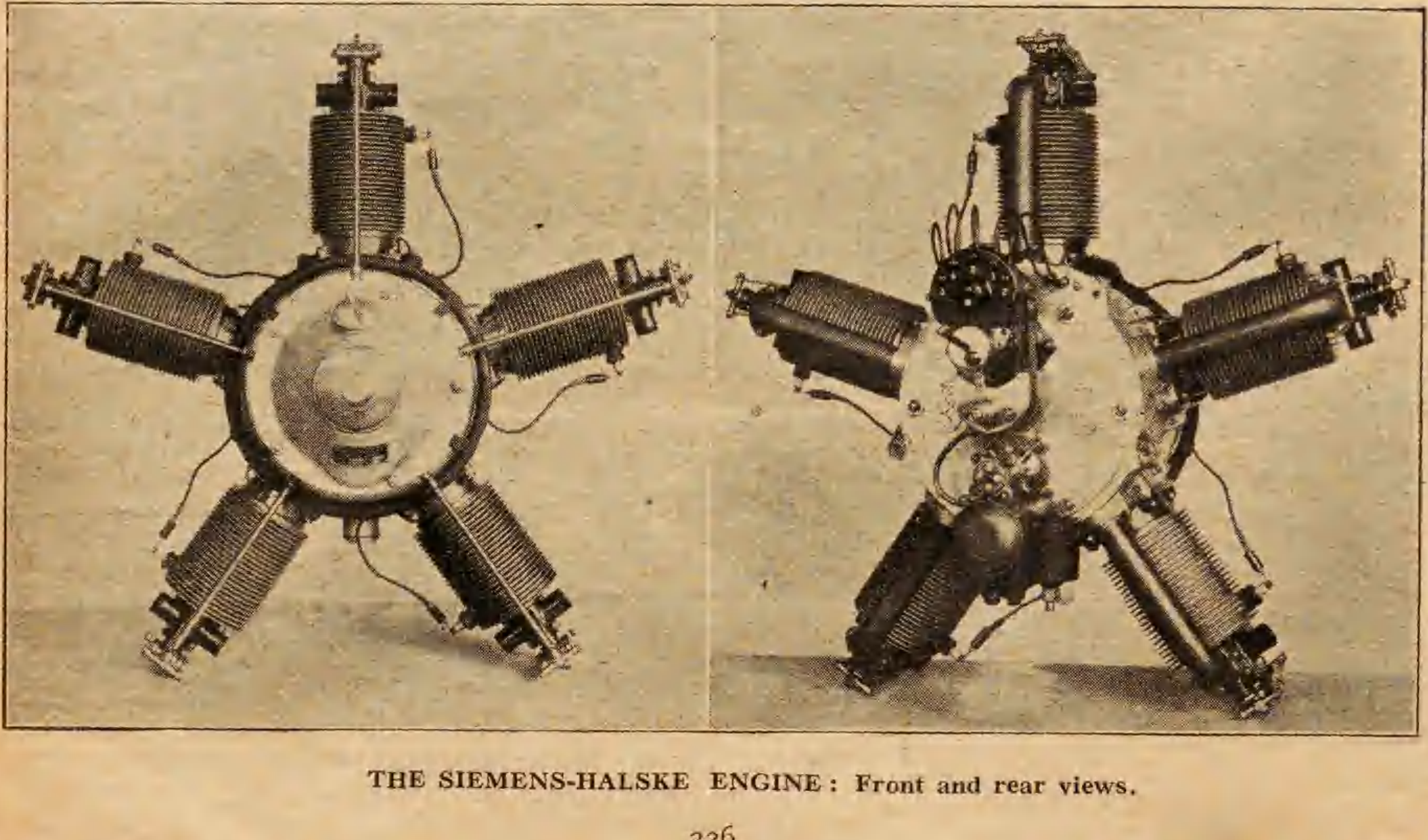
Whether in anticipation of a limit of 60 h.p. for single-seaters we cannot say, but the fact remains that, just about the time when the latest regulations came into force (May 5) the Siemens-Halske firm, of Siemensstadt, near Berlin, completed and tested a small radial air-cooled five-cylindered engine of approximately 60 h.p. In view of the fact that, up to the present, Germany has not produced many engines of this size, it may safely be assumed that the new Siemens-Halske engine is likely to become popular in Germany in the near future. The new engine has, we understand, been thoroughly tested, and is said to have given good results. We regret that no figures of weight, revolutions, consumption, etc., are available at the moment, but the following general description may not be without interest.

As will be seen from the accompanying photographs, the Siemens-Halske engine, with but five cylinders, is of very clean appearance, and should not, with suitable cowling, offer a great deal of air resistance. It is of the four-stroke type, with two valves to each cylinder. The bore is 100 mm., and the stroke 120 mm. The cylinders are of steel, with aluminium jackets having fins machined on them for cooling. The pistons are also of aluminium, or aluminium alloy.

The aluminium crank-case is in two halves, and the flanged cylinder bases are bolted to it with four bolts each. As already mentioned, there are but two valves per cylinder. The inlet valve is operated by double rockers actuated by a push rod from the cam gear on the front of the engine. The exhaust valve is operated, also *via* push rods, by a single rocker arm, placed between the two rockers of the inlet valve. All rocker arms are carried in ball bearings. The valve stem guide of the exhaust valve is situated inside a tubular T-piece, so that the exhaust gases escape through two openings. We believe that the manufacturers have designed a standard exhaust ring collector for this engine, so that from each exhaust valve cage, two short L-pipes run to the exhaust



THE SIEMENS-HALSKE ENGINE : Side view.



THE SIEMENS-HALSKE ENGINE : Front and rear views.

ring, which is placed *behind* the cylinders, and from which a single exhaust pipe projects upward in the typical German style. In the accompanying photographs this exhaust collector ring is not shown.

The rear portion of the crank-case contains the induction chamber, from which the various inlet valves are supplied through straight induction pipes bolted to the crank-case, and to the inlet valve cages. In the front portion of the crank-case are housed the cam discs and the thrust race. Needless to say, the camshaft, which is in two parts, runs in ball bearings. The high tension leads to the sparking plugs are housed in a ring on the front of the engine, and a single pipe carries all the leads from the magneto, which is mounted on a platform on the rear cover of the engine. The oil pump, which forces oil through the hollow crankshaft to the big ends, is also mounted on the rear cover of the crankcase. In its present form, the engine is provided with but one magneto, and there is only one sparking plug per cylinder, but we understand that, if desired, the manufacturers can supply the engine with complete dual ignition.

We hope that later some particulars relating to weight, r.p.m., fuel and oil consumption, compression ratio, etc., may become available, when we shall hope to publish them in FLIGHT.

AVIATION IN AUSTRALIA

SOME important information is contained in a report issued by the Controller of Civil Aviation (Air Ministry), giving a *résumé* of Commercial Aviation activities in the British Colonies and Dominions, and foreign countries. Space will not permit the publication of this report in full, but the following extracts in reference to aviation in Australia are of special interest.

Geraldton-Derby Service.—Further details are given of the fatal accident that occurred at the opening of the Geraldton-Derby service on December 5 last, and the abandonment of the service. The reason given by the contractor of the service for its discontinuation was that the Commonwealth Government had not fulfilled its part of the contract, in that the landing ground at Geraldton—which had been prepared by the R.A.A.F.—was not suitable for his machines to operate from. As the result of an inspection of the route by the Controller of Civil Aviation, accompanied by the Superintendent of Flying Operations, it was decided that the objections of the contracting company were admissible, and a basis of agreement for the resumption of the service submitted by the company was later provisionally accepted by the Controller. In this it was provided that an alternative aerodrome site at Geraldton be acquired and prepared by the Department, and an interior service, weekly in each direction, between Perth and Roebourne (about 1,000 miles) be immediately resumed—the full service between Geraldton and Derby being resumed as soon as the new aerodrome was completed.

The Perth-Roebourne Service started on February 21 last, and it was anticipated that the full service would be in operation by March 10. As a result of the inspection of this route by the Controller of Civil Aviation, additional emergency landing grounds between Northampton and Hamelin Pool were considered desirable, which, together with those already prepared, should render Australia's first subsidised aerial route (some 1,200 miles) an exceedingly safe one.

Brisbane-Sydney and Sydney-Adelaide Services.—Contracts for services between Brisbane and Sydney, and Sydney and Adelaide have been granted to Mr. F. L. Roberts and the Larkin Aircraft Supply Co., Ltd., respectively. The former has applied for permission to assign his rights to the Larkin company, who, in turn, seek to assign both contracts to a new company—the Australian Aerial Mail Service, Ltd. These services will be inaugurated early in July, and will be maintained once weekly in each direction over a period of one year, with a subsidy of £11,500 for the Sydney-Brisbane route, and £17,500 for the Sydney-Adelaide route. The machines to be used will be three Handasyde monoplanes (pilot and six passengers); three D.H. 4 biplanes (pilot and two passengers); and one Sopwith "Wallaby" (pilot and five passengers), all of which are fitted with 360 h.p. Rolls-Royce Eagle VIII engines. Two spare engines, spares for engines and spares for machines are also provided for.

The survey and preparation of the Sydney-Adelaide route has been completed, with the exception of Adelaide, whilst it is expected to have the other route completed by July.

Charleville-Cloncurry Service.—Particulars of this service were given in FLIGHT for May 18 last, but the following additional information may be of interest. The service over this route will link up the Western terminals of the three main East-West railways, viz., Brisbane-Charleville; Rockhampton-Longreach, and Townsville-Cloncurry. The country traversed by this route is very well suited for flying, and the local governing authorities of most of the towns selected as regular stopping places have shown their practical interest in civil aviation by taking steps to establish aerodromes under their own control.

In connection with aerial reconnaissance carried out by the Controller of Civil Aviation (Col. Brinsmead), also referred to in the above-mentioned issue of FLIGHT, the following technical observations may be of interest: Whilst the machine (Bristol "Tourer") and engine (Siddeley) behaved quite well throughout the trip, a number of modifications to adapt the machine to local conditions were manifest. The fitting of an auxiliary radiator is the most important of these—shade temperatures of 110 deg. F. are common on the North-West coast. Metal-tipped propellers appear to be essential, as the low scrub, stones and sand gave much trouble with the unprotected propeller fitted. A four-bladed propeller with as small a diameter as possible would probably give the least trouble. Timber shrinkage was very noticeable, and necessitated a number of adjustments to bracing wires, and minor trouble was experienced with tyres, tubes and rubber shock-absorbers.

In conclusion, it may be mentioned that the total appropriation for Civil Aviation (in Australia) for 1921-1922 is £98,010, and the provision for "Estimated Savings" is £35,000, giving a total amount available for Expenditure of £63,010.

IN PARLIAMENT

Commercial Aviation

MR. W. GREENWOOD, on May 25, asked the Secretary of State for Air the amount of money we were spending to extend commercial aviation in this country, and the comparison such expenditure bears to that in Germany and Russia?

Capt. Guest: The estimated expenditure on civil aviation during the current financial year on the basis of the organisation forecasted when presenting the Estimates in £325,000. In addition, however, services on behalf of civil aviation are rendered by the Department of Supply and Research, the Controllerate of Communications, and the Meteorological Office. The German Government is giving direct assistance to the air transport industry by the payment of a subsidy of 10 marks per kilometre flown for distances under 300 kiloms., and 11 marks for distances above 300 kiloms. In addition, in 1921, a sum of 10,000,000 marks was devoted to the relief of aircraft constructional companies. The amounts set aside as subsidies for air transport in 1920, 1921 and 1922 are reported to be as follows:—

1920, 12,000,000 marks.
1921, 11,000,000 marks (and 1,000,000 marks for meteorology).
1922, 40,000,000 marks.

The Russian Government is understood to have entrusted recently the development of air lines in Russia and between Russia and Germany to a German concern, the Aero-Union Aktien Gesellschaft, with which it has co-operated in the financing of a Russian-German air transport company.

Sir H. Brittain: Can the right hon. gentleman give us any idea of the number of commercial aeroplanes operating in England as a result of that expenditure as compared with Germany?

Capt. Guest: If my hon. friend will put a question down I will give him all the information I can.

Mr. L'Estrange Malone: Is there not a great deal of money being spent by the Admiralty which might more profitably be spent on civil aviation?

British and German Commercial Aeroplanes

SIR H. BRITTAIN, on May 30, asked the Secretary of State for Air whether he is able to give the approximate number of commercial British 'planes in actual service in this country as compared with the number of German 'planes operating in Germany?

Capt. Guest: It is not possible to draw any useful comparison between the total number of British commercial aeroplanes in operation in this country and the number of German 'planes operating in Germany, as the new Regulations (which permit of the manufacture of civil machines under certain conditions) only came into force on May 5, 1922. The total number of machines available for civil air transport in Germany is 225, including 100 old ex-military machines (which are reported to be in bad condition). It is probable, however, that the number of machines operating in Germany will increase as a result of the new Regulations coming into force. The total number of British aircraft holding Certificates of Airworthiness in Great Britain is 115. This number includes all machines used for "joy-riding" purposes and for cross-country flights with passengers or goods. The number of commercial aircraft actually in service on the London-Paris and London-Brussels routes is 18, but, in addition, occasional trips to the Continent are made with other machines.

Air Power

SIR H. BRITTAIN asked which country now possesses the most powerfully-equipped air force; and whether any country has today a greater ratio than the two-Power standard formerly held by Great Britain on the seas?

Capt. Guest: The comparative assessment of air strength for which my hon. friend asks is most difficult to calculate, depending, as it does, not only on numbers of squadrons, machines and personnel, but on relative efficiency of armament and fighting power. The general position was explained in my speech of March 21 last on the Air Estimates. I do not think it desirable or possible to compare air strength on the basis of a one-Power or two-Power standard, but the subject is too complicated to be dealt with usefully by way of question and answer.

NOTICES TO AIRMEN

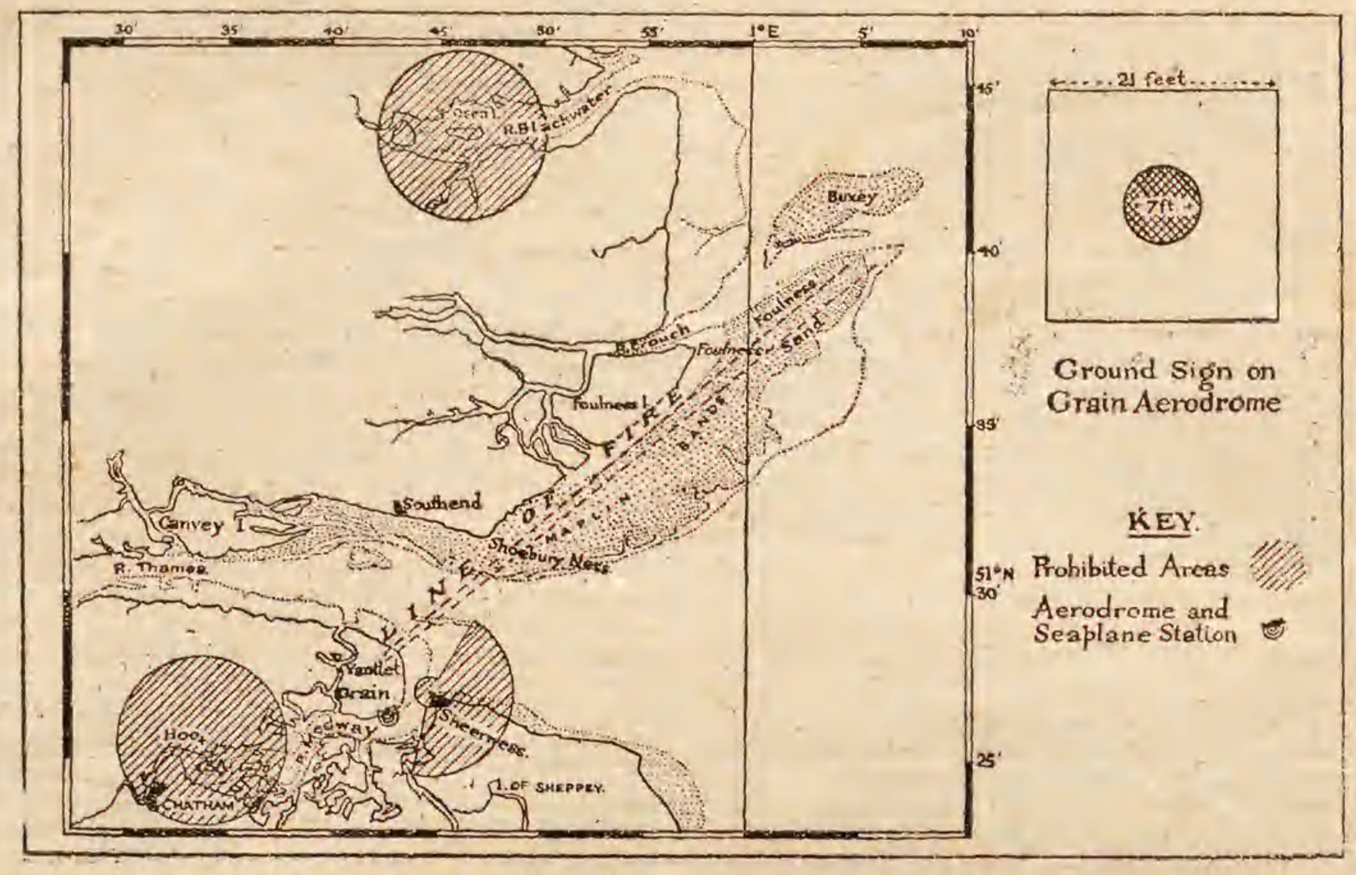
Thames Estuary—Danger Area

IT is notified: 1. *Yantlet Artillery Range.*—Artillery practice, which takes place at irregular times on the Yantlet range, forms a danger to aircraft over an area extending across the mouth of the Thames from Yantlet (Lat. 51° 28′ N., Long. 0° 42′ E., approx.), about 2 miles N.W. of Grain Aerodrome, to the N.E. extremity of Foulness Sand (Lat. 51° 40′ N., Long. 1° 5′ E., approx.), as shown on the appended sketch.

Pilots should, therefore, so far as possible, avoid this part of the Thames Estuary.

2. *Warning Signal at Grain.*—When firing is in progress, a ground signal will be displayed on Grain Aerodrome, 1½ miles W. of Sheerness (Lat. 51° 26′ N., Long. 0° 43′ E.) This signal consists of a white square, each side measuring 21 ft., having in the centre a red disc, 7 ft. in diameter, as shown on the sketch.

(No. 51 of 1922.)



Aerodromes for Civil Use—Amendments

NOTICE to Airmen No. 35 of 1922 (Consolidated List of Aerodromes) is amended as follows:—*List C. Licensed Civil Aerodromes.*

(*a*) *Civil Aerodromes licensed for all types:*
Ensbury Park, Bournemouth, should be deleted.

(*b*) *Civil Aerodromes licensed as "suitable for Avro 504 K and similar types of aircraft only":*
Gwaun-cae-Gurwen should be added.

(No. 52 of 1922.)

* * *

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN MAY 28 AND JUNE 3, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	63	162	25	44	62	2 44	D.H. 34 G-EBBS (2h. 4m.)	B. (4), Br. (1), D.H. 4 (1), D.H. 18 (2), D.H. 34 (3), G. (8), H.P. (1), H.P.W. 8B (1), Sp. (4), V. (1), W, (1).
Paris–Croydon	63	173	9	35	61	2 36	D.H. 34 G-EBBS (2h. 0m.)	B. (4), Br. (1), D.H. 4 (1), D.H. 9 (1), D.H. 18 (3), D.H. 34 (3), G. (7), H.P. (1), H.P.W, 8B (1), Sp. (3). V, (1), W. (1).
Croydon–Brussels ...	5	9	4	4	5	2 37	D.H. 34 G-EBBT (2h. 20m.)	D.H. 4 (1), D.H. 18 (1), D.H. 34 (2), W. (1).
Brussels–Croydon ...	5	10	—	3	4	2 24	D.H. 34 G-EBBR (2h. 7m.)	D.H. 4 (1), D.H. 18 (1), D.H. 34 (2), W. (1).
Croydon–Rotterdam–Amsterdam.	12	13	12	11	12	2 45	Fokker H-NABQ (2h. 21m.)§	F. (7).
Amsterdam–Rotterdam–Croydon.	12	12	12	10	12	2 21	Fokker H-NABS (2h. 19m.)§	F. (6).
Totals for week ..	160	379	62	107	156			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys. § Rotterdam.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport. P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westlan

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Incidental Flying.—Capt. Barnard and Capt. Stocken were out testing sundry machines for the Aircraft Disposal Co., including an Avro, D.H 9, and Martinsyde. Mr. Hayns was also out on an S.E. 5a.

LONDON TERMINAL AERODROME

Monday evening, June 5.

THERE was a welcome influx of passengers during the week-end, but on the whole there is still a shortage on last year's totals. Airway managements are beginning to express the opinion that the recent accidents are responsible for the dearth of passengers. The situation, at any rate, is now becoming acute. Several air-line employés, engaged with the idea that they would be needed in order to cope with a heavy traffic, have been discharged. There is now a movement on foot to induce the Air Ministry to return to the old subsidy of so much a completed trip instead of, as at present, so much on actual load carried. It is to be hoped, however, that the Air Ministry will refuse to comply with this suggestion, as it would stifle all initiative and lead to wasteful extravagance and inefficiency.

A fatal accident, in which three lives were lost, occurred on Saturday. A "Spad," owned by the Messageries Aériennes, and carrying two passengers, nose-dived into the Channel when about three miles off Folkestone, hitting the water with such force that the pilot and his two passengers were killed instantly. The passengers had booked by Daimler Airways, but, owing to the fact that the one remaining D.H.34 of this firm was temporarily unavailable, they were transferred to the "Spad." The pilot, M. Morin, has had considerable experience on the cross-Channel service. It is thought by airway experts at the air-station that he was overcome by some sudden indisposition, probably due to the heat, and that, robbed of his controlling hand, the machine dived headlong into the sea. One of the passengers, Dr. Gordon Ley, was well known on the airways, having been a constant aeroplane traveller since "Airco" days.

Awkward Forced Landing on the Brussels "Airway"

MR. BRADLY, of the Instone Air Line, had an unpleasant experience in Belgium on Monday last. Soon after leaving Brussels, piloting a D.H.18, one of the connecting-rods of the engine broke, and tore through the crank-case. Mr. Bradly glided down to alight, the district being particularly bad for forced-landing, and, choosing the largest field he could see, managed to land safely in spite of numerous barbed-wire fences which it was impossible for him to see from the air. Before the machine actually pulled up, however, it struck a wooden rubbing-post, which had been erected in the middle of the field for cattle to rub against. The collision so damaged the machine that it had to be dismantled and carted to Brussels for repairs and re-erection.

On Wednesday night Maj.-General Sir W. S. Brancker made the first commercial night flight to Paris in a Service Handley Page 0-400, piloted by Flight-Lieut. Roach. Col. Blandy, Director of Communications at the Air Ministry, and Capt. Biddlecombe accompanied Gen. Brancker. Practically all the illuminations at the aerodrome were working, and one searchlight was throwing its beam into wind in order to provide an illuminated path down which the machine could get off. Lieut. Roach, however, disdained such aids to night-flying, and, without troubling to get on to the illuminated section of the aerodrome, took straight off. The visibility was quite good throughout the journey, and each light along the route was picked up long before the one in the immediate vicinity of the machine was lost sight of. The journey to Paris was, in fact, made with as much ease as if it had been daylight. Maj.-Gen. Brancker returned to London by boat and train on Thursday, and the machine flew back during the day.

New Fokker Monoplane of Unusual Design

I UNDERSTAND that Fokker is building a new 12-passenger monoplane, in which he is incorporating the novel idea of additional wing area for extra loads. The machine is normally a monoplane, but when it is required to carry an extra heavy load this can be accomplished by adding two small and easily-fixed wings to the machine, turning it into a sort of hybrid "monoplane-biplane." I hear, furthermore, that in future all monoplanes built at the Fokker works are to have the wing raised above the *fuselage* with a gap between the top of the *fuselage* and the bottom of the wing. This, it is stated, gives increased lift, in addition to allowing the pilot a good view to the rear. The K.L.M. had a record weight of air-parcels-post on Saturday, the total being 95 lbs. This seems to show that on this route, at any rate, there is some chance of the air-parcels-post providing really satisfactory loads in the not-too-distant future.

Handley Page Transport have been carrying quite good loads during the week. They have now obtained delivery of their third W.8B.

Famous French "Ace" at Croydon

CAPT. PINSARD, a very well-known French flying "ace," arrived at the aerodrome on Wednesday during a Paris–Brussels–London–Paris flight in connection with the Lamblin Cup. He succeeded in beating all previous competitors, accomplishing the round trip of, roughly, 600 miles (with half-hour stops at Brussels and Croydon) in 5 hrs. 45 mins.

The Daimler Airways still continue to run two services in each direction daily with one machine, and the regularity of this service, considering the difficulties, is really remarkable. They are still suffering, however, from a lack of passengers, and I understand that their idea of a revised subsidy is that a guarantee of a 50 per cent. load should be given. This would mean that, in order to make the service pay, machines and all other items in the service would have to be run efficiently, and waste of every description eliminated.

First Vickers "Vulcan" on Paris Service

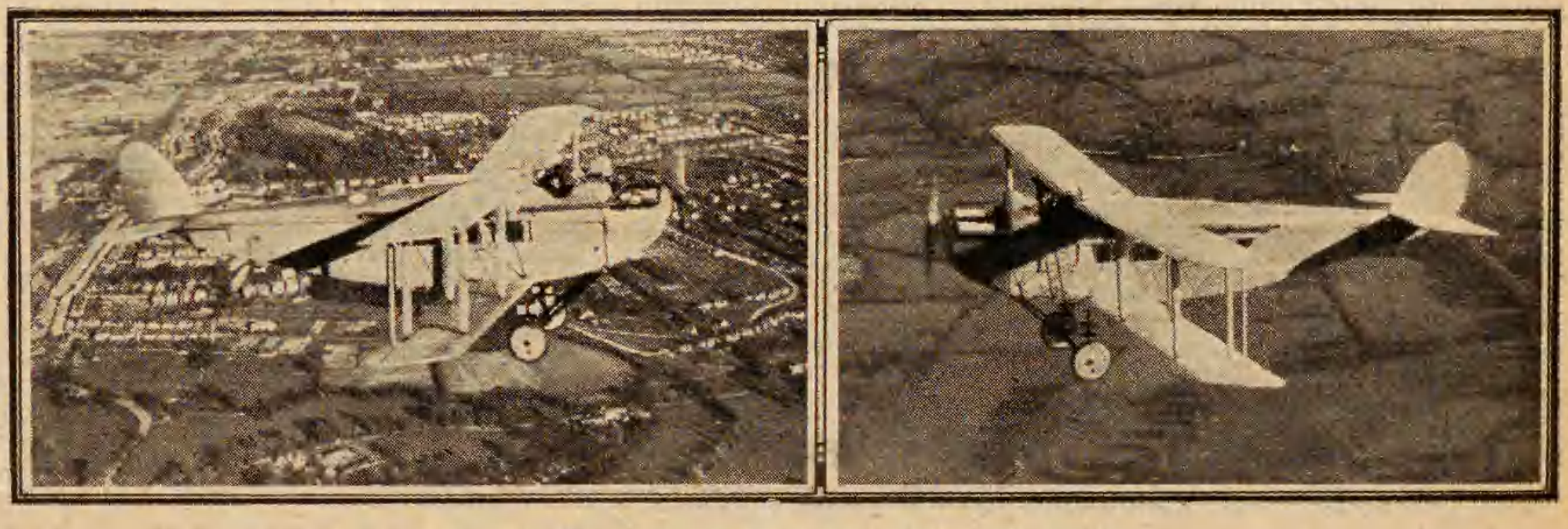
THE Instone Air Line have now secured delivery of the first Vickers "Vulcan." Capt. Barnard flew it to Paris with six passengers on Thursday, and the machine got off very well. The most remarkable feature of the machine, however, is its slow landing speed, which delights all pilots at the aerodrome.

Traffic on the French air-lines consists, in the main, of goods, and there is no gainsaying the fact that what goods-traffic there is goes by the foreign lines. Goods traffic on the British lines forms a very insignificant proportion of the general total.

On Whit Monday air passenger figures were, generally speaking, disappointing, although the weather was so fine.

During the week-end, however, Capt. Muir was busy with joy-riders, while it was noticeable that there were large numbers of the public in the free enclosure to watch this joy-riding, and also the departures and arrivals of the continental "air expresses."

Mr. MacIntosh was a busy man on Monday, having two tasks on hand at the same time. One of these was to test the new Handley Page W.8B; the other was to play in a cricket match for Wallington, whose field is just at the bottom of Plough Lane, near the aerodrome. Mr. MacIntosh was, one might say, in the air one minute and the next engaged arduously in cricket. It is a tribute to his energy that he carried out both efforts successfully.

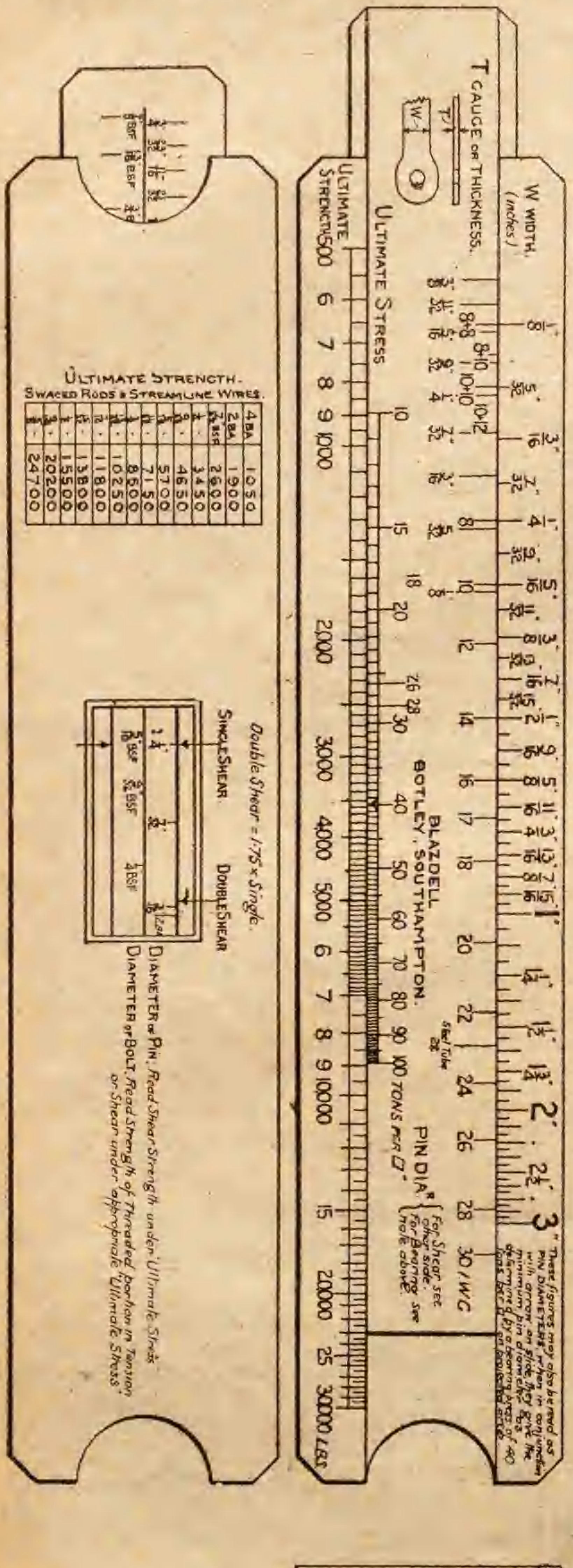


IN FULL FLIGHT: Two views of the D.H.34, 450 Napier "Lion" engine.

A STRENGTH CALCULATOR FOR AEROPLANE DETAILS

A Handy Slide Rule for the D.O.

[ALTHOUGH there is in modern design a tendency towards a reduction, or the total suppression, of bracing wires, with their lugs, bolts, pins, etc., we shall probably still be using wires, streamline or otherwise, in aircraft for a number of years to come. This means a considerable number of calculations of sizes for wiring lugs, bolts, etc., and any instrument which enables the draughtsman to make these calculations rapidly and accurately is entitled to consideration. Such an instrument is the slide rule calculator invented by Mr. Charles Blazdell, who has very kindly sent us the following description of his instrument.—ED.]


ULTIMATE STRENGTH.
SWAGED RODS & STREAMLINE WIRES.
1050
1900
2600
3450
4650
5700
7150
8600
10250
11800
13800
15500
20200
24700
Double Shear = 1.75 × Single.
SINGLE SHEAR
DOUBLE SHEAR
DIAMETER of PIN. Read Shear Strength under 'Ultimate Stress'
DIAMETER of BOLT. Read Strength of Threaded portion in Tension or Shear under 'appropriate Ultimate Stress'
T GAUGE or THICKNESS.
W WIDTH. (inches)
ULTIMATE STRENGTH
ULTIMATE STRESS
BLAZDELL, BOTLEY, SOUTHAMPTON.
TONS per □"
PIN DIA^R { For Shear see other side. For Bearing see hole above.
30 I.W.G.
LBS.

The calculator herein described is intended for use in the drawing office when deciding the sizes of such details as wiring lugs, bracing attachments, bolts, pins and such like parts carrying loads in new designs of aircraft, or for checking the strengths of parts already designed. Though much has been done in the way of standardisation of such fittings, special circumstances constantly arise which necessitate departure from standard, and consequently involve calculations for strength.

By means of this instrument such questions as the following can be determined without calculation by one movement of the slide :—

(1) The necessary width of a wiring lug in any gauge of plate, for any given load, when made in material of any given strength.

(2) The pin diameter as determined by the given permissible bearing pressure in any thickness of plate.

(3) The strength in single or double shear of pins and rivets in material of any shear strength.

(4) The safe load and ultimate tensile strength of bolts, with the shear strength of the plain and threaded portions.

The scales are divided direct in fractional parts of an inch, and standard wire gauge numbers as generally employed on drawings, and bolts are given in B.A. and B.S.F. sizes. It is, therefore, unnecessary to convert drawing sizes to decimals, nor to refer to tables of wire gauge sizes or screw-thread core diameters, as results are read direct in the units usually used on drawings. As shown in the illustration, the calculator is a simple form of slide rule—the two upper scales on the front face reading direct in fractions of an inch from $\frac{1}{8}$ in. to 3 ins., and in wire-gauge numbers from 30 S.W.G. to $\frac{3}{8}$ in. The two lower scales are graduated for any strength of material from 10 to 100 tons per square inch, and any load from 500 to 30,000 lbs. Two scales read through the back of the rule are provided, the upper scale, divided in $\frac{1}{32}$'s of an in. from $\frac{3}{32}$ in. to $\frac{3}{4}$ in. diameter, dealing with pins and rivets, the lower scale, marked direct in B.A. and B.S.F. thread sizes from 4 B.A. to $\frac{7}{8}$ in. B.S.F., being used for bolts.

A table on the back of the rule gives the ultimate strengths of all B.E.S.A. swaged rods and streamline wires, and the strengths of materials to B.E.S.A. Specifications in common use are specially marked on the scales.

A considerable saving of time and labour as compared with an ordinary slide rule results from the employment of this calculator on problems within its scope, the special division of the scales rendering the reading of the result both quick and easy.

◆ ◆ ◆ ◆

The Writing in the Sky

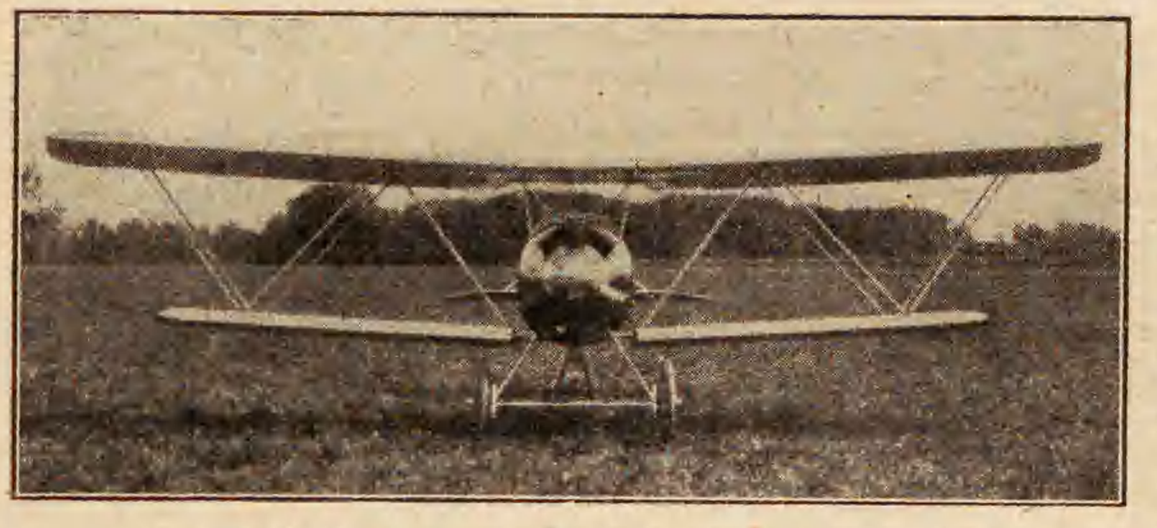
THIS week has witnessed the first practical application of the invention of Major J. C. Savage, by means of which chemical smoke trailing from an aeroplane can be used for writing words or tracing figures in the sky. Capt. Cyril Turner, who will be remembered as one of the pilots of the B.A.T. firm, has been flying the machine in which the apparatus has been installed. His first "sky sign" took the form of the word "Castrol," the famous aero-engine lubricant. Later in the week he repeatedly wrote the words "Daily Mail" across the sky. We would suggest that it might be well worth the trouble and expense of the Air League to get in touch with Maj. Savage, with a view to getting Capt. Turner to undertake a propaganda campaign by writing, day after day and in various localities of the kingdom, "Wake up, England." In that way the public would have brought home to them the urgent need for a revision of our air policy.

Apart from the publicity value of this new air "stunt," it would appear to have possibilities of scientific application. For instance, it might be possible to install the smoke-producing apparatus in the nose of an aeroplane and let the smoke pour over the machine, meanwhile photographing or "filming" the paths followed by the smoke over various parts of the machine. In this manner it might be possible to get a lot of valuable information about downwash and its effect on the tail of a machine, the effect of slip-stream and so forth. If that be feasible, the scientific value of Maj. Savage's invention may well prove far greater than its application to advertising.

THE LONGREN TWO-SEATER BIPLANE

IT cannot be said that American designers have neglected the moderate-priced, low-to-medium-powered aeroplane, for the efforts in this direction, have been numerous. Such machines, it should be noted, are particularly suitable—especially when of the easy-to-fly-and-maintain type—for countries like the States and Canada, where vast tracts of land unserved by regular transport services, ranches, scattered farms, and the like prevail; communication, inspection, and various duties connected with these conditions can easily be carried out by means of the type of machine in question.

One of these machines developed in the U.S.A. is the Longren, described and illustrated herewith. It was designed and built by the Longren Aircraft Corporation of Topeka, Kansas, as a business and pleasure vehicle of moderate price ($2,465) for the individual owner—or owner-pilot. Besides several novel constructional details, low cost of upkeep and operation, small housing space, and facility for obtaining spare parts—all parts are numbered, listed and a full stock always available—are the main features of this machine.



Front view of the Longren two-seater biplane, showing the Warren-type interplane trussing.

The Longren is a two-seater side-by-side tractor biplane, with its wings arranged to fold back. The *fuselage* is made of hard vulcanised fibre, moulded to a good streamline form. The fibre is fastened, at the top and bottom centre lines, to two ash *longerons*, and is reinforced with laminated ash ribs, giving an exceptionally strong and rigid assembly that is resilient and shock resisting. This fibre has a strength-weight ratio that is claimed to be double that of plywood or veneer, and it cannot be shattered or splintered. A combustion point of 650° F. is another of its advantages over wood, or fabric-covering, and it is thus practically fire-proof. After assembly, the *fuselage* is water-proofed inside and out.

The cockpit is immediately beneath the top plane centre section, and is entered by way of a door in the side of the *fuselage*. This door is so designed that the *fuselage* is not weakened at this point, where it is reinforced with ash ribs. The pilot's and passenger's seats are of comfortable width, and well upholstered. Standard stick and foot-bar control are fitted, and are arranged to leave no moving parts exposed, making a clean and roomy cockpit, where there is no danger of clothing, etc., catching on any part. In front of the cockpit is an aluminium instrument board, containing a tachometer, altimeter, clock, map case, petrol gauge, oil pressure gauge, motor meter switch and throttle lever. A space is provided under the seat for baggage.

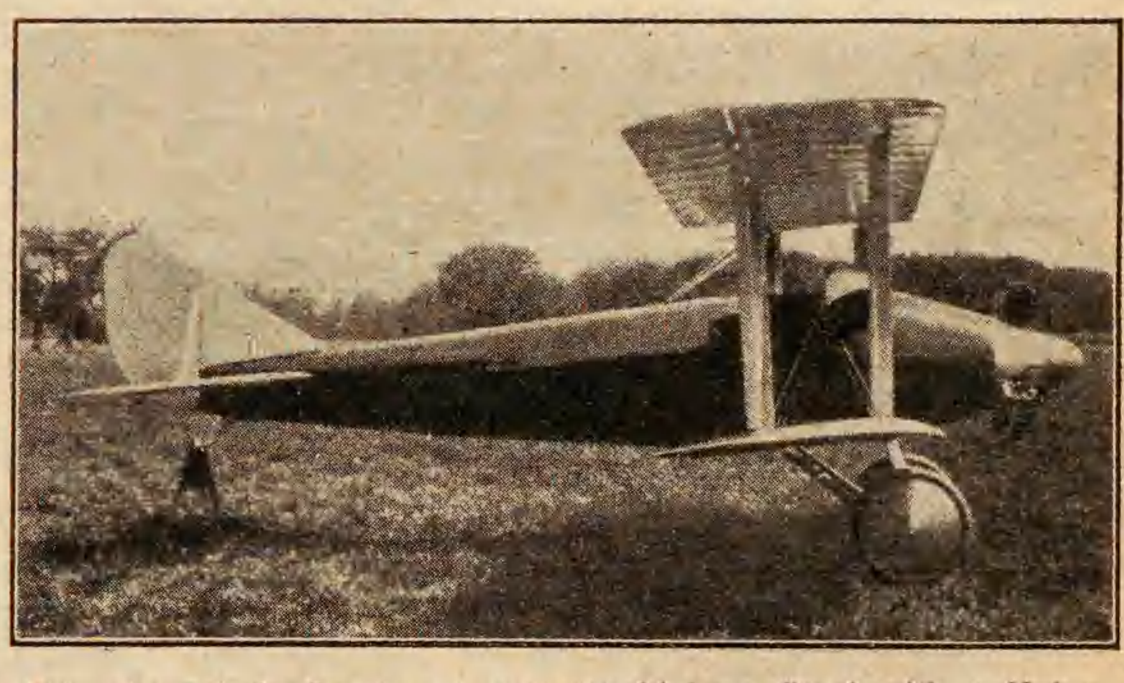
For the main planes the U.S.A. No. 2 wing section, slightly modified, is used, a section giving very satisfactory results with a machine of this type. The top plane consists of two outer sections, and a short centre section; the lower plane is in two sections only. The main spars are built-up I-section spruce, and the ribs are made with ply-wood webs and ash cap strips. The fittings are standardised, and interchangeable. The *ailerons*, which are fitted to the top plane only, are also interchangeable, and are actuated by a torque tube within the wing and with the operating arm in line with the rear hinge of the wing. Swivels are provided on the arms to allow the wings to fold without affecting the controls. The centre section is supported by four short struts and braced in front by streamline straps, and by a V-tube at the rear.

By the employment of the Warren system of interplane trussing, it is possible to fold the wings without disturbing the setting of the latter or the controls, and no adjustments, or rigging, is necessary, after each operation of folding. The unlocking and removal of four pins is all that is necessary to fold the wings, which when folded back are braced to the *fuselage* with tubes provided for the purpose. Thus, when the machine is being towed over roads or rough ground the wings are fixed securely against shocks, and are thereby unlikely to be damaged or strained.

The tail surfaces are made thick enough to require a mimimum of bracing, only two struts being used and no wires. The horizontal stabiliser is of the divided type, the halves being interchangeable, as are the elevators. The leading edges of the latter, and also those of the rudder and *ailerons*, serve as operating torque tubes, as well as front spars. The elevator controls are entirely enclosed in the *fuselage*, and the rudder control has a short arm, and only a very short length of wire exposed.

A tail skid of neat and compact design is fitted consisting of a steel leaf spring, faired, and fastened to the lower *longeron*, directly under the last transverse rib. The compression load of the skid is carried by a Duralumin compression plate.

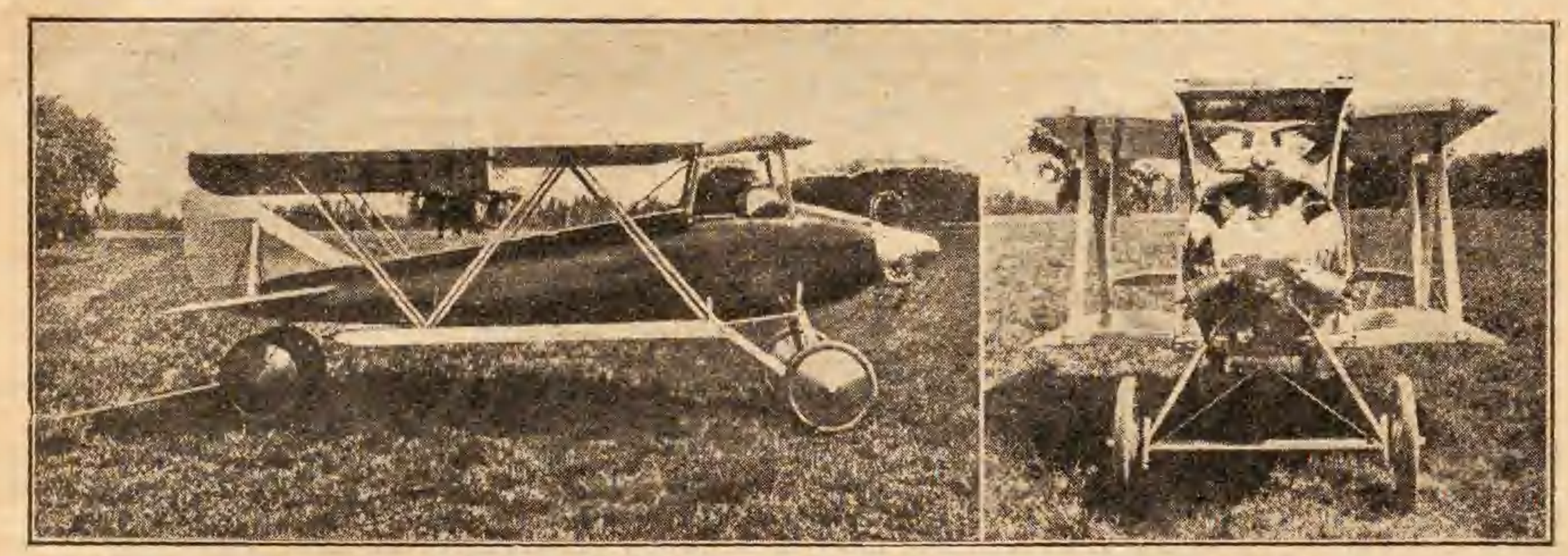
A Lawrence 60 h.p. three-cylinder (air-cooled) radial engine is fitted, being bolted directly to the substantial plywood nose panel of the *fuselage*, giving a strong and simple mounting. The engine is enclosed, except for the cylinder heads, by a metal cone-shaped cowling.



Side view of the Longren two-seater biplane, fitted with a 60 h.p. Lawrence engine.

A simple V-type landing gear is fitted, the lower ends of the streamlined struts terminating in Duralumin shock-absorber housings. The axle fairing is given a lifting section, and its leading edge forms the compression member connecting the V's, whilst the trailing edge is attached to the axle and rises and falls with it: both leading and trailing edges are of Duralumin. The chassis is braced by streamline wires.

The Longren flies and handles well, and during the American Legion Flying Meet, held at Kansas City, Mo., last November, one of these machines won the looping contest (38 loops), and at the Omaha Meeting it also won the considerable distinction.



A side and front view of the Longren two-seater biplane with the wings folded back.

The principal characteristics of the Longren two-seater biplane are :—

Span (upper)	27 ft. 11 ins.
,, (lower)	21 ft. 11 ins.
Chord	4 ft. 3 ins.
Gap	4 ft. 3 ins.
O.A. length	19 ft.
O.A. height	7 ft. 8 ins.
Width folded	9 ft. 8 ins.
Incidence (upper)	3°.
,, (lower)	2°.
Dihedral	3°.
Wing section	U.S.A. 2 (mod.)
Stabiliser incidence	1½°.
Area, main planes (inc. *ails.*)	189 sq. ft.
,, *ailerons* (2)	191·1 sq. ft.
,, stabiliser	13·5 sq. ft.
,, elevators	11·4 sq. ft.
,, fin	2·6 sq. ft.
,, rudder	5·6 sq. ft.
Weight (empty)	550 lbs.
,, (loaded)	1,050 lbs.
,, /h.p.	17·5 lbs.
,, /sq. ft.	5·55 lbs.

R.A.F. Club

THE Royal Air Force Club has decided to hold an annual Cricket Week during September of this year.

It is a new departure in Club convention, but that it meets with approval is shown by the fact that the Week is to be held under the distinguished patronage of H.R.H. The Duke of York, K.G., with Viscount Cowdray (President of the R.A.F. Club) as President and the Secretary of State for Air, Captain F. E. Guest, D.S.O., M.P., and the Chief of the Air Staff, Air Chief Marshal Sir Hugh Trenchard, Bart., K.C.B., D.S.O., as Vice-Presidents.

The affair will be a combined social and sporting event. Two three-day matches will be played, and these will in all probability be (1) a revival of the old North *v.* South match, and (2) the Royal Air Force (Past and Present) *v.* the M.C.C. Touring Side leaving for South Africa. The R.A.F. Club propose including the services of two or three ex-R.A.F. professionals, and it is understood that Hobbs, Woolley and Strudwick will play. The amateurs who are members of the Royal Air Force Club include, amongst many others, such players as P. G. H. Fender, Hon. F. Calthorpe, A. H. H. Gilligan, Sqdn.-Ldr. Blount, S. L. Amor, B. S. Foster and E. Martin. The Hon. L. H. Tennyson has consented to lead the opposition.

The Club Committee responsible for the event consists of Messrs. Air-Commodore Halahan (Chairman), Hon. F. Calthorpe, P. G. H. Fender, H. D. G. Leveson-Gower, Major Young, and Captain M. G. Kiddy (Hon. Secretary) to whom all communications should be addressed at 24, Denison House, 296, Vauxhall Bridge Road, S.W. 1. ('Phone : Victoria 2112).

Play will be by invitation only, but at the same time the Hon. Secretary would be glad to hear of the names of all first-class amateurs or professionals who served in or were attached or seconded to the Royal Flying Corps, Royal Naval Air Service, or Royal Air Force, who will be free during the month of September.

The Lamblin Cup

CAPT. PINSARD, on a Nieuport monoplane with 300 h.p. Hispano-Suiza engine, has put up a fine performance for the Coupe Lamblin. Leaving le Bourget at 9.45 a.m. on May 31, he landed at Brussels at 11.32, and at Waddon at 1.49 p.m. Paris was reached at 3.30 p.m., his total flying time being 4 hrs. 30 mins. 30⅘ secs. As a single-engined, single-seater machine, with an engine of between 200 h.p. and 400 h.p., the Nieuport would, under the rules of the competition, get a start of 15 minutes over the scratch machines, which are single-engined single-seaters with engines of 400 h.p. or more. Thus for the time being Capt. Pinsard is the holder of the Lamblin Cup.

R.A.F. Groves Prize Awards

THE Air Ministry announce that the awards in the 1921 competition for the R. M. Groves Memorial Essay on "A Forecast of Aerial Development," open to all members of the Royal Air Force, are as follows : First Prize (£30 and books), Wing-Commander C. H. K. Edmonds, Staff College, Andover ; Second Prize (£20 and books), Wing-Commander R. H. Verney, Cadet College, Cranwell ; Third Prize (£10 and books), Flight-Lieut. W. P. Groves, British Delegation, Air Section, Paris.

A special prize of £10 for the best imaginative *résumé* on "Aviation in the Next World War," has been awarded to Flight-Lieut. W. P. Groves, winner of the third prize.

The Memorial Essay, it will be remembered, was established by the family of the late Air-Commodore R. M. Groves, who died in Egypt in 1920, as the result of an aeroplane accident. The essays are required to be divided each year into three parts, the first relating to Imperial defence, the second in relation to Civil Aviation, Exploration, etc., and the last to an imaginative *résumé* on Aviation and the next World War.

French Airworthiness Certificates

THE Air Ministry on June 6 issued the following announcement :—

"In view of the statements appearing in certain portions of the Press this morning regarding the cross-Channel air services, the Air Ministry feels it necessary to state that it regards the allegation that existing French machines would not be permitted to fly if they were British owned as quite unwarranted. As a signatory of the Air Convention, Great Britain has agreed to recognise French certificates of airworthiness for French passenger aircraft, and although the French system of certification and inspection differs from that established in this country, there is at present no reason to suggest that it is any less efficient than our own.

"The safety of passengers travelling by air is, of course, always one of the first considerations of the Air Ministry, and every endeavour has been and will be made to co-operate with the French and other Governments to that end."

Siam Tries an "Air" Lottery

FAILING to obtain the necessary grant for the development of her Air Service, Siam is holding a million tical lottery as an alternative method of getting things aerial going. Fifty thousand pounds will be distributed in prize-money, and the Air Service will benefit by the same amount. The first prize will be £10,000.

Siam's Air Force consists of 115 aeroplanes and a staff of 650. There are five aerodromes and 25 prepared landing-places in the country.

THE ROYAL AIR FORCE

London Gazette, May 30, 1922

General Duties Branch

Pilot Offr. C. C. K. Bloxam resigns his short service commn. ; May 31.

Stores Branch

J. S. Griffiths is granted a permanent commn. as a Flying Offr. for Accountant duties, with effect from March 5, 1921 (substituted for *Gazette*, March 15, 1921).

Medical Service

W. D. Miller, M.B., is granted a short service commn. as a Flight Lieut., with effect from and with seny. of May 15. F. W. Squair, M.B., T.D., is granted a temp. commn. as a Flight Lieut. (Hon. Squadron Leader), with effect from and with seny. of May 16.

Memoranda

Two Cadets are granted hon. commns. as Sec. Lieuts., with effect from the dates of their demobilisation.

Capt. A. Brind relinquishes his temp. commn. on account of ill-health contracted on active service, and is granted the rank of Maj. ; Nov. 6, 1919 (substituted for *Gazette*, Nov. 14, 1919).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

Air Vice-Marshal J. F. A. Higgins, C.B., D.S.O., A.F.C., from R.A.F. Depot (Inland Area) to Headquarters (Inland Area), for duty as Air Officer, Commanding vice Air Vice-Marshal Sir J. M. Salmond, K.C.B., C.M.G., C.V.O., D.S.O. (May 26).

Group Captain A. B. Burdett, D.S.O., from Inland Area Aircraft Depot (Inland Area), for duty with British Section, Inter-Allied Aeronautical Commission of Guarantee, Germany (May 5).

Wing-Commander J. R. W. Smyth-Pigott, D.S.O., from Inter-Allied Aeronautical Commission of Control (Germany), for duty with British Section, Inter-Allied Aeronautical Commission of Guarantee, Germany (May 5).

Squadron Leaders.—J. H. Herring, D.S.O., M.C., from No. 7 Group Headquarters (Inland Area), for duty with British Section, Inter-Allied Aeronautical Commission of Guarantee, Germany. 5.5.22. A. C. Maund, C.B.E., D.S.O., from Aeroplane Experimental Establishment (Coastal Area), to command No. 31 Squadron (India). 6.5.22. V. S. Brown, from Instrument Design Establishment (Inland Area), to command No. 84 Squadron (Irak). 6.5.22. P. C. Sherren, M.C., from R.A.F. Depot (Inland Area), to Half-pay List. 12.5.22.

Flight Lieutenants.—H. V. Jerrard, from R.A.F. Depot (Inland Area), to Stores Depot (Irak). 6.5.22. W. A. Kingston, from Headquarters, R.A.F., Irak. 6.5.22. A. T. Cooper, from R.A.F. Depot (Inland Area) to Headquarters, R.A.F., Irak. 6.5.22. R. S. Booth, A.F.C., from School of Technical Training (Men) (Inland Area), for duty with British Section, Inter-Allied Aeronautical Commission of Guarantee. 5.5.22. E. B. Grenfell, from No. 47 Squadron (Middle East) to No. 2 Armoured Car Company (Middle East), for Armoured Car duties. 24.4.22. A. F. Brooke, from No. 27 Squadron (India), to R.A.F. Depot (Inland Area) (Supernumerary non-effective). 28.3.22. R. T. B. Houghton, A.F.C., from R.A.F. School (India) to No. 27 Squadron (India). 7.4.22. C. R. Keary, from No. 1 Wing Headquarters (India), to No. 20 Squadron (India). 15.4.22. G. C. Pirie, M.C., D.F.C., from School of Army Co-operation (Inland Area), to No. 4 Squadron (Inland Area). 17.5.22. H. G. White, from No. 4 Squadron (Inland Area), to School of Army Co-operation (Inland Area). 17.5.22. K. B. Lloyd A.F.C., from Headquarters, R.A.F., Middle East, to R.A.F. Depot (Inland Area) (Supernumerary). 27.4.22. J. B. Woodrow, from Research Laboratory and Medical Officers' School of Instruction (Inland Area), to R.A.F. Depot, for duty as Medical Officer. 15.5.22. Hon. Squadron Leader E. A. Aldridge, M.C., B.A., from Research Laboratory and Medical Officers' School of Instruction (Inland Area), to No. 1 School of Technical Training (Boys) (Halton), for duty as Medical Officer at R.A.F. Hospital, Halton. 15.5.22. A. G. Jones-Williams, M.C., from R.A.F. (Cadet) College (Flying Wing) (Cranwell), to R.A.F. Depot (Inland Area) (Supernumerary). 15.5.22. T. J. Thomas, M.B., from Engine Repair Depot (Middle East), to No. 4 Flying Training School (Middle East). 20.4.22. H. V. Worrall, D.S.C., from No. 230 Squadron (Coastal Area), to School of Naval Co-operation and Aerial Navigation (Coastal Area). 7.5.22. C. W. Bailey, from No. 230 Squadron (Coastal Area), to School of Naval Co-operation and Aerial Navigation (Coastal Area). 28.3.22. E. J. Webster, D.F.C., from No. 230 Squadron (Coastal Area), to School of Naval Co-operation and Aerial Navigation (Coastal Area). 28.3.22. Hon. Sqdn. Ldr. Frances W. Squair, T.D., M.B., to Inspector of Recruiting (London Depot) (Coastal Area), on appointment to temporary commission. 16.5.22. J. H. Wood, M.C., M.B., D.P.H., from Research Laboratory and Medical Officers' School of Instruction (Inland Area) to Headquarters, Coastal Area (Supernumerary). 22.5.22.

* * *

Aeroplane Wrecked in the Channel

A SPAD, belonging to the Messageries Aériennes, and piloted by M. Paul Morin, fell into the Channel a couple of miles off Folkestone on June 3. The machine, which carried two passengers, had left Croydon about 10.30, and was seen to go out over the sea at about 11.15. Some eye-witnesses to the accident state that the engine was running badly, and that the pilot returned and circled over the town as if in doubt whether or not to proceed. He then, apparently, made up his mind, and the machine flew out over the sea. When about two or three miles out the machine nose-dived into the sea, and an out-bound steamer hurried to the spot. The bodies of the pilot and one of the passengers were picked up shortly afterwards, but at the time of writing the third body has not been found. The cause of the accident will probably never be known, as, even in case of engine stoppage, the machine should not have nose-dived into the sea. One theory is that the pilot fainted.

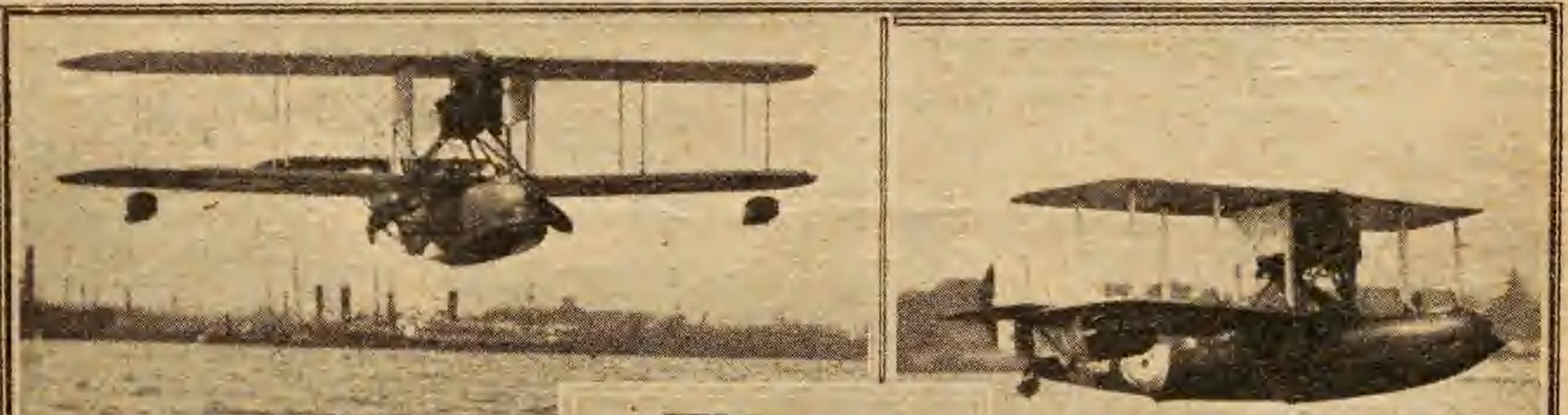
At the inquest, which was held at Folkestone on June 6, no light was thrown on the cause of the accident, and the Coroner returned a verdict that Dr. Gordon Ley died from injuries accidentally received while a passenger in an aeroplane from Croydon to Paris. A similar verdict was returned in regard to the pilot, Mr. Morin, and sympathy was expressed with the relatives. The body of M. Carroll, the other passenger, has not yet been recovered.

The "Neptune" Wrecked ?

FROM Algiers it is reported that the British flying boat "Neptune," in which Air Commodore Samson and his crew flew from Malta to Gibraltar, and which was forced down by engine trouble on the return journey, has been washed overboard from the lighter on which it was being towed by a destroyer.

Portuguese Aviators Succeed in Third Machine

AFTER having come to grief twice, through alighting in a very rough sea, the Portuguese aviators Comdr. Sacadura Cabral and Capt. Gago Coutinho have at last succeeded in reaching the South American mainland, on the third Fairey seaplane, Rolls-Royce "Eagle" engine, sent out to them. Leaving Fernando Noronha in the morning of June 5, just before eight, they arrived at Pernambuco about noon on the same day, and made a safe landing.



The latest Supermarine Amphibian Flying Boat, photographed during recent tests : In 1 the machine is seen just after getting off, and 2 shows her about to alight. In 3 she is flying over land, with the wheel undercarriage lowered. Note how wheels are lifted well clear of the water when flying over the sea.

PERSONALS

Married

On June 3, at St. Mary's, Hendon, Flight-Lieut. ALBERT WILLIAM FLETCHER, D.F.C., A.F.C., R.A.F., younger son of the late Cornelius and Mrs. Fletcher, of Child's Hill, N.W., was married to MARJORIE ELLIOT HAY, only daughter of Dr. and Mrs. Hay, of Thame, Oxfordshire.

Group Capt. EUGENE LOUIS GERRARD, C.M.G., D.S.O., R.A.F., youngest son of the late Mr. and Mrs. Thomas Gerrard, was married on June 1 to PHYLLIS LOUISA BALL, fourth daughter of the late Edward Stone and of Mrs. Stone.

Death

NORMAN SYDNEY (Lieut., M.C., Legion d'Honneur, 2nd Battalion East Surrey Regt. and R.A.F.), of Kingsdown, Burwash, Sussex, who died on May 26, after an operation for a head wound received in Salonica in May, 1917, was the eldest son of the late Sydney B. Beale, A.R.I.B.A., and Elizabeth Beale, of Sutton House, Sutton. He was in his twenty-ninth year.

Item

The will of the late Flight-Lieut. ROBERT CHARLES JENKINS, M.B.E., M.C., of Bicton Crofts, Godalming, formerly of White Cottage, Norton, Yarmouth, Isle of Wight, who died as the result of an accident while flying at Farnborough, aged 26, has been proved at £7,944.

* * * *

Independent Air Force Reunion.

MONDAY, June 19, should see a full muster at the I.A.F. Reunion dinner at the Hotel Cecil, under the presidentship of Air Chief Marshal Sir H. M. Trenchard. In addition to Group-Captain H.R.H. the Duke of York, among the guests are General De Castelnau, Capt. the Rt. Hon. F. E. Guest, Secretary of State for Air, Mr. Winston Churchill, and Captain De Corvette Sable, French Air Attaché. I.A.F. members should address themselves to the Hon. Sec., I.F. Dinner Club, Room 337E, Alexandra House, Kingsway, W.C. 2.

An All Flying Services Dinner.

IT is announced that on June 23, the night before the Royal Air Force Pageant, a gathering of past and present personnel of the Flying Services is to be held in London. Dinners are being organised for the various units of the R.N.A.S., R.F.C., and R.A.F., on that night, including the aeroplane, airship, kite-balloon and ground services.

The pageant will be a meeting-place for all airmen, and these dinners are being organised so that members of individual service units may foregather and renew their war-time associations. Anyone wishing to rejoin his old formation for the occasion is invited to write to the Honorary Secretary of the unit, c/o Room 651, The Air Ministry, Kingsway, W.C. 2, giving his rank and enclosing a stamped addressed envelope.

War Medals now Ready

THE War Medals (1914 Star, 1914-15 Star, British War Medal, and Victory Medal) are now being issued to ex-airmen. Any person entitled to medals by service in the Royal Flying Corps and Royal Air Force who has not yet received them should, therefore, make application to the Officer in Charge, R.A.F. Record Office, Ruislip, Middlesex, stating his regimental number and rank on demobilisation, and the address to which he desires the medals to be sent.

Kite-Balloon Observers and Prize Money

IT is pointed out by Wing-Comdr. John Dunville, late Commanding Officer No. 1 Balloon Training Wing, and Mr. Harry Delacombe, late Kite Balloon Organisation Department, Air Ministry, that officers and men who did duty as kite-balloon observers at sea during the War are entitled to participate in the distribution of the naval prize fund Those who are not aware of this fact can obtain full particulars from the Accountant-General of the Navy (Prize Fund Branch), Stamford Street, S.E.

More Entries for French Gliding Competition

THE number of entries for the French Gliding Competition to be held at Puy de Combegrasse from August 6-20 has now reached 30; 16 of these were given in a recent issue of FLIGHT. The additional entries are: 17, Gustave Thorouss; 18, Daniel Montagne; 19, Farman Works; 20, Henry Grandin; 21, J. Rolle; 22, Maurice Rousset; 23, Henry Potez; 24, Georges Sablier; 25, Pierre-Octave Detable; 26, Louis Peyret; 27, Aime Valette; 28, Ettore Bernasconi; 29, Maurice Griffeath; 30, Lucien Lefort.

THE LONDON AERO-MODELS ASSOCIATION

(The Society of Model Aeronautical Engineers.)

THE Competition held on Hackney Marshes on Saturday last was a great success, thanks to the excellent arrangements made by the Secretary of the Competitions Committee. Mr. C. Burchell won by getting round the course in 29 flights; time taken, 31 mins. Mr. Lansdown was second, doing the course in 33 flights; time, 51 mins. Mr. Rippon was third, in 39 flights in 31.10 mins.; Mr. Whelpton fourth, in 43 flights in 29 mins. Mr. Burchell flew his spar model, Mr. Lansdown an enclosed model, Mr. Rippon a Farman type. There were 10 entries in all, only the four mentioned above completing the course, which proved ideal for such competitions.

* * * *

PUBLICATIONS RECEIVED.

Aviation in Peace and War. By Sir F. H. Sykes, G.B.E., K.C.B., C.M.G. London: Edward Arnold and Co., 41-43, Maddox Street, W. Price 8*s.* 6*d.* net.

Scientific Papers of the Bureau of Standards. No. 430. High-Frequency Resistance of Inductance Coils. By G. Breit. Department of Commerce, Bureau of Standards, Washington, D.C., U.S.A.

Scientific Papers of the Bureau of Standards. No. 431. The Field Radiated from Two Horizontal Coils. By G. Breit. Department of Commerce, Bureau of Standards, Washington, D.C., U.S.A.

Technical Note No. 96. Notes on Propeller Design—IV: General Proceeding in Design. By Max M. Munk. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published June 8, 1922

31,583. SPERRY GYROSCOPE CO. Gyroscopic compasses. (153,589.)

APPLIED FOR IN 1921

Published June 8, 1922

4,398. H. LEITNER. Screw propellers. (179,632.)
4,785. A. W. WELLER and J. F. N. YOUNG. Rotary engines. (179,661.)
5,417. J. H. HARE. Rotary explosion engines. (179,684.)
11,470. N. E. DAVIES. Propellers. (179,797.)
12,933. A. SERPIERI. Rotary engine. (169,426.)

APPLIED FOR IN 1922

Published June 8, 1922

9,952. H. E. S. HOLT. Parachutes. (179,884.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from p. xiv.*)

INSULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C.1.
City 3115; "Vanduara," Cent. London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 273; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15.
Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5.
Dalston 1893.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.

PROPELLERS—

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19.
Hornsey 910 & 2472.

Lang Propeller, Ltd., Weybridge, Surrey.
520-521, Weybridge; "Aerosticks," Weybridge.

PUTTEES—

Fox Bros. & Co., Ltd. (Dept. R), Wellington, Somerset.

RADIATORS AND RADIATOR REPAIRS—

Serck Radiators, Ltd., Warwick Road, Greet, Birmingham.
Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

SPARKING PLUGS—

Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15.
Putney 2132, 2133.
"Kaalgee," Phone, London.

SPRAYING PLANT—

Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1.
Holborn 2041; "Aerography," London.

STABILIZERS—

Auto Controls, Ltd., 19, Regent Street, Piccadilly Circus, London, S.W. 1.
Regent 3649.

TAPES AND WEBBING—

MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent. London.

TIMBER—

Owen, Joseph, & Son, Boro' High Street, S.E.
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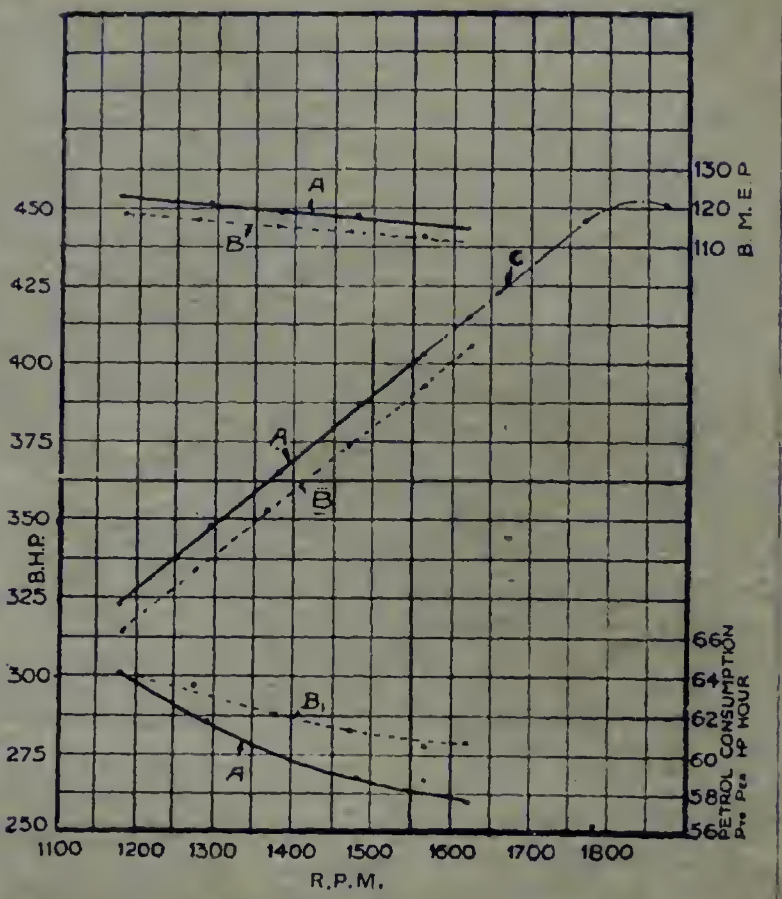

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

1922.	
June 19	**Independent Air Force, R.A.F., Dinner, Hotel Cecil**
June 23-25	**International Competition for Touring Aeroplanes, Brussels**
June 24	**Royal Air Force Pageant, Hendon**
June 27	**Royal Aero Club 21st Anniversary Banquet**
July 29	**Aerial Derby, starting at Waddon**
Aug. 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**R.Ae.C. Race Meeting, at Waddon**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT.

Civil Aviation and Safety

IN this issue of FLIGHT we publish an article on the subject of Civil Aviation and safety, and call attention to some of the reasons which would appear to make a continued exploitation of the London-Paris service upon the present conditions a waste of effort. The weather conditions on that route are far from favourable, and necessitate a ground organisation of such magnitude, in proportion to the traffic which can reasonably be expected, as to preclude the services coming within measurable distance of paying except by heavy subsidies. It is further pointed out that we should not object to any such expenditure if—and that appears to us to be the crux of the whole matter—there were any reasonable prospects of ultimate expansion into something more than the mere 240 miles separating us from the French capital. But we can see no such prospects. The route, as far as British machines and British lines are concerned, leads to nowhere except Paris. The route could undoubtedly be made considerably safer, but at a cost out of all proportion to the gains, present or potential, to be expected. It is, therefore a pertinent question to ask—why continue to specialise on this route to the exclusion of all others.

By way of indicating alternative routes, the article suggests making much fuller use of the seaplane type of aircraft than has been done in the past. The subject of the seaplane is one to which we have had occasion to refer frequently of late, partly because there appears to be a lack of realisation of its possibilities in Government circles, and partly because, from the point of view of national safety, we shall require large numbers of seaplanes in the not distant future for co-operation with the Navy. In the article to which we refer no mention has been made of the uses of the land machine on routes other than the London-Paris. This is not because we have the slightest intention of belittling what the land machine can do, or because we desire to see the seaplane developed at the expense of the aeroplane. Far from it; but the case for the aeroplane has been stated so well and so often that we feel there is no need to repeat it in the present argument. The land machine has enormous possibilities, but we do plead for not letting these blind us to the uses of the seaplane, and we would emphasise the need for developing the seaplane side by side with the aeroplane, not one at the expense of the other.

There can be very little doubt that a properly designed seaplane, used over a route which comes well within its capacity, is safer than very fast land machines as long as there is any risk of forced landings. On the London-Paris route there have been a number of forced landings during the last few months. Fortunately, however, these have been made under favourable weather conditions, and no serious damage has resulted. But if the services had attempted to run during foggy weather, and had been forced to alight on unknown ground in the fog, it can scarcely be doubted that serious accidents would have resulted.

The seaplane, on the other hand, is much more easily "landed" in a fog. Instruments are available which will indicate to the pilot when he is at a certain height above the sea. The matter of making a safe *amerissage* is not then a difficult one. There are no hills and valleys, nor any hedges or other terrestrial obstacles. In other words, there is always an "aerodrome" below the seaplane. There is, of course, the possibility of a ship being on this "aerodrome," but except in or near a crowded harbour, the risk of collision is not very great.

Owing to the fact that a commercial seaplane need not have a very high "ceiling," having no hills to surmount, nor the need to climb to considerable heights so as to be within gliding distance of some landing ground, the power can be expended in load carrying, and consequently the seaplane should be capable of carrying a greater percentage of useful load. In other words, it should not require such a large subsidy to make it pay as does a fast land machine such as is apparently required on the London-Paris route. Furthermore, there are no special emergency landing grounds to establish, and no special lighthouses, the seaplane being able to make use of existing ones, as well as of the usual customs and passport organisations. All this points to a saving in expenditure on what we might term incidentals, which would mean that more money could be spent on improvements in the machines themselves.

As a direct result of ours being an island Empire, we shall need large numbers of seaplanes, and the training of seaplane personnel takes very much longer than does the training of personnel for land machines. How are we to train this personnel if we do not provide a civilian seaplane service? The last war was fought almost exclusively on land machines. There is good reaon to suppose that the next war will see a very marked change, and that the greater part of the matériel for naval use will be seaplanes. There appears to us to be every reason for developing the seaplane, and as it offers possibilities of doing so commercially at relatively small cost, there is all the more reason for beginning at once. The London-Paris service must be kept up, but we think that it should most certainly not be kept up exclusively and at the expense of others offering better prospects of becoming paying propositions.

◆ ◆ ◆

The Double Cross-Channel Night Flight

Following closely upon the official flight of the Handley Page machine with General Brancker on board, from Croydon to le Bourget, a second—this time a double—journey has been made across the Channel by night. The machine used was a Farman Goliath belonging to the Grands Express Aériens piloted by M. Labouchere, the famous French pilot. Leaving le Bourget at 10.22 on June 7, with eight passengers on board, the Goliath proceeded towards the coast. At first, thunder and rain were encountered, but later the machine ran into clear weather. The light at Lympne could be seen before the machine left the French coast, and the Croydon light became visible approximately at Tonbridge. Before alighting M. Labouchere switched on the two searchlights under his planes, and made a perfect landing on the Waddon aerodrome. After a supper at the aerodrome hotel the machine left again at 2.50 a.m., arriving safely at le Bourget a few minutes after 6, having completed the double journey.

The performance was a very fine one, and points to the not far distant day when night flying over a properly organised route will be as simple as flying by day. We are not very certain that night flying on the London-Paris route is any very great advantage, but for longer journeys the capacity to fly in the dark is equivalent approximately to doubling the speed of an aeroplane. If a machine flies for 12 hours at 100 m.p.h., and then has to stop overnight for another 12, its real speed is, of course, only 50 m.p.h. Thus night flying should have very great commercial advantage, and the flights made recently may therefore be regarded as first steps in a new stage of progress.

◆ ◆ ◆

The Lisbon–S. America Flight

As briefly recorded in last week's issue of Flight, the Portuguese aviators, Commander Sacadura Cabral and his navigator, Capt. Gago Coutinho, have at last succeeded in completing their flight across the South Atlantic. Two machines were smashed, but on the third seaplane sent out, a standard Fairey C III, with Rolls-Royce "Eagle" engine, the aviators succeeded in flying from Fernando Noronha to the mainland, reaching Pernambuco. Since then news has reached this country that they have arrived at Bahia, and barring very bad luck, they should get to Rio safely. The flight has been one of difficulties, and the greatest credit is due to the skilful navigation of Capt. Coutinho. Our old allies the Portuguese were ever good navigators at sea. They have now proved to be equally to the front in air navigation, and we feel proud to think that two British firms have been associated with them in the historical flight to South America.

◆ ◆ ◆

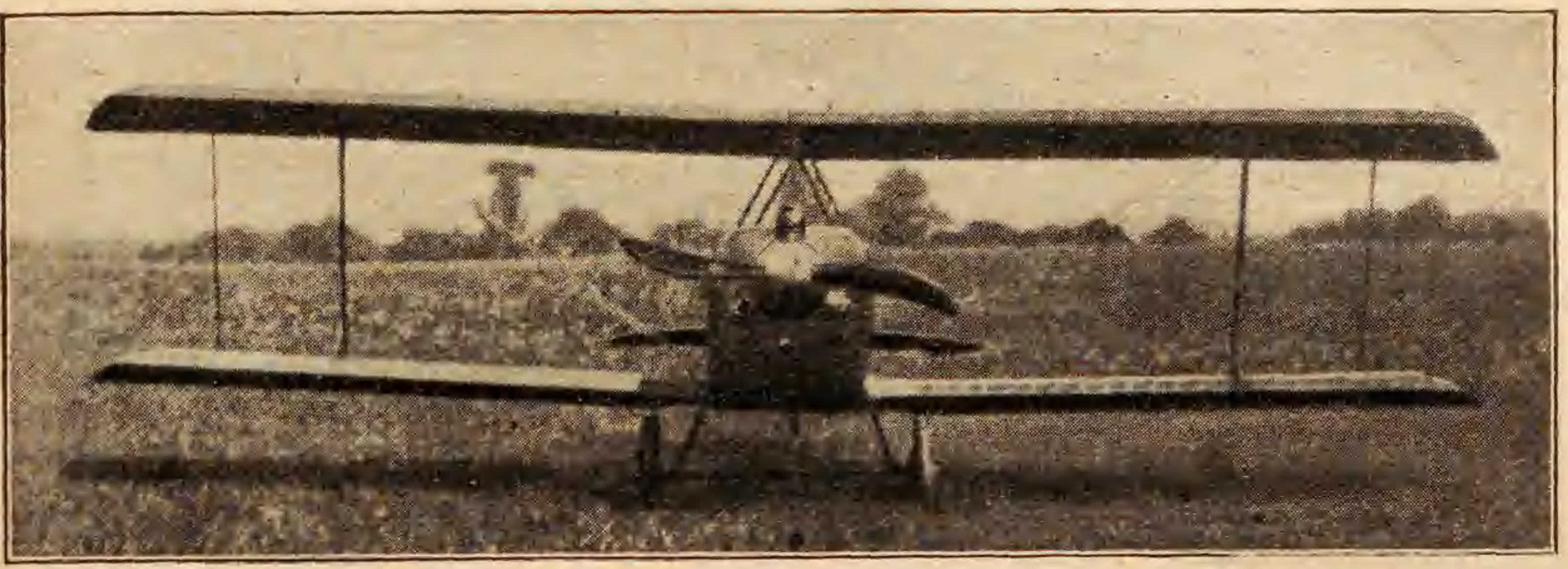
The King's Congratulations

The King, in a message which he has addressed to the President of the Portuguese Republic in connection with the flight, says:—

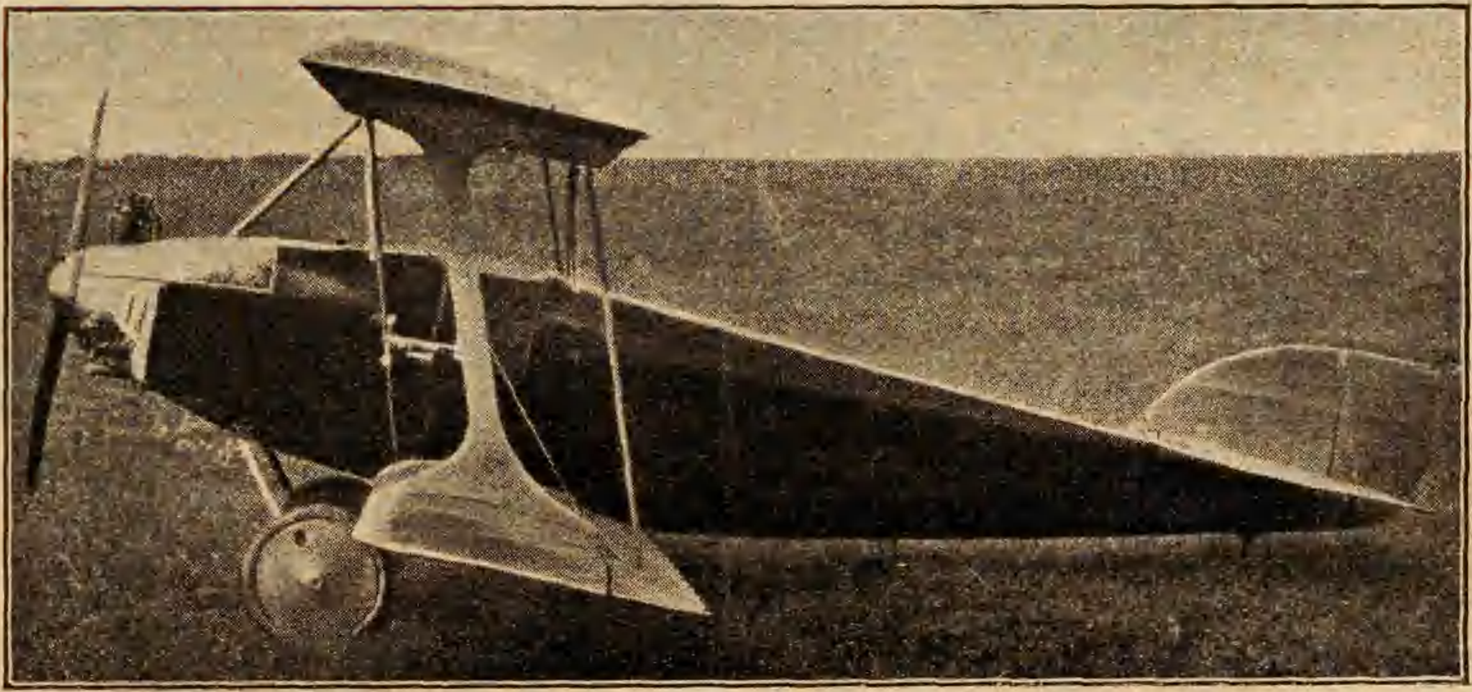
"Please accept my warm congratulations and those of my people on the successful issue of the daring enterprise of Portuguese aviators in their memorable flight to South America. This great achievement, which commands the admiration of the world, is worthy of the Portuguese nation, and adds further lustre to its annals."

THE BaCo "SKYLARK"

PARTICULARS are to hand of yet another small, low-powered machine of American origin possessing several distinctive features. This is the BaCo "Skylark," designed and constructed by the Bethlehem Aircraft Corpn., of Bethlehem, Pennsylvania, U.S.A., a two-seater tractor biplane fitted with a 60 h.p. 3-cyl. Lawrence air-cooled engine. The pilot and passenger are seated side by side, an arrangement that has much in its favour but which is not very often adopted by designers. As may be seen from the accompanying illustrations, in general appearance this machine is not unlike the Eastchurch and Grain "Kittens" (designed by the Experimental Construction Dept. of the R.N.A.S. during the War), nearly grown up to a "Cat." It is stated that the "Skylark" possesses remarkable inherent stability, and that on releasing the "stick" the machine will settle by itself to its natural flying angle, which may be varied by the adjustable stabiliser. It will do this from either of the two extreme positions of a stall or vertical nose dive. Its lateral stability is also good. Other qualities in the "Skylark" that make it particularly suitable as a sporting or popular general-purpose machine, are its low landing-speed, quick take off—on landing it rolls but a short distance after the wheels touch the ground—the ease with which it can be handled on the ground, low operating expense, and long flight duration. The provision of an adjustable tail plane in a small machine of this description is somewhat in the nature of a novelty, if not a luxury.



THE BaCo "SKYLARK": Front view.



The BaCo "SKYLARK": Side view.

The main planes are of the four-*aileron* type of even span and chord, with the top plane staggered forward 20 ins. They have no sweepback, but a dihedral angle of $1\frac{1}{2}°$; the angle of incidence of the top plane is 1° and that of the lower plane 0°. The comparatively thick wing section employed is U.S.A. 27. Top and bottom planes are each in two units, the bottom ones being attached to the lower *longerons* of the *fuselage*, and the top ones to a *cabane* of two inverted V streamline steel struts; an additional streamline strut extends forwards from the top of the *cabane* down to the *fuselage*.

Front spars are of selected spruce, 4-ply laminated rectangular sections. Rear spars are of I-beam sections of spruce. They are built up so as to form a section similar to the ordinary routed spar. It consists of two spruce members of shallow U-shape, with the bottoms of the U side by side, and with a centre piece of $\frac{1}{16}$-in. veneer, the grain running vertically to take the longitudinal sheer.

Cap strips of the spars are of birch $\frac{1}{8}$-in. thick. Their construction is very logical since the veneer takes the horizontal shear across the grain, and the cap strips of birch utilise a material of high strength where the fibre stress is greatest.

The internal bracing system is of double swaged wires and forked ends attached to mild steel fittings bolted to the main spars, which are left solid at these points. Main plane fittings are of standard and simple design made up of plain mild steel sheet metal. Ample strength has been allowed on all fittings, and no off-centre wire pulls are present anywhere in this machine.

The trailing edge of the wings is formed of wire, and hand-holes are provided on both lower wings to facilitate handling on the ground.

The wing truss is of clean design. The single I-struts which are laminated and built up of spruce are of very generous proportion.

The double lift wires, front and rear, are of stranded cable. They run forward, as well as inward, serving both as external drift wires and flying wires. The landing wires extend from the front of the *cabane* in the centre to the front and rear of the bottom of the interplane struts. This places the rear landing wire out of the way of entrance to the cockpit. This, together with the strut running from the centre of the plane, from the top of the *cabane* to the forward part of the *fuselage*, completes the truss for stress of every character, and at the same time reduces the parasite resistance to a minimum; nevertheless the use of the deeply-cambered U.S.A. 27 wing section enables the weight of the wing truss to be kept down to a minimum.

Wing frames are covered with approved grade A cotton fabric, and special care has been exercised in sewing the fabric to the ribs in accordance with Army specifications. Surface treatment is of six coats of Phœnix fireproof dope with a bronze finish.

The empennage is substantially built; the stabiliser is hinged on the rear end so that a large degree of adjustment is possible in flight. Since the balance of the machine is perfect for normal performance, it is expected that the stabiliser adjustment will only be used when the pilot wishes to fly at one particular flight attitude for a long period of time.

The stabiliser, as shown in one of the accompanying illustrations, has a strong rear spar running continuously over-top of the *fuselage*. The laminated front edge is in one piece of semi-circular shape; three ribs on either side give it adequate strength and preserve the camber required. A strong spruce member runs on either side of the *fuselage* from the forward point of attachment of the stabiliser toward the outer end of the rear spar. Two wires run from the top of the rudder post to the outer end of the stabiliser spar, giving added security for severe manœuvres. The stabiliser and rudder are of similar construction, and are well braced internally. The elevator horns are skilfully disposed within the vertical fin, and a particularly strong torsion tube is provided to carry the elevator loads to the elevator horns. The design of the empennage is particularly sturdy and clean and combined with simplicity.

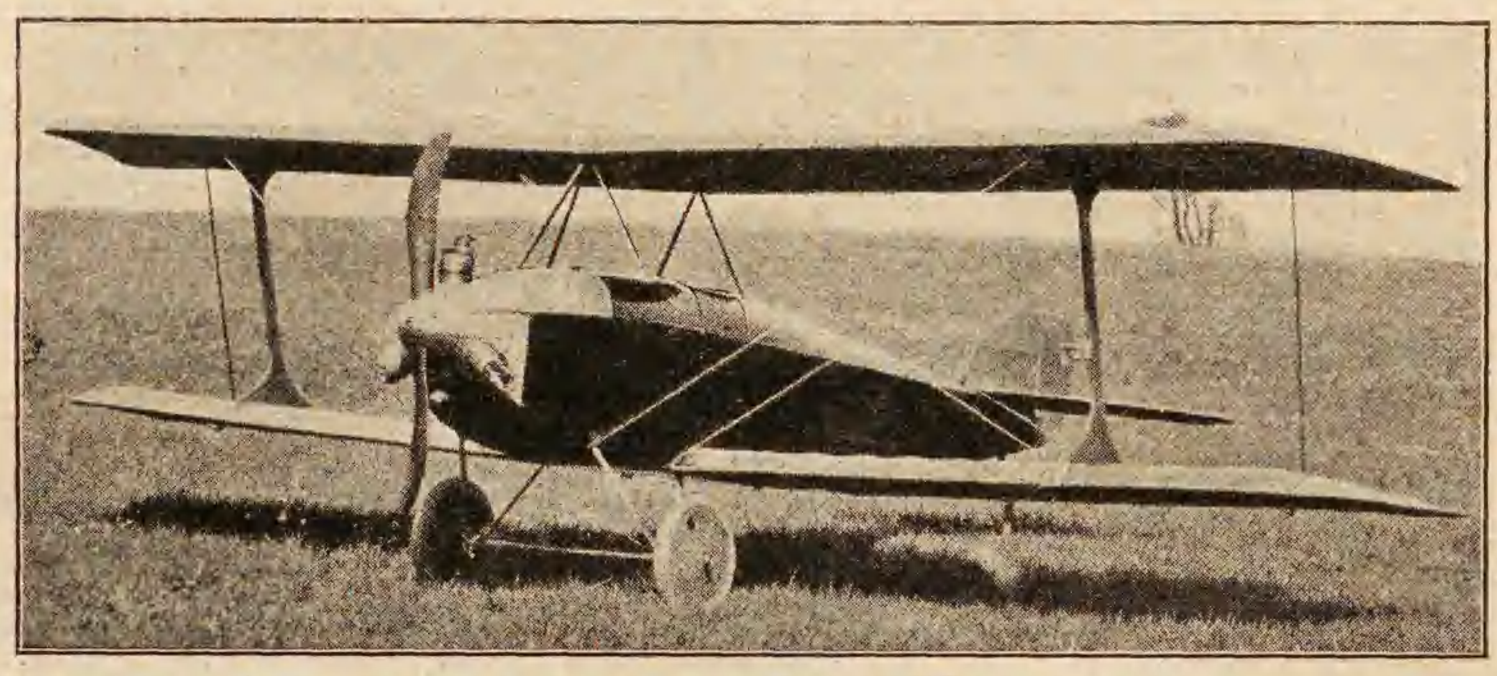
The *fuselage* is solidly constructed. A complete trussing is provided of four solid spruce *longerons*, with diagonal bracing members also of spruce. The whole is covered with mahogany, 3-ply veneer. Although very light, the *fuselage* has a strength far in excess of that required either in the air or on landing. Great care has been exercised not to weaken the *fuselage* at the point where the door to the cockpit is placed, special diagonal and longitudinal members being provided at that point to carry the truss through.

The smooth mahogany finish is particularly pleasing to the eye and touch. A veneer *fuselage* of this type eliminates all fittings and provides a good production job easy of repair. The combination of veneer with the complete wooden truss also eliminates all tendency for warping or distortion of veneer.

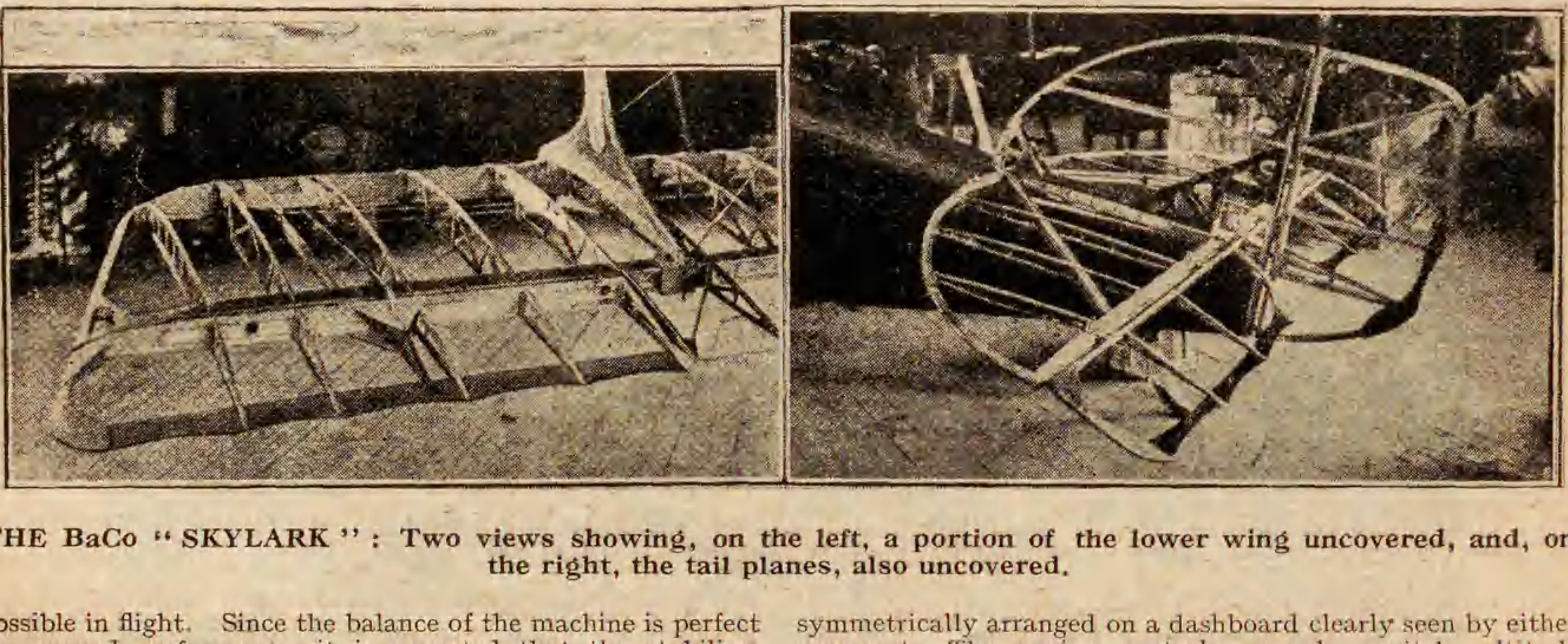
In the cockpit ample room is provided for two persons side by side, together with dual control. The instruments are symmetrically arranged on a dashboard clearly seen by either occupant. The engine controls—namely, switch, altitude adjustment and spark—are placed on the right-hand side. The throttle is placed between the occupants and easily accessible to both. The instrument board carries a banking indicator, turn indicator, air speed meter, altimeter, tachometer, oil pressure gauge, oil temperature gauge and air distance recorder. A compass completes the equipment.

The arrangement of the cockpit and instruments is such as to make a perfect dual control arrangement, but with more facility for engine control, thus giving to the pilot a valuable point in instruction flying.

The machine is easily entered by means of a low step on to the wing, and another low step into the cockpit through the



The BaCo "SKYLARK": Three-quarter front view.



THE BaCo "SKYLARK": Two views showing, on the left, a portion of the lower wing uncovered, and, on the right, the tail planes, also uncovered.

side-door entrance in the body. The control stick and rudder bars are of the standard type. The roomy upholstered cockpit, with attractive instrument board, presents a pleasing and comfortable compartment for the pilot and passenger. To carry a few hundred pounds of mail, express or baggage, instead of a passenger, the extra seat is pushed back, or removed, and the control stick is removed also, giving ample cargo space.

The chassis is of ⅝-in. by 1½-in. oval steel tubing brazed to a guide plate, which allows a 4-in. travel of the axle. The shock absorber cord is simply wound about two spools, provided on the axle, and down under the guide plates. The cross wiring for the chassis struts is provided on both the front and rear struts. Two compression tubes run between the lower end of the front and rear struts. The chassis is very simple in construction, and can be dismounted and assembled in a few minutes.

The 60 h.p. Lawrence engine efficiently blends into the nicely streamlined body, only the cylinders being exposed. It is supported by two steel plates, one on either side. These plates are bolted to the vertical veneer nose panel, which in turn is braced by two veneer tie-panels to the *longerons*. This eliminates all cross bracing wires in the first two sections, giving a very strong mounting. Two complete double ignition systems are provided with double batteries, so that either battery can be used on either system. Ample space is provided around the dual ignition system and oil leads to the engine. A fireproof wall separates the engine and ignition system from the petrol tank and cockpit, thus eliminating, as far as possible, risk of fire—the carburettor hanging outside and underneath the engine.

The principal characteristics of the "Skylark" are as follows:—

Span	29 ft. 10 ins.
Chord	4 ft.
Gap	5 ft.
Stagger	1 ft. 8 ins.
Overall length	23 ft.
Overall height	8 ins.
Wing curve	U.S.A. 27
Dihedral angle	1½°
Area of main planes	214 sq. ft.
Weight empty	700 lbs.
Useful load	600 lbs.
Loading/sq. ft.	5 lbs.
Loading/h.p.	19·3 lbs.
Speed range	33-90 m.p.h.
Climb (full load)	600 ft./min.
Ceiling	18,000 ft.
Duration	4½ hrs.
Petrol tank capacity	20 gals.
Oil tank capacity	2 gals.

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Paris–Croydon ...	53	123	9	34	52	2 40	D.H. 34 G-EBBS (2h. 2m.)	B. (6), D.H. 4 (1), D.H. 9 (1), D.H. 18 (1), D.H. 34 (3), G. (8), H.P. W8B (3), Sp. (1), V. (1), W. (1).
Croydon–Brussels ...	6	8	3	3	5	2 24	D.H. 34 G-EBBT (2h. 20m.)	D.H. 34 (2), W. (1).
Brussels–Croydon ...	7	14	—	2	6	2 22	D.H. 34 G-EBBR (2h. 2m.)	D.H. 34 (2), V. (1), W. (1).
Croydon–Rotterdam–Amsterdam.	9	4	9	9	9	3 12	Fokker H-NABH (2h. 24m.)§	F. (7).
Amsterdam–Rotterdam–Croydon.	10	11	9	9	9	2 33	Fokker H-NABN (2h. 5m.)§	F. (9).
Totals for week ...	137	262	49	94	133			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys. § Rotterdam.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Sp. = Spad. V. = Vickers Vimy, Vulcan, etc. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijke Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

Incidental Flying.—During the week Capts. Stocken and Muir made several test flights on D.H. 9's for the Aircraft Disposal Co., and on the 8th Mr. Hayns left for Brussels on an Avro.

* * *

French Aero Salon

DECEMBER 15 next to January 2, 1923, is the date fixed for the next French Aero Salon—the eighth—to be held, as before, at the Grand Palais. The exact title has been changed to "Exposition Internationale de l'Aeronautique."

Royal Aero Club Coming-of-Age Banquet

TUESDAY, June 27 next, looks like being marked up as an historical milestone in aeronautics. On that date the Royal Aero Club hold their 21st Anniversary Banquet at the Savoy Hotel, and already there promises to be a record attendance of members and their supporters. The Duke of Atholl, the President of the Club, will take the Chair, and amongst those who will be present are the Duke of Sutherland, Air Chief Marshal Sir Hugh M. Trenchard, Rear-Admiral Sir Roger Keyes, Sir Travers E. Clarke, K.C.B., Capt. the Right Hon. F. E. Guest, etc.

It would be well for members of the Club to get their applications for seats along to the Secretary at 3, Clifford Street, without delay, as the accommodation is limited and there may be sad disappointment awaiting late comers, especially as members have the privilege upon this unique occasion of introducing friends, including ladies, so far as there are seats available. The price of the tickets is £1 1s.

CIVIL AVIATION AND SAFETY

The Cross-Channel Fetish

The title chosen for these notes may be interpreted in two ways: it may be taken to refer to the safety from accident of passengers and pilots, and it may be read in its wider sense as meaning civil aviation in its relation to national safety. In the following the subject will be dealt with from both points of view, without an attempt at exhausting either. To do so would require several issues of FLIGHT. As the phase which is, perhaps, uppermost in the public mind at the moment, owing to recent regrettable accidents, is that relating to the safety of travelling by air, we will refer to that first.

As always after a flying crash, the daily Press has made the most of the accident to the Spad which fell into the Channel, giving the usual glaring headlines and blazoning the news from thousands of posters. This was followed by articles questioning the adequacy of the precautions taken by the organisation of the London–Paris route, and suggesting all sorts of improvements that ought to be made. Although we are very far from wishing to claim that the organisation of the London–Paris route is perfect, it is certainly and emphatically not so haphazard as might be imagined from reading various articles in the Press.

If we look upon the matter calmly and dispassionately, what has happened is that in one case two aeroplanes have collided under weather conditions of low visibility, and in the other a machine fell into the Channel for some cause at present unknown. Collisions still occur at sea, one not more than a few days ago, yet no one suggests that innumerable precautions over and above those already existing are required. Boating accidents occur almost every week; yet these, if involving the loss of only two or three lives, are reported, probably, in a two-line paragraph—or not at all.

Precautions Taken in Manufacture

Let us examine, briefly, what are the precautions taken to ensure the safety of passengers on the London–Paris service. Before a machine is built, detail drawings of its constructional parts, accompanied by stress calculations showing the factor of safety of every stressed part, are submitted to the Air Ministry experts. The drawings and calculations are gone over very carefully, and if any part is found which does not satisfy the Air Ministry requirements the designers are asked to re-design it. When all drawings and calculations have been thus inspected, and not until then, the designers are allowed to proceed with the construction. Does the Government supervision end here? By no means. Every bit of material used in the machine, be it metal, wood, fabric or dope, is inspected by the Aircraft Inspection Department, and stamped by them before being allowed to be put into the machine. While the materials are being turned into structural parts such as spars, struts, fittings, etc., an A.I.D. inspector is present to examine everything and to reject any part which does not satisfy him.

Finally, the machine is finished, and flown by the manufacturer's pilot. Having tuned the machine up until he is satisfied with its behaviour in the air, the manufacturer's pilot takes the machine to Martlesham Heath, where there is an Air Ministry testing station. Here the machine is put through a number of tests by Government pilots—tests of performance, stability, controllability, landing, etc. When the machine has passed all these tests, and not until then, it is passed by the Air Ministry as fit for carrying passengers, goods or whatever load it has been designed for. Usually the machine then returns to the makers for further tests by their pilot, and when all these experts agree that the machine is as good as it is possible to make it, it receives its airworthiness certificate.

Daily Inspection

And does the Government supervision end here? Assuredly not. The Government, in the shape of the Air Ministry, insists that the machine shall be inspected *before every flight* by a competent expert known as a "ground engineer," who has passed Air Ministry examinations and is declared by the Air Ministry to be competent to judge of the condition of machine and engine (in the class and of the type for which he is licensed). This ground engineer is paid by the operational firm, who has no option in the matter as the Air Ministry insists upon his presence. The ground engineer is responsible to the Air Ministry for passing as fit for flying only such machines and engines as are really fit. If he should, in course of time, become too lenient, he would soon be found out and his licence would be withdrawn; in other words, he would lose his job.

Ground Organisation

We now come to the organisation of the air lines themselves—that is to say, the ground organisation, apart from the care and upkeep of the flying stock. At Waddon there are, in addition to the buildings in which machines and engines are housed and overhauled, wireless offices, meteorological offices, etc. Weather forecasts are sent out from the Air Ministry, and from wireless stations on the route reports are constantly coming in relating to the weather conditions there. Thus, frequently conditions are favourable at Croydon and Le Bourget, but there is a fog in the Channel, or at some point along the route to Paris. It is left to the discretion of the pilots whether, after receiving the reports, they will fly or not.

For use at night, or for machines which have been delayed and do not arrive until about dusk, there is a very complete lighting installation on the aerodromes, and lighthouses have now been erected at various points along the route, both in this country and in France. Recent test flights have demonstrated that, under normal conditions, it is as easy and as safe to fly by night as by day.

The wireless service is both of the ordinary and of the direction-finding variety. All British machines now carry wireless telephones, by means of which the pilot can be in communication with Croydon, Le Bourget and intermediate stations. It is, however, a fact that the French section leaves something to be desired in the manner of promptitude. Thus it is not uncommon for a pilot to be in touch with Croydon until he is well on his way towards Paris, and then he fails to get in touch with Le Bourget, which may be only a few miles away. Here there is undoubtedly room for improvement. But—and this is an important point—the French section of the route is about three times as long as is the British. It is therefore easy enough for us to say it should be improved. But, after all, French pilots are using the route as well as ours, and it is a matter of some delicacy for us to suggest how France should organise her air lines. Much can be done by conferences, but it should not be forgotten that, while at the moment the London–Paris route is, with the exception of the London–Brussels, our only one, it is one of the shortest in France, and France may well regard it as of very minor importance. In that case we can scarcely expect France to spend a great deal of money on it, mainly for our benefit, and without a great deal of goodwill from France the London–Paris route may well prove impracticable as far as we are concerned.

Some Absurd Complaints and Suggestions

During the week there have appeared in the Press letters and articles complaining about existing conditions or offering suggestions for improvements or extra precautions. While some of these have been very sensible and quite to the point, others have been of such a nature as to call for comment: for instance, Mr. Asquith's complaint that his daughters suffered from air sickness on a recent trip by air to Paris. We are very sorry to hear it, but we do think that they must have been most unfortunate in happening to have flown in very "bumpy" weather. Even so, was the passage any worse, we wonder, than a mildly rough Channel passage by steamer?

The suggestion has been made, also, that all machines should be compelled to carry two pilots. While in most machines this would be possible, it would be a somewhat severe tax on the operational companies, who already fail to pay their way, even with present subsidies, on the London–Paris route. On most British machines, it is true, an engineer or navigator is carried next to the pilot, but it is rather doubtful whether an engineer, even with a fair knowledge of piloting, could make a safe landing in case of the chief pilot being taken ill. It seems to us that a more economical solution, which would have other advantages, would be to equip machines with a stabiliser, unless the machine were already inherently stable. Large twin-engined machines have already been flown fitted with the Aveline stabiliser, which relieves the pilot of all control except directional. Even an engineer with only a limited knowledge of piloting should be able to make port safely on a machine thus equipped, while for flying in fog or in the dark the "automatic pilot" would relieve the pilot of a great deal of work. The Aveline stabiliser, it is true, weighs a good deal, but as machines are rarely flying with full loads nowadays, this would not greatly matter. At any rate, it would come cheaper than always carrying two competent pilots.

Another suggestion made is that the machines used should have lower landing speeds. To a certain extent we are in agreement with this view. We cannot view with equanimity a passenger machine which has to make a forced landing at a speed somewhere in the neighbourhood of 80 m.p.h. On the other hand, suggestions, emanating from people having a claim to be regarded as experts, that machines should be able to land at 20 m.p.h. are merely absurd, and only serve to give the non-technical an entirely false idea of the problems involved. In order that a machine could be landed as slowly as 20 m.p.h. it would be necessary to obtain a maximum lift coefficient of 1—which may be possible with high-lift wings, but the wing loading, even then, could only be just over 2 lbs./sq. ft. Such a machine, even if possible of production, would be useless for commercial purposes.

Yet another suggestion is that there should be many more wireless stations, listening posts, lights and what not. If all that is necessary, it points to the absolute unsuitability of the London–Paris route in view of the fact that it leads to nowhere. All these improvements would cost huge sums of money; and what should we have at the end of it all? An organisation which people might come from all over the world to see, but which would run into hundreds of thousands of pounds per year—all for a few thousand passengers who could probably afford to pay much more for their flights (and would do so) on unsubsidised machines. We have not the slightest doubt that the London–Paris route could be made absolutely safe, absolutely reliable and absolutely regular; but in view of the fact that even if it were, the volume of traffic would be wholly insufficient to pay even the interest on the capital, is it worth wasting money on? Frankly, we do not think it is. Support civil aviation we must, but why do it in the least profitable way?

Why Specialise on London-Paris?

Having realised this—that it is by the grace of our Ally, and solely by it, that we can run the London–Paris line at all—does not the question naturally arise: Why do we specialise on such a line? And this brings us to the wider scope covered by the title of these notes—Civil Aviation and national safety. It is now generally admitted, except by the Government, that our safety in the air depends upon a strong civil aviation. Does the London–Paris route offer any scope for building up a strong civil aviation? Does running the London–Paris service teach us anything which we did not already know in 1920? Does it promise ultimately to lead to expansion farther afield? We think that to all thinking people the answer of all these questions must be "No." Climatically the London–Paris route is one of the worst that could have been chosen. The two cities are already served by one of the best train and boat services in the world. Owing to the time wasted in getting to and from the aerodromes, the machines used on this service must be very fast—about 120 m.p.h., at least—in order to compete, in point of time, with existing facilities. This means relatively small carrying capacity; in other words, uneconomical machines. Owing to some extent to the already excellent travelling facilities, the amount of passenger traffic available on the London–Paris service is very limited. This is now beginning to become evident. Quite apart from any dropping in bookings that may have resulted from the two accidents referred to, there is not a great volume of passenger traffic, and yet three British firms have been subsidised to run services on this route. What is the result? That machines have to fly with half or quarter loads; that all three firms cannot possibly come within sight of making the services pay; that to carry on they will probably have to be further subsidised: in short, waste and inefficiency. If we could see that, sooner or later, the London–Paris services might reasonably be expected to develop, to expand, or if they were teaching us something, we should not feel disposed to begrudge a few thousands of pounds spent in keeping them alive during the earlier stages. But the London–Paris service, as far as we are concerned, is a blind alley; it leads to nowhere beyond Paris, as far as carrying passengers by British machines is concerned. It is scarcely to be expected that France would let a British company operate a service from, for instance, Paris to Marseilles. She would probably not object to our running a mail service across France, so long as we did not pick up mails and passengers *en route*, but, except on sufferance, the London–Paris line is to us a *cul-de-sac*, and the sooner we realise it the better. To continue to spend money on a route which can teach us nothing, for which an expensive ground organisation is necessary involving an expenditure out of all proportion to the amount of traffic existing, or which can reasonably be expected during the next few years, and which leads to nowhere, is sheer waste. That we must continue to spend money on civil aviation, and spend much more than we have done, is quite obvious; but that is not saying that we must continue to spend it in the direction in which there is least hope of a reasonable return.

When the London-Paris service was started in 1919 it formed a good test route. It was known to be bad from a meteorological point of view, but that had, at any rate, the advantage that if we could maintain a fair regularity under the conditions there obtaining we should be likely to be in a position to do so practically anywhere else in the world. The now defunct Aircraft Transport and Travel demonstrated beyond a doubt that it was possible to maintain a reasonably good regularity over that route. It also demonstrated that the machines used, converted war machines, did not and could not pay as a commercial proposition. That lesson having been learned, it might have been thought that those in authority would have commenced to look elsewhere for routes offering better prospects and being favoured by better climatic conditions. Not so. We still stuck to the London-Paris route—of which we do not complain, French competition and subsidisation made that necessary—but we stuck to it to the exclusion of all other routes. That is where the mistake was made. We now see the result.

Where the Seaplane Scores

As destructive criticism is of little use unless accompanied by suggestions for improvements, it may be well to examine briefly in what other directions we should have looked—and must look in the future—for better use of our money and brains. The case for the seaplane has been stated in FLIGHT in season and out for the last several years. We have made a point of publishing, whenever possible, full reports of articles and papers dealing with the design and construction of seaplanes, realising that a knowledge of the technical problems—which are quite different from, and considerably more difficult than, those relating to land machines—was essential if progress was to be made with the development of the seaplane. Lately we have had occasion to call attention to the neglect to which the seaplane has been subject in this country, and have published articles showing the use which other countries have made and are making of this type of aircraft.

The arguments in favour of the seaplane have been stated in this journal repeatedly, but they may be briefly summarised here. To begin with, the seaplane is not competing with express trains travelling at some 60 m.p.h., but with steamers having a speed of 20 m.p.h. at the most. In view of the fact that the steamer travels day and night, and assuming that at the moment this is not possible for the seaplane, we must approximately double the steamer speed to compete in point of time. That brings us to a speed of 40 m.p.h. necessary for flying during 12 of the 24 hours in order to make good the same distance as the steamer. If, therefore, the seaplane has a cruising speed of, for instance, 70 m.p.h. with a maximum speed of 100 m.p.h. or so, it will easily beat the steamer in point of time, and, moreover, at a cruising speed of 70 m.p.h. the power loading of a seaplane can be as high as 30–35 lbs./h.p. at cruising speed. In order to provide a reserve of power, the full-power loading should, of course, be somewhat lower, but even that may be as high as 20 lbs./h.p. or a little more. Now all these figures mean that a seaplane can carry a *paying load* (for a flying range of about 400 miles) of approximately 8 lbs. per horse-power. What land machine, of the speed necessary on the London-Paris route, could show a figure even beginning to approach this?

Then there is the question of aerodromes and ground organisation. Land machines require large and costly aerodromes, costly not only in first cost but also in upkeep. They necessitate—over a route like the London–Paris at any rate—a network of wireless stations, meteorological stations, emergency landing grounds for use in case of engine failure, lighthouses and arrangements for illuminating the aerodromes at night. The seaplane, always flying above its "aerodrome," does not require any of these. Use can be made of existing lighthouses, customs and passport organisations, without the need for establishing special ones. Thus any subsidy spent on seaplane services can be used, mainly, in developing better and better machines. Night flying, and flying in fogs, present far smaller obstacles to the seaplane than they do to the land machine. As long ago as 1913 Mr. Pemberton-Billing invented and constructed an instrument by means of which indication was given to the pilot when he was a certain distance, say 50 ft., above the sea. It was then a relatively simple matter to "land" the machine. Improvements have since been effected in instruments for a similar purpose, and a trained seaplane pilot should have little difficulty in making a safe "landing" in the dark or in a fog.

On the question of forced landings a seaplane would be no worse off in stormy weather than is a land machine in a fog. As a matter of fact, the sea which a seaplane will negotiate (and by seaplane we mean flying boat at least as much as a twin-float machine) is largely a matter of size, as in the case of ships. What is a very heavy sea to a dinghy is only a ripple to a steamer, and so on. For use over fairly calm stretches of water a fairly small seaplane would be perfectly safe. For use over more open and disturbed stretches, the seaplanes used should be larger, but there is no difficulty in building fairly large seaplanes, even with the knowledge we have today. In this matter of size the seaplane is far better off than is the land machine. Doubling or trebling the size of a seaplane does not introduce any great problems, but a similar increase in the size of aeroplanes is attended with various difficulties. For instance, to mention but one, the bearing load on the wheel axles and the bearing area of the wheels themselves on the ground are matters which assume some importance in a very large land machine. An excellent instance of this was provided at the Elta show at Amsterdam. The aerodrome was newly laid down, and was, although fairly hard on the surface, decidedly soft underneath. The small light machines had no difficulty in alighting and getting off, but the large, heavy, twin-engined machines were bogged and stood on their noses.

From the point of view of seaplanes as a national necessity, it cannot be doubted for a moment that in the future great numbers of seaplanes will be required to co-operate with the Navy. If we are to gain the necessary experience in design and construction, and in the training of personnel, purely during routine work with the Navy, it will cost enormous sums of money if it is to be done on a scale commensurate with our requirements. On the other hand, if we choose to develop the seaplane along commercial lines (as well, of course, as along the highly specialised lines which the Navy will certainly demand), there is every prospect of being able to do this at a very reasonable outlay, owing to the excellent prospects which the seaplane offers of being a paying proposition, or very nearly so.

Some Seaplane Routes

With this brief outline of what the seaplane has to offer, let us turn to the question of its practical application in civil aviation. The possibility of being able to use rivers running through towns as "aerodromes" is a fascinating one, avoiding as it does the delay of travelling to and from an aerodrome situated several miles outside towns. In very many cities this would be feasible. Experiments have shown it to be feasible under favourable conditions both in London and Paris. Both rivers are, however, relatively narrow, are fairly crowded with surface traffic, and, finally, the route to Paris leads to nowhere as far as we are concerned. A service could undoubtedly be operated between the two cities, but it would have to be run with machines of light power loading, and therefore with small capacity for paying load. It is therefore questionable whether that route would offer any better prospects than do the existing land-machine routes.

We know that in the colonies and dominions there are innumerable opportunities for using the seaplane; but without going so far afield, let us examine whether there are not, nearer home, routes which could profitably be exploited. For instance, our road to Central and Northern Europe lies over Belgium, Holland, Germany, Denmark, Sweden and Norway. In order to reach all these countries it is necessary to cross an arm of the North Sea, or, at any rate, the Straits of Dover. Is there any reason why a flying-boat or seaplane service should not be run from some east coast port, or from the mouth of the Thames, to Antwerp, Amsterdam, Emden, Bremerhaven, Hamburg and onwards to Copenhagen, Stockholm and Christiania. In the case of a letter to Copenhagen, it takes three days from posting in London to delivery in Copenhagen. By a seaplane or amphibian service it should be possible to leave London early in the morning and be in Copenhagen the same night. In other words, a letter would not take more than 24 hours, instead of the 72 now taken. The saving to the other ports mentioned would be in proportion. For a passenger service it might be advisable to use one of the east coast ports as the seaplane terminus. At Harwich, for instance, there are already customs and passport facilities for Denmark and Holland. The train service is excellent (about 1½ hours), and the Felixstowe seaplane station might be taken into use.

Later on, when and if things settle down a bit in Ireland, a seaplane service between London and Ireland should help considerably in bringing the two closer together.

Again, in order to bring nearer such parts of the Empire as India and Australia, a flying-boat service from Marseilles (if French permission could be obtained) *via* Malta and Crete to Egypt, or possibly as far as Karachi, should be feasible. By linking up with the existing overland air route to Baghdad a very great saving in time could be obtained.

In India, Australia, New Zealand and Canada there are enormous possibilities, but it appears to us that the first step should be made at home, by bringing these places nearer to London. And how can we, except by airships, hope to do so without taking into our service the possibilities of the seaplane? Some of the routes indicated would take the seaplane over fairly long stretches of land, and might make the use of amphibians advisable. But even in an ordinary seaplane not so fitted we would far rather travel across country than we would across wide stretches of sea in a land machine. During the war it was repeatedly shown that, even with such a relatively primitive outfit as a "225," it was possible to penetrate quite far inland. The flying boat has, on occasion, been known to make quite a respectable landing on grass. But what land machine has alighted on the sea without serious damage to itself and, at least, great inconvenience to its passengers?

We could go on advancing reasons for seriously setting to work on seaplane development, but sufficient has, we think, been said to indicate the sheer folly of continuing to spend large sums on the London–Paris route, where the return is not, and cannot be for years, in the slightest commensurate with the outlay and expense of the organisation. We do not suggest that the London–Paris service should be stopped altogether, but we do think that one firm would be quite sufficient to subsidise on that route, and some of the money might be spent to far greater advantage in subsidising a few seaplane services which had, at least, a reasonable prospect of becoming self-supporting some day. That the London-Paris route will not be for years. And while we stick to this route, using land machines, England is and will remain "off the map."

Personals

Married.

Flying Officer **Dudley Fisher Cox**, R.A.F., the youngest son of Mr. and Mrs. H. R. Cox, was married on June 6, at St. Jude's, Hampstead Garden Suburb, to **Dorothy**, eldest daughter of Mr. and Mrs. **Bastable**, of The Gables, Woodlands, Hendon.

On June 7, at Stoke-Damerel Church, Devonport, Flight-Lieut. H. M. **Daniel**, R.A.F., was married to **Margaret Anna**, youngest daughter of the late Mr. **Percy Bulteel** and Mrs. **Matthews**, of Plymouth.

Douglas Gordon Nairn, Major, R.A.F., was married at Ottawa, on June 10, to **Florence Muriel**, daughter of Mr. and Mrs. **Mabee**, of Ottawa.

Capt. **Evelyn Jack Needham**, late Northants Regt. and R.A.F., elder son of the late Col. the Hon. H. C. Needham and the Hon. Mrs. Needham, of The Gate House, Windsor, was married on June 7, at St. Michael and All Angels, Warfield, to **Mary Campbell**, only child of the late Rev. B. C. **Littlewood**, M.A., Vicar of Warfield, and Mrs. Littlewood, of Hillside, Bracknell, Berks.

To be Married

The marriage will take place on June 29 between **George Veevers Carter**, R.A.F., and **Mary Gladys Stark**, daughter of the late Dr. M. D. **Stark**, of Oxford.

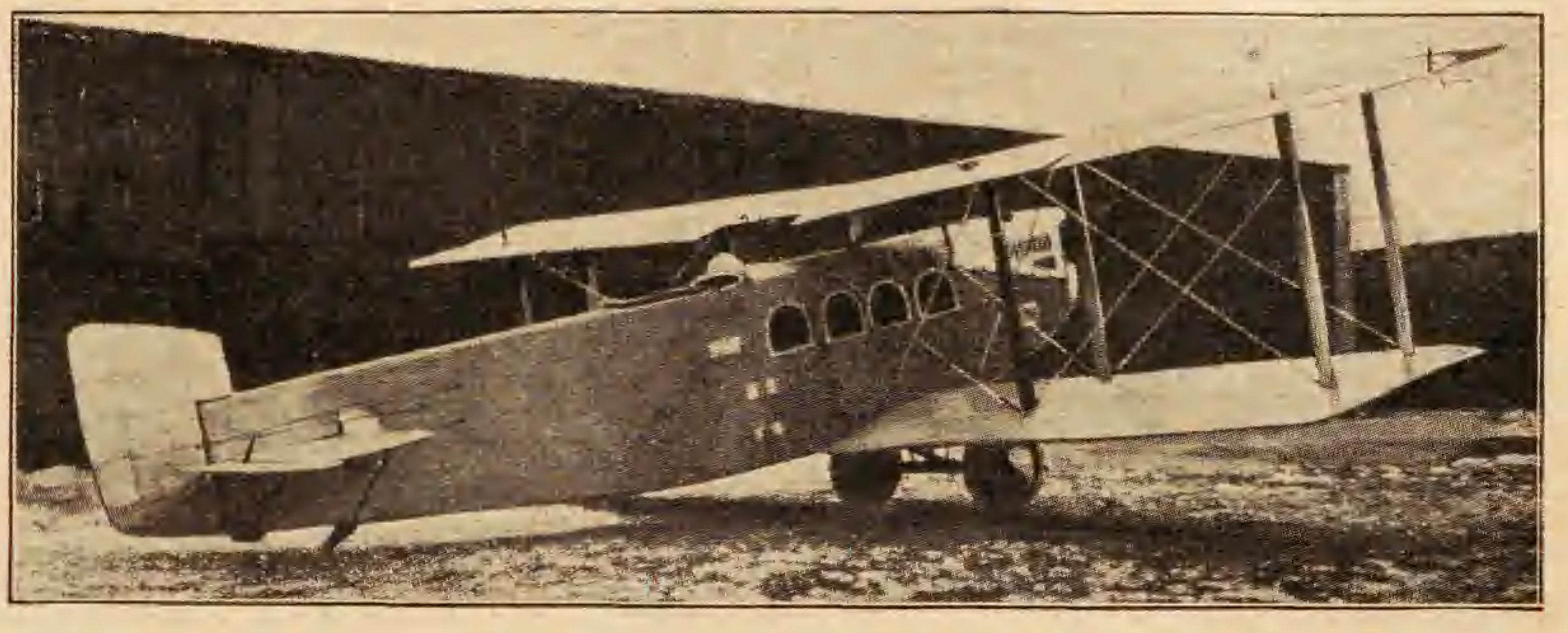
The engagement is announced between **Grenville Wainwright Wilson**, D.F.C., R.A.F., only son of Capt. A. C. Wilson, of Wilsonia, South Africa, and **Cicely**, youngest daughter of the late **John Lane Densham**, late of Waldronhyrst, Croydon.

A NEW CZECHO-SLOVAK COMMERCIAL BIPLANE

The Limousine Ae 10

IN the first commercial aeroplane to be designed and constructed in Czecho-Slovakia this re-born country has demonstrated that, in spite of the fact that up to a few years ago its aviation industry was conspicuous for its absence, it is already capable of taking its place amongst the foremost aircraft constructing nations. This new commercial machine has just been turned out from the works of the Aero Aircraft Factory of Prague, whose designers, MM. Husník and Vlasák, are to be congratulated in having produced a machine the general lines of which at once strike one as being both practical and pleasing to the eye.

The Limousine Ae 10 was designed to meet the needs of the growing demand for aerial intercourse with neighbouring countries, the Republic being determined to take an active part in the various aerial services running, and to be run, to and from Czecho-Slovakia. It is a tractor biplane, with a deep *fuselage* of good streamline form. The engine, a 260 h.p. Maybach Mb. IVa, is mounted in the nose and drives a 10 ft. 3 in. tractor screw. The radiator is mounted behind the latter, and has been found to give very satisfactory results, causing little resistance.

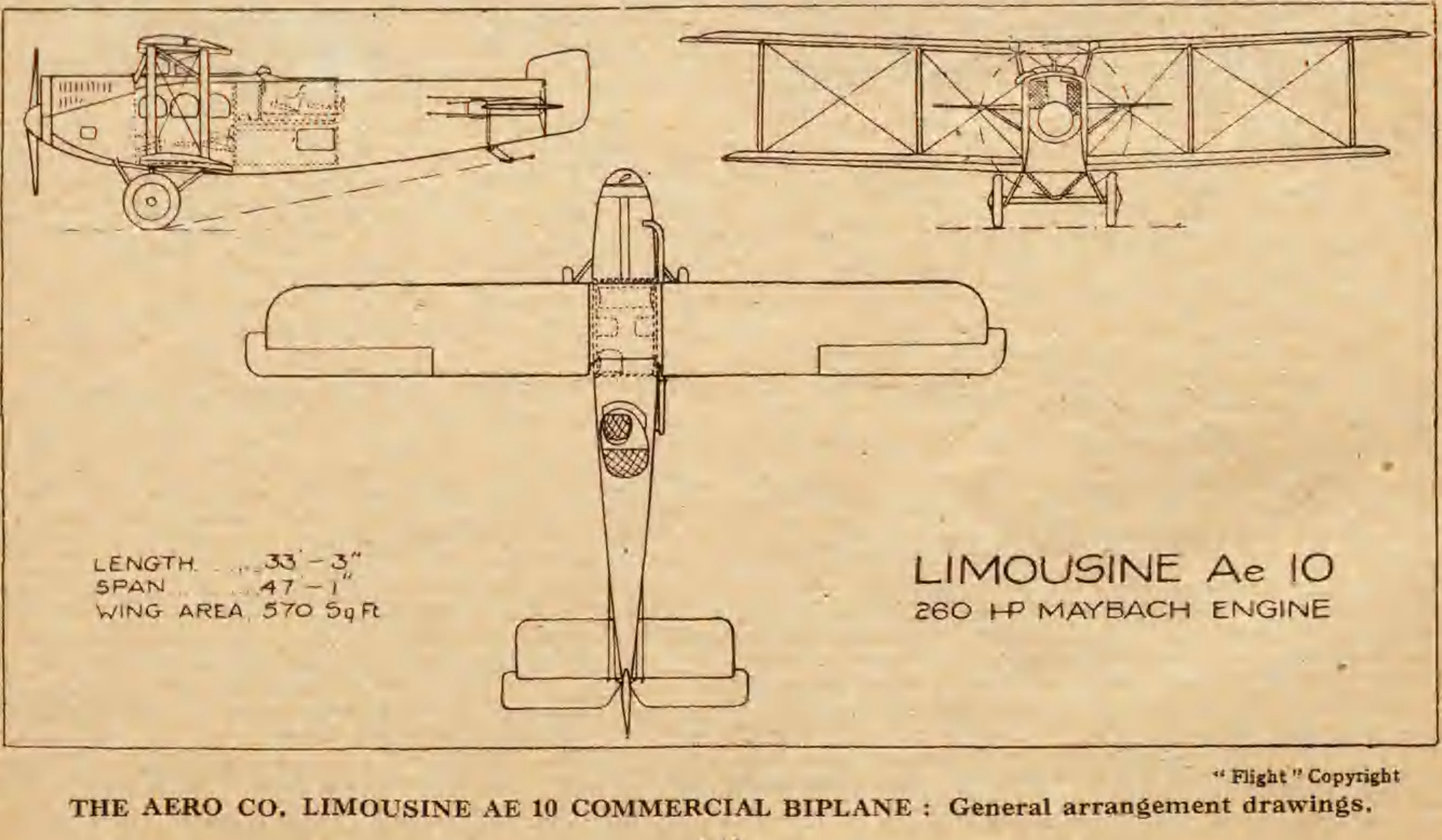


"Flight" Copyright

THE AERO CO. LIMOUSINE AE 10 COMMERCIAL BIPLANE : Three-quarter rear view.

Behind the engine is an enclosed cabin accommodating three or five passengers, and separated from the engine compartment by a double metal-covered partition as a precaution against fire. The cabin is very roomy, well upholstered, and has double walls, ceiling and flooring, giving an exceedingly strong construction ; it is also isolated and noise-proof, and so adds to the safety and comfort of the passengers. Three windows, glazed with Triplex, on each side of the cabin give a good range of vision, whilst the rear window may be used as a direct communication between the cabin and the pilot—conversationally, of course.

Access to the cabin is by means of a door on the right-hand side of the cabin. In the cabin are three comfortable seats, and two tables which are upholstered underneath, so that they can be tilted up and used as seats when two extra passengers are carried. At the rear of the cabin is a space for luggage, measuring 5 ft. 10 ins. by 3 ft. by 2 ft. Above this is the pilot's cockpit, just behind the main planes, from which an excellent view in all directions is obtained. Provision is also made for the accommodation of a navigator, who has a seat just behind the pilot, and both can easily change places if desired. A fire extinguisher, in direct communication with the engine and carburettor, is also located in this cockpit.



"Flight" Copyright

THE AERO CO. LIMOUSINE AE 10 COMMERCIAL BIPLANE : General arrangement drawings.

The main planes are in five sections, the lower in two attached direct to the *fuselage*, and two upper attached to a small centre section. They are set at a dihedral angle, but no sweep-back, and the top plane has a very slight overhang. Balanced *ailerons* are fitted to the top plane only. The main petrol tank is carried in the top centre section, whence the petrol is led by gravity through a single pipe, *via* a filter, direct to the carburettor. The petrol system is thus of the simplest form possible. The tank is filled by means of a special pump, and the petrol passes through a filter before entering the tank.

The tail plains are of tubular steel construction, fabric covered, and consist of an adjustable rectangular horizontal stabiliser, mounted between the upper and lower *longerons* just above the line of thrust, two balanced elevators hinged to the stabiliser, and a balanced rudder. No vertical fin is fitted, as the flat sides of the *fuselage*, which tapers to a deep vertical knife-edge, renders this unnecessary. The controls are of the conventional type—elevator and *aileron* column, and rudder bar.

Special attention has been given to the undercarriage, as it was realised that many of the accidents are caused by faulty landing gear. The two wheels are of large diameter—960 mm.—with the object of enabling the machine to land on very soft and uneven ground. They are located well forward, which has the effect of giving a quick pull up. The wheels are mounted on a divided axle, with rubber shock absorbers, which is carried by twelve steel struts, having six points of attachment to the *fuselage*. These struts are arranged in three pairs of "M's," when viewed from the front, as indicated in the accompanying general arrangement drawings. Landing shocks are thus well distributed over the *fuselage*; in places the factor of safety is about 12, both in the landing chassis and cabin. Throughout the machine double wiring is employed.

The principal characteristics of the Limousine Ae 10 are :—

Span	47 ft. 1 in.
Chord	5 ft. 9 ins.
Length	33 ft. 3 ins.
Height	11 ft. 8 ins.
Area of main planes	570 sq. ft.
Useful load (3 pass.)	1,650 lbs.
Weight, fully laden	1,620 lbs.
Weight/sq. ft.	8·2 lbs.
Weight/h.p.	17·7 lbs.
Speed	93 m.p.h.
Duration	4 hours.
Engine	260 h.p. Raybach.

THE "SYLPHON" PETROL PUMP

AN interesting type of petrol pump is being used on Liberty "12" and Wright Model "H" engines in America. This pump, which is known as the "Sylphon," was designed with the object of replacing air pressure feed, where sufficient gravity head is not available. The principal features of this pump are that it eliminates troubles arising from glands, and their packing, and that it gives a maximum discharge pressure at high speeds and sufficient delivery of fuel at any speed, thus eliminating the employment of a relief valve.

The elimination of glands is achieved by the use of metalic (thin copper) bellows, which go by the name of "Sylphon," by means of which the petrol is drawn from the tank and delivered to the carburettor. The bellows are in duplicate, so that in the event of one pumping unit failing, the other will maintain sufficient fuel supply for all engine speeds.

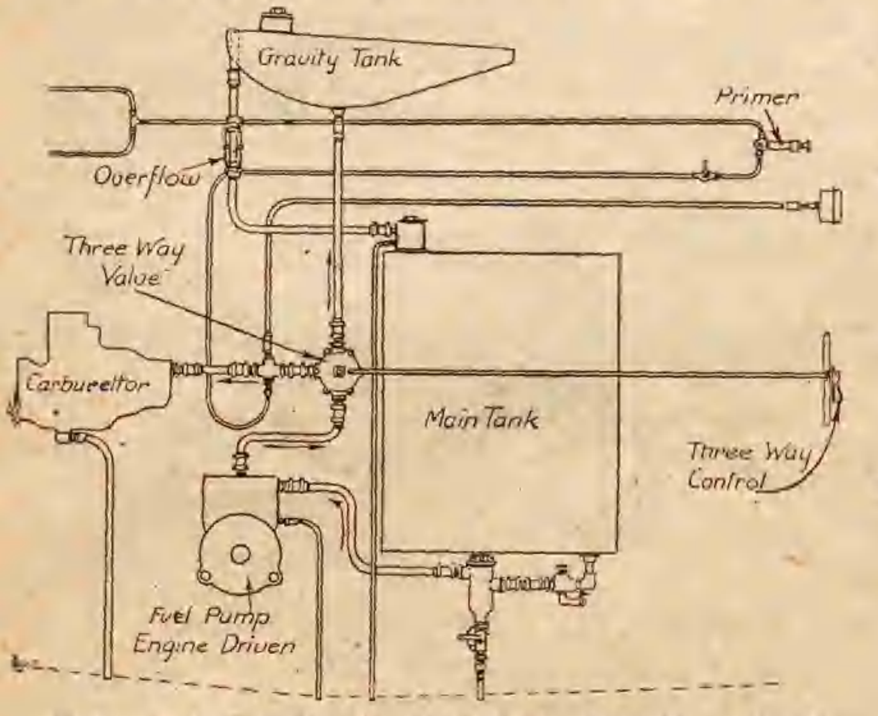
At present this pump is produced for use on the two engines previously mentioned—the Liberty "12" and the Wright "H"—but the only difference between the two models is in the drive-shaft and the base casing flange.

This pump consists of two main castings, a lower one containing the driving gear and the upper one containing the pumping units. In the lower casting is a four-pitch worm, shaft, coupled direct to the rear end of the engine crankshaft in the case of the Liberty, and to the magneto drive gear shaft in the Wright. The worm meshes with a 32-tooth worm wheel, giving an 8 to 1 reduction, which is carried by a bracket extending down from the partition separating the two castings. The worm wheel is attached to a camshaft, having a cam on each side, each of which actuates a cam roller attached to a vertical cam follower. The upper end of the cam followers extend into the bellows chamber, where they are attached to flanges to which the bellows are soldered. Bronze bushings are provided for the cam followers in the camshaft support, and in the base of the gear chamber.

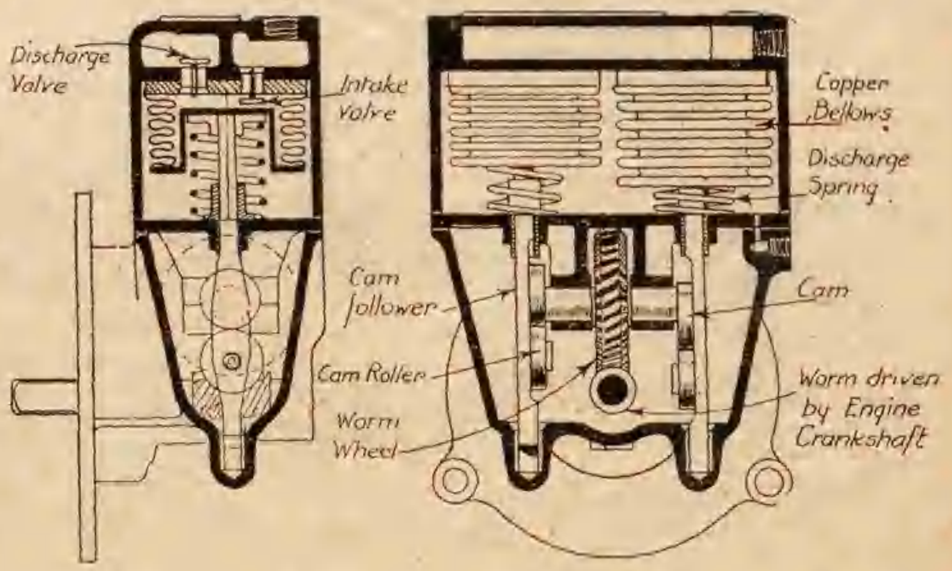
The upper ends of the bellows are soldered to a head plate in the upper casting, which also carries the inlet and outlet valves, these being, of course, in direct communication with the bellows. Between the bellows flange and the base of the bellows chamber is a coiled spring which tends to keep the bellows contracted.

The action of the pump is thus: As the worm rotates the worm wheel, the cams move the camfollowers down against the action of the spring, extending the bellows and drawing in a supply of petrol through the inlet valve. The bellows are then returned to the original position—discharging the petrol through the outlet valve—by the spring, which is designed to give a maximum pressure of 4½ lbs. per square inch, with a closed discharge. Thus, should the pressure of the petrol between the engine and the pump exceed that exerted by the spring, the bellows will remain extended and the cams will "idle" until the pressure falls.

There are two intake and two outlet valves, each a unit, screwed into the valve chamber, which forms the upper part of the bellows chamber. The valve chamber is divided by a partition, on one side of which are the two intake valves, and on the other side the two outlet valves. The valve units may easily be removed if necessary. Two outlets and two inlets are provided, so that connection may be made from the top or sides as required; plugs are screwed into the unwanted connections. A hole, having ¼ in. pipe thread about one half way down on one side of the pump, is utilised as a drain in case a gasket or bellows leaks.



THE "SYLPHON" PETROL PUMP: Diagram showing a standard fuel system employing the "Sylphon" pump.



THE "SYLPHON" PETROL PUMP: Diagrammatic sketch showing the mechanism.

LONDON TERMINAL AERODROME

Monday, June 12, 1922.

Air passenger traffic shows no signs of improvement. It is in fact, if anything, rather on the downward grade. What makes it seem really worse than it really is is the comparison with last year, when machines were daily carrying full loads, while now there are so many machines running daily that, although the passenger traffic is almost the same as last year, there are very few travellers per machine, and the illusion of only a driblet of traffic is created. I am informed that the Handley Page Transport are, in fact, carrying a record number of passengers, but as they are running twice as many machines as at any previous time in their existence, their machines are by no means full.

The air-station is fairly seething with indignation against adverse articles in the daily Press; but there are a thinking few who are of the opinion that good will come of these articles in the long run, as they are bringing skeletons out of the cupboard, and may probably hasten remedial measures.

It is interesting to note that one day last week there were no fewer than 28 machines in and out between London and the continent, and the total of passengers for the day was only 27. There were, of course, mails and goods in addition.

London-Amsterdam Goods Service

The goods traffic between London and Holland is developing rapidly, and the daily load is now in the neighbourhood of three-quarters of a ton. Passengers are really quite a side-line of this service, but even these have been increasing slightly. There is now a regular daily consignment of freshly-cut flowers arriving in London by air from Amsterdam, and on several occasions recently this traffic alone has been almost sufficient to fill one of the F. 111 monoplanes. Quite a novelty in aeroplane cargoes was a consignment of queen bees that arrived from Amsterdam on Thursday. Each queen bee was packed in a special container, a little larger than a matchbox, and with a perforated top to allow fresh air. They were immediately passed through Customs and motored to London where they were placed on the first express train to Dumbarton in Scotland.

With the gradual increase in the goods traffic the Customs officers have found their office accommodation rather cramped, and alterations which have given them another and pleasanter office, in addition to the old one, are now completed. In common with the rest of the Government staffs on the aerodrome, they have now to keep a constant attendance from before 5 a.m. almost to dusk.

The weather has been reasonably good all the week, with the exception of Friday morning, when the early-morning machines were unable to get away, and those leaving before nine o'clock were held up on the route to the coast.

Mr. Cobham's Flight from Belgrade

It was unfortunate that this should have happened on this particular day, as Mr. Alan J. Cobham was expected to arrive after a particularly fine flight from Belgrade. Mr. Cobham is always departing to, or arriving from, some remote part of the map, so that his comings and goings do not now excite much attention; but on this occasion the details of the flight were exceptional. In order that *The Daily Mirror* should pander to the taste of its numerous women readers for wedding pictures, Mr. Cobham had undertaken to bring photographs of the royal wedding in Belgrade to London—a distance of nearly 1,200 miles—in a flight which, apart from the necessity of alighting for petrol, was practically continuous night and day. He was expected to arrive at the air-station between 2 a.m. and 3 a.m. on Friday morning, but after a ceaseless struggle with the weather, from Strasburg to south-east England, he was forced to descend finally at Penshurst at 8 a.m. and bring the pictures to London by motor, afterwards returning to Penshurst and, when the weather had cleared, flying his D.H. 9 back to Stag Lane.

The Daimler Airway still continue to run their one machine twice a day between London and Paris, and, in spite of its constant 1,000 miles a day, the regularity of the service is such that the arrival of "the red machine" over the aerodrome in the evenings gives workers in the gardens and allotments round about a very good idea of the time.

Vickers "Vulcan" on the Airways

The Vickers "Vulcan" is now running regularly on the Instone Air Line services to Paris and Brussels. The Instone pilots have been making trial flights in the machine in order to get it on their licences, and on Saturday Mr. Powell, with seven passengers on board, in addition to goods and baggage, took the machine off in 14 seconds! The Instone Line have now arranged a round trip by air between London, Brussels, Paris, and back to London again.

Quite the most interesting event of the week was the night flight from Paris to London, and back, made by one of the Farman "Goliaths" of the Grands Express. Piloted by M. René Labouchere, and carrying eight passengers, the machine left Paris at 10.22 p.m. on Wednesday evening, and for the first section of the night flight had to contend with thunderstorms, and intermittent heavy rain and hail showers. M. Labouchere told me that at Beauvais the weather cleared somewhat, and by the time Abbeville was reached the conditions were perfect. The "cone-light" at Lympne was picked up when the night-flyers were still over France, and the lights at Croydon could be seen from Tonbridge.

The "Goliath" arrived at the air-station at 1.12 a.m., appearing over the aerodrome at a height of 8,000 feet. The navigation lights on the machine were plainly seen, even at this height, and the two headlights fitted below the *fuselage* were quite brilliant. M. Labouchere alighted on the aerodrome with the aid of the ordinary paraffin-flares and his own headlights. After an impromptu supper at the Trust House, the passengers embarked again in the machine and flew back to Paris, although the meteorological reports stated that the weather on the French side was becoming steadily worse.

This particular Goliath is not only fitted with navigation lights, but is also the only foreign machine on the airways fitted with wireless, while, in addition, the Aveline stabiliser is also installed. M. Gaston acted as relief pilot during the return night flight.

This flight is memorable as an indication of how near we now are to regular night flying. I understand, in fact, that the only thing that is stopping regular night operation on the airway is the attitude of the insurance companies, who are quoting very high premiums for the insurance of machines which are to be used at night.

Captain Muir, of the Surrey Flying Services, has been quite busy during the week-end with joy-riders, who now seem to be coming along in good numbers. During the week Captain Muir was again carrying out flights for the testing of a new type of parachute. I understand that the Surrey Flying Services are shortly sending out a joy-ride machine for a tour round England; or, alternatively, they may locate it at some popular spot where joy-riders are likely to be a paying proposition.

Mrs. Vernon Castle, the well-known dancer, hired a special Handley Page W 8 the other day in order to fulfil a dancing engagement in Paris, and she paid the Handley Page the compliment of saying that, had one or two chairs been removed, there was such steadiness in the machine's flying that she could have danced in the saloon while in the air.

Apropos the flower consignments from Holland—mentioned earlier in these notes—the interesting fact now transpires that flower-sellers in places other than London are beginning already to avail themselves of the speedy transport afforded by the air carriage from Holland. At the K.L.M. offices on the aerodrome, for example, a trunk call came through on Monday morning from Birmingham, asking that certain cases of flowers, from among the consignment due in on the machine arriving from Amsterdam at midday, should be so labelled that they could catch a train early in the afternoon at Euston for Birmingham—where the flowers would, in fact, arrive fresh that same evening, having travelled through all the way from Holland in a single day.

The K.L.M. are, by the way, putting on a special 6 a.m. monoplane on Wednesday to take newspapers over to Holland in connection with the European economic conference which, following upon the deliberations at Genoa, is about to open in the Peace Palace at the Hague.

The Avro Company has, it seems, received an order from the Russian Soviet Government for an Avro "Baby." The machine, while *en route* by air for Moscow, has apparently been delayed somewhere in Germany with engine trouble, and the other day Mr. Bert Hinckler went over by the monoplane service to Holland with a view to travelling on by train to the point where the machine was hung up, and dealing with the trouble, whatever it is, from his expert knowledge in the handling of this machine.

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An All-Metal Spad Monoplane

From Paris it is reported that M. André Herbemont, the famous Spad designer, has just completed loading tests of a new all-metal monoplane. No details are available, but we understand that the tests indicated a factor of safety of 13.5.

CENTRE OF PRESSURE COEFFICIENTS FOR AEROFOILS AT HIGH SPEEDS[*]

By W. S. DIEHL.

It has been customary to calculate the strength of the rear wing beam for the "high-speed" condition on the assumption that the centre of pressure was at 0.50 of the wing chord. It can be shown that this assumption is not justified, regardless of the utility of a "high-speed" condition in strength calculations.

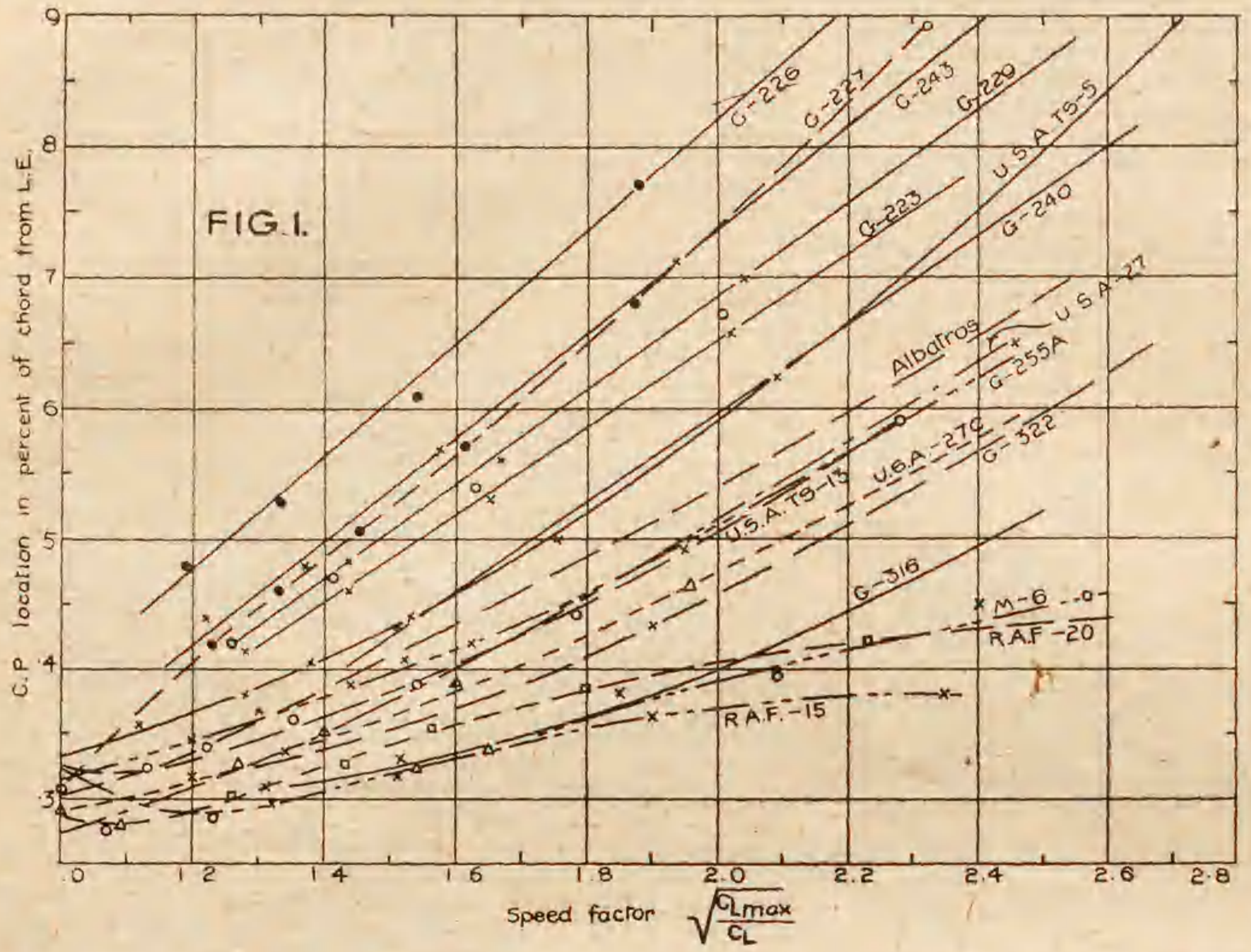

Fig. 1: Variation with speed of the centre of pressure of representative aerofoils.

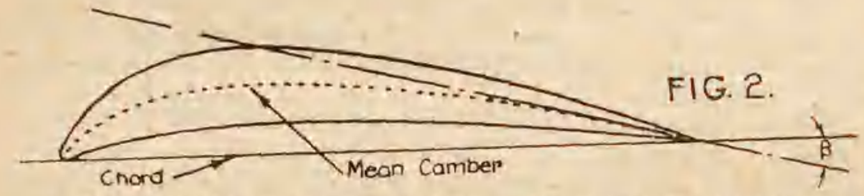

Fig. 2: Diagram showing "Angle of Trail."

In the course of an investigation of the C.P. movement for a series of aerofoils, it was found that the C.P. moves rearward more or less uniformly with increase in speed. This is shown in Fig. 1, in which the C.P. data for a number of notable aerofoils are plotted against the speed factor $C_{L_{max}}/C_L$. It will also be noted that there is a wide variation in the C.P.

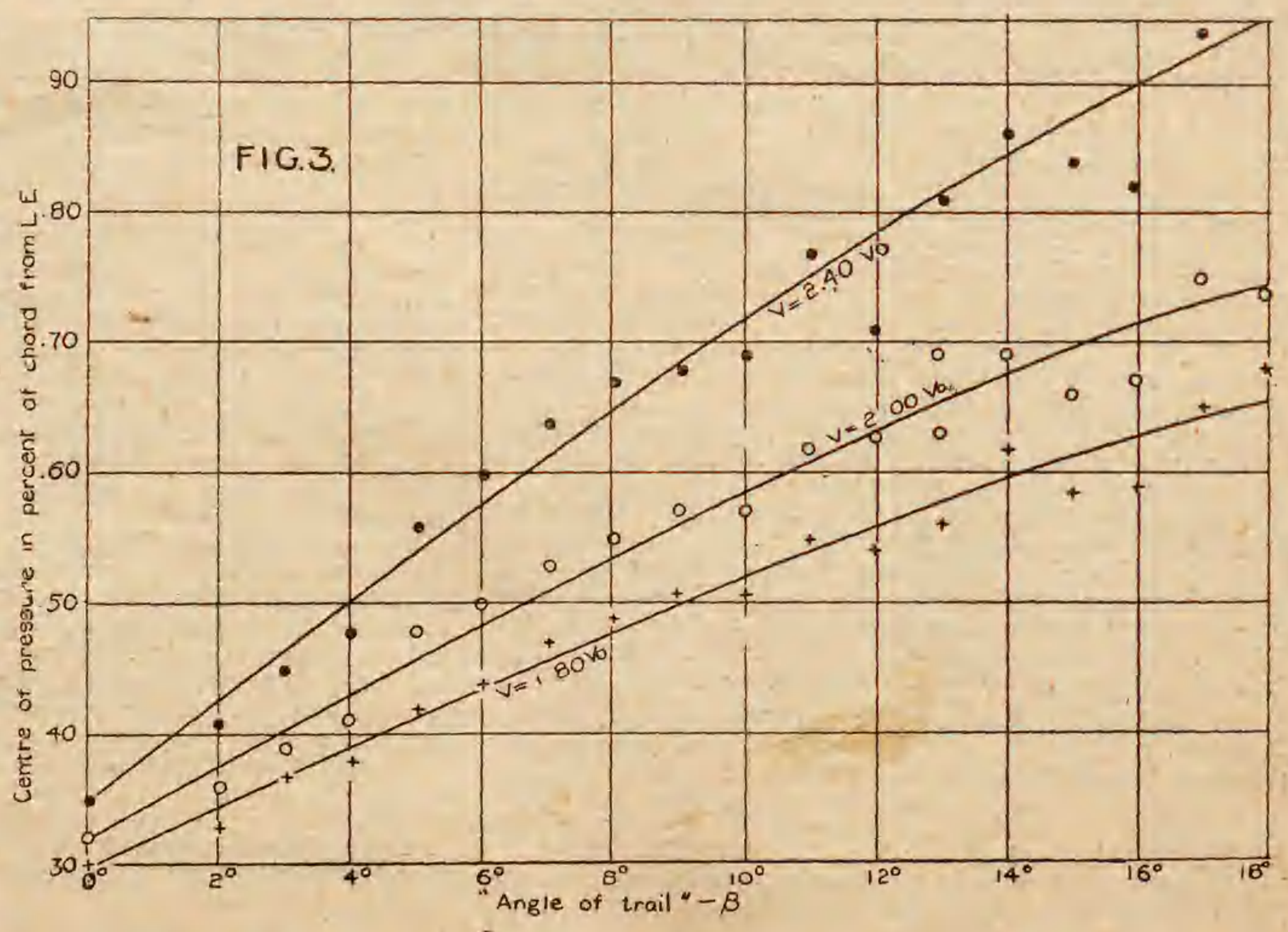

Fig. 3: Centre of pressure variation with speed and angle of trail. Göttingen aerofoils.

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[*] Technical Note No. 25 of American National Advisory Committee for Aeronautics.

location at a given speed factor for the aerofoils given. The C.P. location at high speeds is invariably well forward for thin "high-speed" aerofoils and well aft for thick "high-lift" aerofoils.

It has been shown in a series of recent papers by some of the leading continental mathematicians that the centre of pressure for certain aerofoils may be calculated from the curvature of the mean camber. The methods are quite involved, and therefore useless from the view-point of the average engineer. It appears, however, that a practical substitute for the curvature of the mean camber is the "Angle of Trail," or angle between the chord of the aerofoil and the tangent to the curve of mean camber at the trailing edge, as shown in Fig. 2. The centre of pressure data for 117 aerofoils of the Göttingen series have been analysed in order to connect the C.P. movement with the angle of trail. The results are given in Fig. 3, in which the C.P. for three speeds, expressed in terms of the landing speed, are plotted against the angle of trail, β.

It is obvious from an inspection of Fig. 3 that the greater the angle of trail the further aft will be the C.P. at a given speed factor. It should be noted that the C.P. movement increases with an increase in β to such an extent that the usefulness of aerofoils of this class may be limited to aeroplanes having a low speed range, *i.e.*, ratio of maximum to minimum speeds. The assumption of 0.50 as the position of the centre of pressure at high speed is obviously without justification.

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THE ROYAL AIR FORCE

London Gazette, June 6, 1922

General Duties Branch

The following are granted short service commns., for three years on the active list, as Flying Officers, with effect from, and with seny. of, the dates indicated:—A. W. Crees; May 24. R. M. Taylor, M.C.; May 24. F. B. Young; May 26.

The following Lieuts., Army, are granted temp. commns. as Flying Officers, with effect from, and with seny. of, the dates indicated, on seconding for four years' duty with the R.A.F.:—F. W. G. Bedford, Black Watch; March 7. G. Horsfield, R.F.A.; April 9. H. P. Maltby, R.G.A.; J. H. Tanner, R.G.A.; S. McD. Watson, R.G.A.; May 3. E. F. Colam, Middx. Regt.; May 22. Flying Officer J. H. Woodgett is placed on the retired list; June 7. The following Pilot Officers resign their short service commns., June 7:—L. B. J. Bumstead, M.C.; A. E. L. Scott-Atkinson.

Medical Service

J. Prendergast, M.B., B.A., is granted a short service commn. as a Flying Officer (Hon. Flight Lieut.), with effect from, and seny. of, May 15. E. Huntley, M.B., B.S., is granted a temp. commn. as a Squadron Leader with effect from, and with seny. of, May 22. Capt. W. E. Hodgins, M.B., R.A.M.C., is granted a temp. commn. as a Flight Lieut., with effect from, and with seny. of, May 24, on seconding for three years' duty with the R.A.F.

Nursing Service

Miss C. M. Moore resigns her appt. as Sister; June 8.

Memorandum.

Second Lieut. L. G. H. Aspinall to be Lieut. (Ad.); Oct. 20, 1918. (Since relinquished). *Gazette* of October 25, 1918, concerning Lieut. P. C. Hoyle is cancelled.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

Wing Commander Francis E. T. Hewlett, D.S.O., O.B.E., from Headquarters (Coastal Area) to R.A.F., Depôt (Inland Area) (Supernumerary). 26.5.22.

Squadron Leaders.—A. B. Gaskell, D.S.C., from R.A.F. Base, Leuchars (Coastal Area) to Headquarters (Coastal Area). 1.6.22. J. C. P. Wood, from Half Pay List to R.A.F. Depôt (Inland Area) (Supernumerary). 1.6.22. E. A. B. Rice, M.C., from No. 6 Squadron (Iraq) to R.A.F. Depôt (Inland Area) (Supernumerary Non-Effective). 21.4.22. R. Rivers-Smith, M.B.E., from Stores Depôt, Egypt (Middle East) to R.A.F. Depôt (Inland Area) (Supernumerary Non-effective). 9.5.22. D. G. Donald, D.F.C., A.F.C., from R.A.F. Base, Leuchars (No. 3 Squadron) (Coastal Area) to command R.A.F. Base, Gosport (No. 3 Squadron) (Coastal Area). 1.6.22. F. H. W. Guard, C.M.G., D.S.O., from R.A.F. Depôt (Inland Area) to School of Technical Training (Men) (Inland Area). 22.5.22.

Flight Lieutenants.—J. G. Le Blount Croke from Composite Flight, R.A.F. Base, Gosport (Coastal Area) to No. 3 Squadron, R.A.F. Base, Gosport (Coastal Area). 1.6.22. A. W. Symington, M.C., from No. 39 Squadron (Inland Area) to R.A.F. Depôt (Inland Area) (Supernumerary Non-effective). 3.4.22. J. A. MacNab, from R.A.F. Base, Leuchars (No. 3 Squadron) (Coastal Area) to R.A.F. Base, Gosport (No. 3 Squadron) (Coastal Area). 1.6.22. C. Boumphrey, D.F.C., from R.A.F. Base, Leuchars (No. 3 Squadron) (Coastal Area) to R.A.F. Base, Gosport (No. 3 Squadron) (Coastal Area). 1.6.22. E. R. Openshaw, from R.A.F. Base, Leuchars (No. 3 Squadron) (Coastal Area) to R.A.F. Base, Gosport (No. 3 Squadron) (Coastal Area). 1.6.22. G. F. P. Warren, from No. 1 School of Technical Training (Boys) (Halton) to School of Technical Training (Men) (Inland Area). 1.6.22. W. B. Higgins, from R.A.F. Depôt (Inland Area) to School of Technical Training (Men) (Inland Area). 22.5.22. E. C. W. Fitzherbert, D.S.C., from R.A.F. Depôt, (Inland Area) to R.A.F. Base, Gosport (Coastal Area) (Supernumerary). 29.5.22. E. J. Cooper, D.S.C., from No. 230 Squadron (Coastal Area) to Marine and Armament Experimental Establishment (Coastal Area). 16.3.22. A. Hunter, O.B.E., from R.A.F. Depôt (Inland Area) to Marine and Armament Experimental Establishment (Coastal Area) 25.5.22. Trevor E. Salt, A.F.C., from No. 56 Squadron (Middle East) to No. 216 Squadron (Middle East) (Supernumerary). 18.4.22. C. Hanson-Abbott, from No. 230 Squadron (Coastal Area) to Marine and Armament Experimental Establishment (Coastal Area). 4.5.22. W. H. Park, M.C., D.F.C., from Aircraft Depôt, Egypt (M.E. Area) to No. 8 Squadron (M.E. Area). 25.1.21. J. C. M. Hay, from Aeroplane Experimental Establishment (Coastal Area) to No. 2 Armoured Car Company (Middle East). 11.4.22.

Long Service and Good Conduct Medal

THE Long Service and Good Conduct Medal has been awarded to the under-mentioned airmen:—

No.	Rank.	Name.	With effect from
365	S.M. 1	Edwards, A. ..	12.8.21.
87631	S.M. 1	Keen, R. S. ..	3.12.21.
166114	S.M. 1	Franklin, A. ..	5.1.22.
186074	S.M. 1	Hill, J.	1.2.22.
147400	S.M. 2	Whitley, H. L. ..	5.1.21.
185145	S.M. 2	Simmons, J. ..	7.5.21.
313624	S.M. 2	Bird, L. M. ..	4.5.21.
133516	Flight-Sgt.	Barnes, E. W. ..	1.3.22.
187852	Flight-Sgt.	Hunter, F. R. ..	17.1.21.
313853	Flight-Sgt.	Parry, T. ..	3.4.21.
428	Sergeant	Brown, G. C. ..	7.10.21.
302885	Sergeant	Riches, H. J. ..	16.2.22.

Award of Certificates to Ex-Naval Ratings

CERTIFICATES have been awarded to the under-mentioned airmen:—

314868	S.M. 2	Hughes, A. J. ..	1.1.22.
237555	Flight-Sgt.	Trowbridge, G. J.	4.1.22.
314937	Sergeant	Devlin, J. ..	1.1.20.

Move of No. 45 Squadron to Iraq

NO. 45 SQUADRON has moved from Almaza (Cairo) to Baghdad, and was transferred for all purposes from the Middle East Command to the Iraq Command, with effect from May 15, 1922.

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Aerial Route Weather Messages

THE Air Ministry announces that on and after June 15 the forecasts of the meteorological changes anticipated in S.E. England which are included in the aerial route weather reports issued by wireless telegraphy from the Air Ministry at 08.35 G.M.T., 11.35 G.M.T., and 14.35 G.M.T., will; for brevity, be issued in code and not in plain language as hitherto. Details of the code are to be found in "Forecast Code for the Abbreviation of Weather Forecasts transmitted by Telegraphy or Radio-telegraphy" (M.O. 244), which may be obtained from H.M. Stationery Office, price 1s. net.

For Aerial Gunnery Practice

THE Air Council has applied to the Board of Trade for consent for aerial firing practices to be carried out off Leysdown by aviation classes from the Royal Air Force Gunnery and Armament School at Eastchurch, which is situated between three and four miles from the proposed bombing range. The practices are proposed to be carried out between certain hours daily during summer and winter.

Paris-Marseilles-Paris

DURING last week two notable flights from Paris to Marseilles and back were made by French pilots. Lieut. Carrié left Le Bourget at 4.55 a.m. on June 9, and arrived at the Istres aerodrome at 9.50. Leaving Istres again at 12.25 p.m., he landed at Le Bourget at 4.35 p.m., having taken 11 hrs. 40 mins. total time, but only 9 hrs. 5 mins. flying time.

Lieut. Battelier left Le Bourget at 5.20 a.m. on the same day, and arrived at Istres (without landing) at 9.18 a.m. He left Istres again at the same time as Carrié (12.25), but was forced, by trouble with his *fuselage* bracing, to land at Lyon. He got his bracing repaired, and resumed his flight from Lyon at 6.25 p.m., arriving at Le Bourget at 8.57 p.m. His flying time was only 7 hrs. 45 mins. By train the journey from Paris to Marseilles and back occupies 26 hours.

SIDE-WINDS

Now that summer is here and organisers of "joy-riding" flights are once more getting busy, the question of proper housing of machines and a place where overhauls can be made becomes important. In this connection we would call attention to a stock of portable hangars held by the Vauxhall Trading Co., Ltd., of 4, Lloyd's Avenue, E.C. 3 (formerly of 37, Great James Street, Bedford Row, W.C. 2). These hangars were originally made by the Royal Aircraft Factory, and are specially constructed of waterproof flax canvas. A feature of these tent hangars is the ease with which they can be erected and dismantled, either operation being performed by six men in one hour. The larger size, measuring 70 ft. in width by 45 ft. in depth by 20 ft. in height, is sold at the very low figure of £120 for new hangars, while a second-hand one can be purchased for £70. A smaller size costs only £90 new.

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ACETYLENE welding, when used in aircraft, must be extremely well done if it is to be permitted at all. A good welded joint is probably as strong and as reliable as the metals joined, but the difficulty has been to ascertain when a weld is satisfactory and when it is not. During the war the difficulty became so great that it was necessary to prohibit the use of welding for parts that might be subject to heavy stresses. X-ray work on metals appears to provide a certain amount of information, but only after the weld has been made. Messrs. Allen-Liversidge, Ltd., of 106, Victoria Street, S.W. 1, at a luncheon given at the Hotel Cecil on June 9, gave a private exhibition of a new film showing acetylene welding. The film was of more than ordinary interest, inasmuch as it had been taken with an ultra-rapid camera, which revealed the action of the molten metal under the blowpipe. In addition to this side of the problem, which may well prove of great importance to metallurgical science, the film also showed how the actual Dissolved Acetylene gas was manufactured.

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Hottentots' Introduction to Aeroplanes

AEROPLANES have speedily brought home to the rebel Bondelzwart Hottentots a reminder of the power of aircraft to enforce order. The band of discontents have been practically surrounded near by the Haib River by the S. West Protectorate forces, after their position had been shelled by guns and the Air Force. The co-operation of the 'planes with the operating forces has proved of the greatest help in quickly bringing affairs to a head.

Following these first reports of the air operations against the rebel Hottentots, the Special Correspondent of the *Cape Argus* has elaborated the details of the effect produced upon the discontents. He states that the aeroplanes sent from Pretoria did more to strike terror into the rebels than the whole volunteer forces engaged. Their operations during the pursuit were particularly arduous owing to the absence of landmarks. Nevertheless, they were very successful, both in spotting the enemy and in locating our own patrols. In one case they discovered five police who, having lost their whereabouts, had been without water for several days. The airmen gave them biscuits and oranges, and carried away as a passenger one of the number whose horse had died of exhaustion.

A remarkable incident was the locating of a body of Hottentots in the mountain gorges at Hankiesdoorns. The machine that first spotted the enemy swung out from the gorge among the mountains on to a small rock-girt plateau 3,000 ft. high. On this desolate spot, strewn with boulders, there sat groups of Hottentots warming themselves by a fire. It was shortly after dawn. The pilot had a full load of bombs and ammunition, and chance had placed these rebels at the airman's mercy. The sudden rise in the altitude and the sharp change of direction had prevented their keen organs of sight and hearing from conveying a timely warning. Bombs were dropped from 100 ft., and machine-gun fire was opened. Many Hottentots tumbled into a gorge and ran from one side to the other of its rocky walls, which rose sheer to the summit. Scores were killed, and those who escaped fled in all directions, yet ten men could have held that summit against an army.

The Hottentots have named the aeroplanes "firebirds," and regard them with superstitious terror. One airman said that though they flew at a height of 50 to 100 ft. and inflicted heavy casualties, only once was a machine fired at.

Three-Engined Caudron Tested

WE understand that the three-engined Caudron biplane which was exhibited at the last Paris Aero Show has been flown by Poirée. The machine is stated to have flown perfectly, maintaining its height on two engines, and being well under control with one wing engine cut out.

THE LONDON AERO-MODELS ASSOCIATION
(The Society of Model Aeronautical Engineers.)

ON Thursday, the 8th inst., Dr. E. H. Hankin, D.Sc., gave a very important lecture before the members at Headquarters, 20, Great Windmill Street, Piccadilly, W. 1, on "The Possibilities of Achieving Artificial Soaring Flight," Dr. A. P. Thurston, D.Sc. (Lon.), presiding. A hearty vote of thanks was passed to Dr. Hankin by the enthusiastic members, and also to Dr. Thurston, the President.

On Thursday, the 15th inst., a committee meeting will be held at Headquarters.

On Thursday, the 22nd, a discussion will be held on Dr. Hankin's lecture with reference to the best method of experimenting with models for the purpose of attaining soaring flight, and it is hoped members will bring along wings built up on the flying fish principle, for demonstration purposes.

On Saturday, June 24, the Competition for Mr. F. J. Camms' Challenge Cup will be held on the Handley Page Aerodrome, Cricklewood. Entries should be sent in at the earliest possible moment to the competition Secretary, Mr. C. A. Rippon, 52, Fairbridge Road, Holloway, N. 19.

On Saturday, July 8, a Flight Golf Competition will be held for the Challenge Cup presented by the Editor of FLIGHT. Full particulars will be published next week.

Full particulars of the Association may be obtained from A. E. Jones (Hon. Sec.), 48, Narcissus Road, West Hampstead, N.W. 6.

⁂ ⁂ ⁂ ⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published June 15, 1922.

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6,123.	D. J. MOONEY, F. E. BROWN and D. H. EMBY. Metal framework for aircraft. (180,074.)
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23,081.	J. KROPACZ. Aeronautic devices with flapping wings. (180,258.)
27,153.	LUFTSCHIFFBAU ZEPPELIN GES. and K. STAHL. Airship gondolas. (170,301.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xiv.)

SULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C.1.
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Monk Engineering Co., Ltd., Coventry.
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ETALS (Anti-Friction)—

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Putney 1323.

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Rubery, Owen & Co., Darlaston.
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MODELS—

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D.A.P., Replingham Road, Southfields, S.W. 18.

ARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5.
Dalston 1893.

PETROL—

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PUTTEES—

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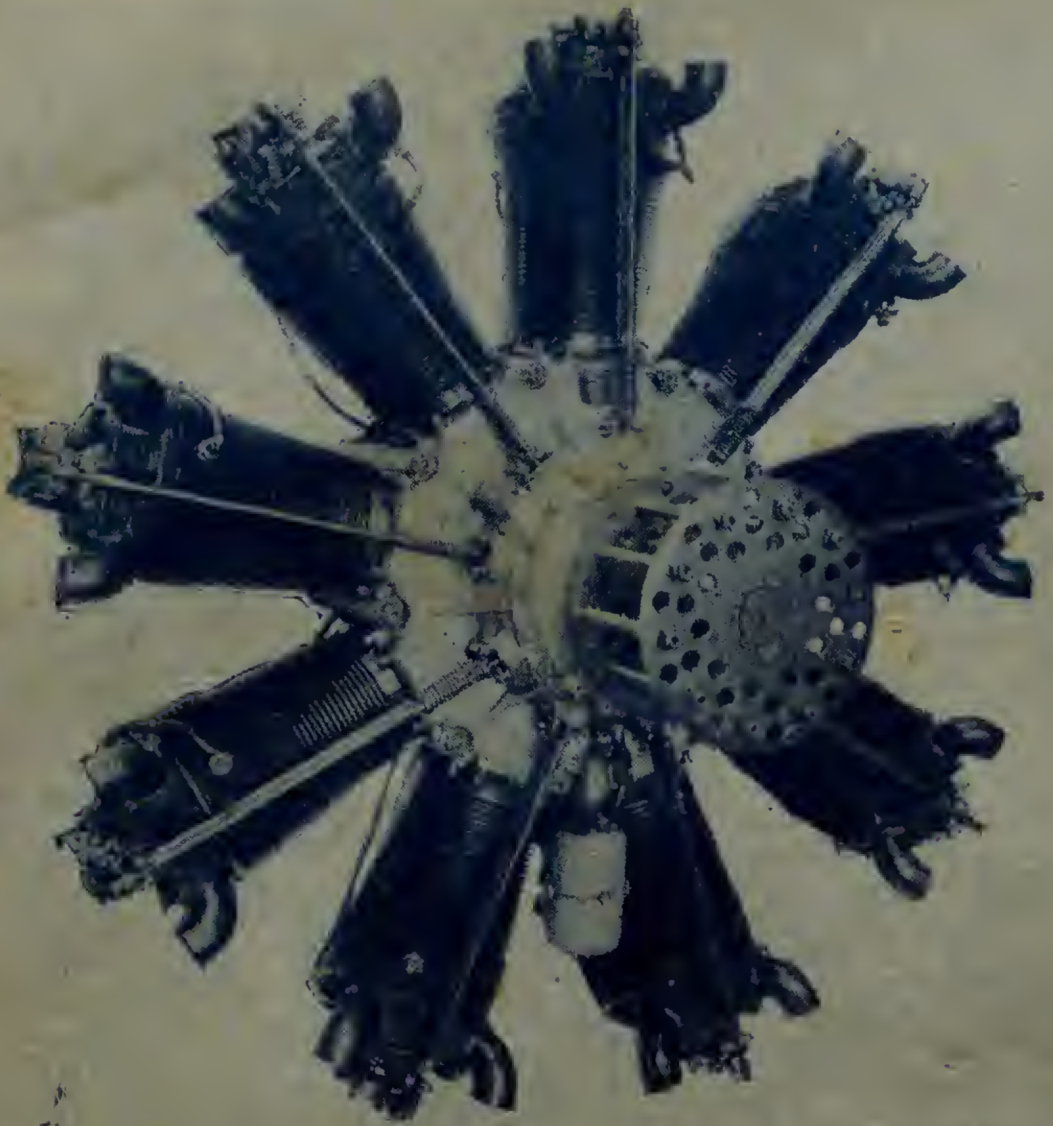

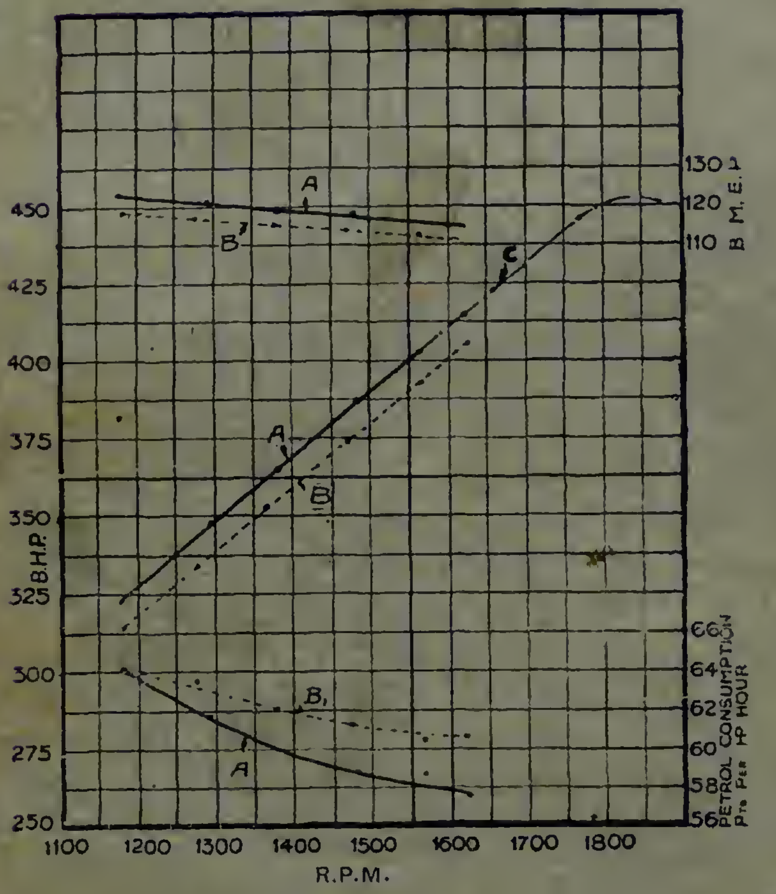

Curves "A"– Readings taken at beginning of Run.
Curves "B"—Readings taken at end of Run.
Curve "C"—Power obtained after Type Test.
Power Readings corrected for Atmospheric Pressure

The Evidence of the Air Ministry Type Test.

The power curve shown was taken during the official Air Ministry Type Test on the

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The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.
Founder and Editor : STANLEY SPOONER
A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
June 23–25	**International Competition for Touring Aeroplanes, Brussels**
June 24	**Royal Air Force Pageant, Hendon**
June 27	**Royal Aero Club 21st Anniversary Banquet**
Aug. 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**Aerial Derby**
Aug. (last fortnight)	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
Dec. 15– Jan. 2	**Paris Aero Exhibition**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

EDITORIAL COMMENT.

THE article describing and illustrating the Parseval "PL27" semi-rigid airship which is published in this issue of FLIGHT was written several months ago. Lack of space has prevented publication until now. In the meantime, the airship scheme proposed by Commander Burney, backed by Vickers, Ltd., and the "Shell" group, has been brought forward. This scheme, as is, of course, well known to readers of this journal, includes the use of rigid airships. In the article on the Parseval, written before the publication of the Burney scheme, it is suggested that possibly the rigid is not the only, nor even the best, solution. While we have not the slightest desire to interfere in any way with the new scheme, which is still under consideration, we think that the opinions expressed in the article may still hold good, without prejudicing in any way the more ambitious programme suggested by Commander Burney. There is still the further consideration of the possibility of the scheme being turned down on financial grounds, after consultation between the Air Ministry and the Treasury. If that should come about (we trust it will not), it might still be found possible to find a solution of the airship problem by turning attention to the use of smaller ships to be built in England.

The Parseval "P.L. 27"

It has been stated by acknowledged experts—and so far as we are aware, the statement has not been contradicted or proved wrong—that as regards cost it is possible to build a semi-rigid airship similar to the "PL27" for about £30,000, or about one-sixth the cost of a rigid of approximately two million cubic feet capacity. If that be a true statement, it would appear that a scheme which contemplated the use of semi-rigid ships would start with an initial advantage of lower first-cost, which would give us an extra million cubic feet capacity for the same money. Translated into pounds of cargo, this would mean, assuming a proportion of useful lift to total lift of 50 per cent. and 65 lbs. lift per 1,000 cubic ft. of hydrogen, 32,500 lbs. of extra cargo capacity for each two-million cubic feet rigid, and for the same original outlay. That is certainly an item worth taking into consideration, and should be given very serious thought before we decide definitely to abandon all thoughts of running airship services.

With reference to the operational side of such a service, we have no information relating to cost of running, but there does not appear to be any reason to think that a service with semi-rigids would be much more expensive to run than one operated with rigids. The crew of each semi-rigid would be smaller, although for a certain total tonnage it might be found that the aggregate was slightly larger, than that of a service operated with rigids. Against that must be placed, however, the lower first cost, and the fact that with six semi-rigids instead of each rigid, we should not be putting all our eggs in one basket, so to speak. Furthermore, as pointed out in the article, the smaller airship, if forced to descend, can be deflated and sent home by steamer or rail. If a rigid is forced down and comes into contact with the ground it is practically certain to become a total wreck.

In one respect, the rigid undeniably scores, and scores heavily: that is, in the matter of range. If we are contemplating non-stop journeys of 2,000 miles or more, there appears to be nothing for it but to use the rigid.

◆ ◆ ◆

The Empire Airship Scheme

Much will depend upon the Government decision with reference to the suggested airship scheme. If the Treasury should turn down the proposal on financial grounds, there is, as we have already mentioned, a possibility of an alternative scheme, based upon the use of smaller ships. If, on the other hand, the Government decides to accept the Burney scheme, it may be taken that large rigids will be the craft used. It now appears, as we ventured to prophesy some time ago, that there is going to be actual competition between the Air Ministry on the one hand and the Admiralty on the other for the control of airships. So far as is known, nothing has been settled yet, but the situation is not without humour. It is not so very long ago that the Admiralty, who then had control, decided to abandon airships altogether, on, it was stated, financial grounds. The airships were then turned over to the Air Ministry, who ran them half-heartedly and very nearly went bankrupt in the process, having ultimately to announce a decision to scrap all airships and hand them over to the Disposal Board. Efforts were made to get the decision altered, but without much success. Major Scott, our cleverest airship pilot, and one of our greatest practical authorities on airships, stated, in his paper read before the Air Conference, that in a couple of years' time we should have to resume airship construction whether we liked it or not. His prophecy already looks like coming true, much sooner than probably even Major Scott expected. Captain Guest at the same time announced that it had been decided to abandon airships, making the fallacious statement that it would be as cheap, in the long run, to resume airship design and construction in ten years, a statement which aroused contradiction from every quarter, and was characterised by one speaker as "brainpicking" and scarcely dignified to say the least of it.

There are now indications that both the Air Ministry and the Admiralty have discovered that they *can* afford airships, or perhaps we should say that they have discovered that they cannot afford *not* to foster them. As to which of the two should have control of airships, opinions will probably be divided. Personally, we have always held that by its very nature the airship should come under the Admiralty. The airship, especially the large rigid, is the long-distance, trans-oceanic craft *par excellence*, and its handling, the training of its crew, as well as its uses during war, appear to be pre-eminently those connected with the Navy. The future of the airship as a long-distance naval scout appears to be fairly well assured by the introduction of non-inflammable gas, which will reduce its vulnerability. The introduction of heavy-oil engines as the power plant is almost within sight, which should remove the second possible source of danger from fire, and thus the airship becomes a craft of vast possibilities. In addition to its functions as a scout, there appears to be good reason for believing that before long it will be possible to use the large airship as an aircraft carrier of extraordinary mobility. Thus the more one looks into the airship question from the war purpose point of view, the more does it appear that airships should come under sway of the Admiralty. Our one objection, perhaps, is that it *might* mean the thin end of the wedge for a dual aeroplane service once again. We, therefore, look forward with keen anticipation to the final issue between the Admiralty and the Air Ministry for control of lighter-than-air craft, the utility of which both had previously questioned.

◆ ◆ ◆

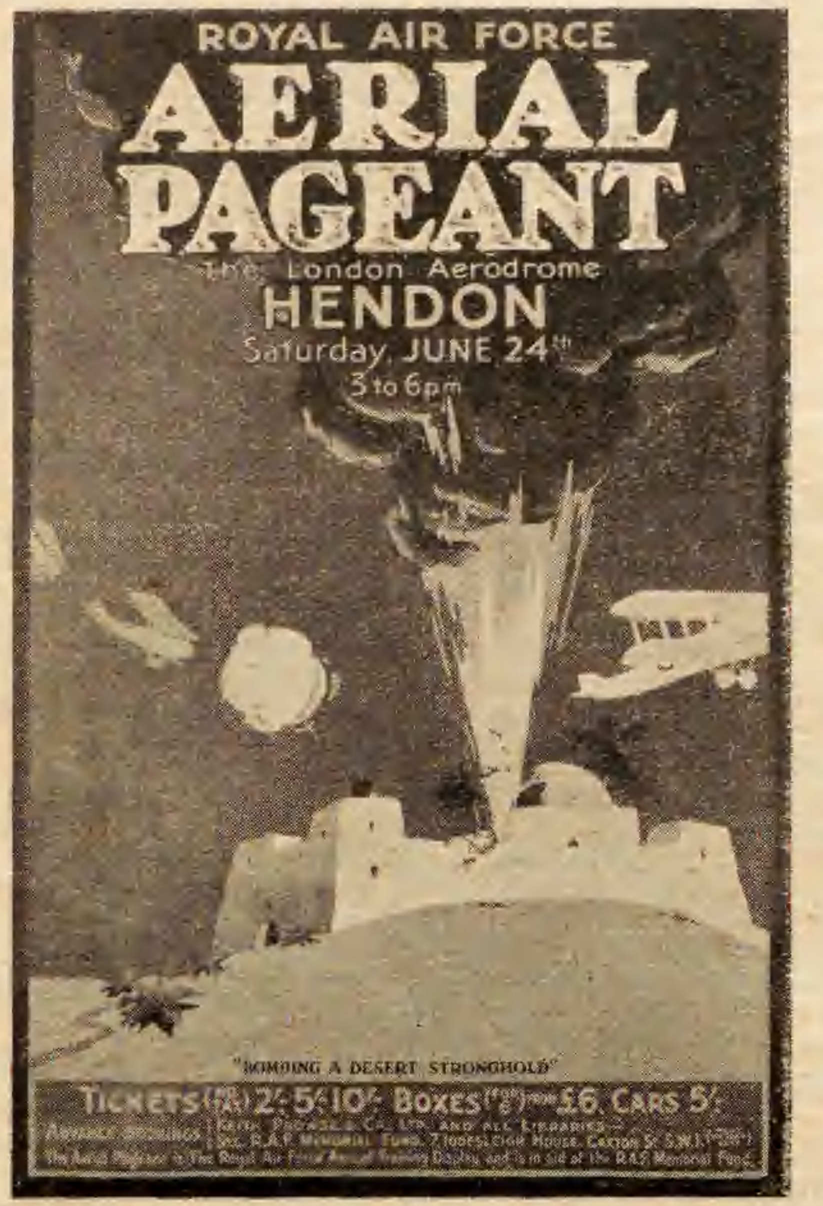
A Seaplane Service at last

After the campaign for developing the seaplane which FLIGHT has been conducting so vigorously during the last few months, it is naturally with considerable satisfaction that we learn of the Air Ministry's "approval" of a service between Southampton and Cherbourg and Le Havre, with a subsequent service between England and the Channel Islands. The new firm to operate this line, it is stated, will be known as the British Marine Air Navigation Co., Ltd., and as mentioned elsewhere, the London and South Western Railway Co. is actively interested in the undertaking. The service is to be run by Supermarine flying boats, which have an excellent reputation for seaworthiness as well as good flying qualities. We congratulate the Supermarine Aviation Works upon their success, and would take this opportunity of pointing out that the recognition afforded by this new departure is but the just reward of Mr. Scott-Paine and Commander Bird for their unfaltering faith in the seaplane and their courage in persevering, in spite of the greatest difficulties, in keeping their works running purely as a flying-boat manufacturing establishment. We sincerely hope that this is but the beginning of the official and commercial recognition of the seaplane.

We have repeatedly pointed out that seaplanes should be more economical to run than fast land machines over a route like London-Paris. This appears to be borne out by the subsidy which is being granted to the new company. We not only wish the new company every success, but are quite confident that success will be its ultimate reward. At first, it is to be expected that there will be difficulties, but we do not doubt for a moment that these will be overcome.

THE R.A.F. AERIAL PAGEANT

ON Saturday this week, the third Aerial Pageant, which is organised by the Royal Air Force for the benefit of the R.A.F. Memorial Fund, will be held at Hendon Aerodrome. From the advance reports to hand, it would appear that this year's arrangements will be even more attractive than ever—although looking back on the previous displays one really wonders if such a thing is possible! The considerable increase in the number of visitors at last year's display, as compared with the previous one, is expected to be even greater this year, and further special arrangements have been made as regards accommodation. The enclosures have again been increased in size—sufficient for 100,000 people to witness the pageant in comfort—and well-organised motor-car parks will enable a large number of motorists to take up good positions with ease. Three main parks will be used for this purpose, one reserved for large limousines only, one for open touring cars only, and the third for light cars. The admission fee for cars will be 5*s*. Char-à-bancs will also be admitted at the rate of 10*s*. per char-à-banc and 2*s*. for each occupant. Motorists are advised to approach Hendon *via* Golders Green, and Hendon village. The prices of admission are 2*s*., 5*s*., and 10*s*.—tickets for the last two enclosures being obtainable, if desired, through the usual agents or from the Hon. Sec., R.A.F. Memorial Fund, 7, Iddesleigh House, Caxton Street, S.W. 1.



THE R.A.F. AERIAL PAGEANT: The "striking" poster issued by the organisers, depicting the star turn on Saturday's programme.

The traffic arrangements, which will be under the special control of Scotland Yard, are being greatly extended by the following operating companies.

A third class ticket costing 1*s*. 3*d*. only is being offered by the Midland Railway Co., which is available by the following trains which leave St. Pancras at 12.23 p.m., 1.30 p.m., 2 p.m., and 2.5 p.m., arriving at Hendon about 25 mins. later. The last train is a special one, and extra accommodation is being provided on the other trains mentioned.

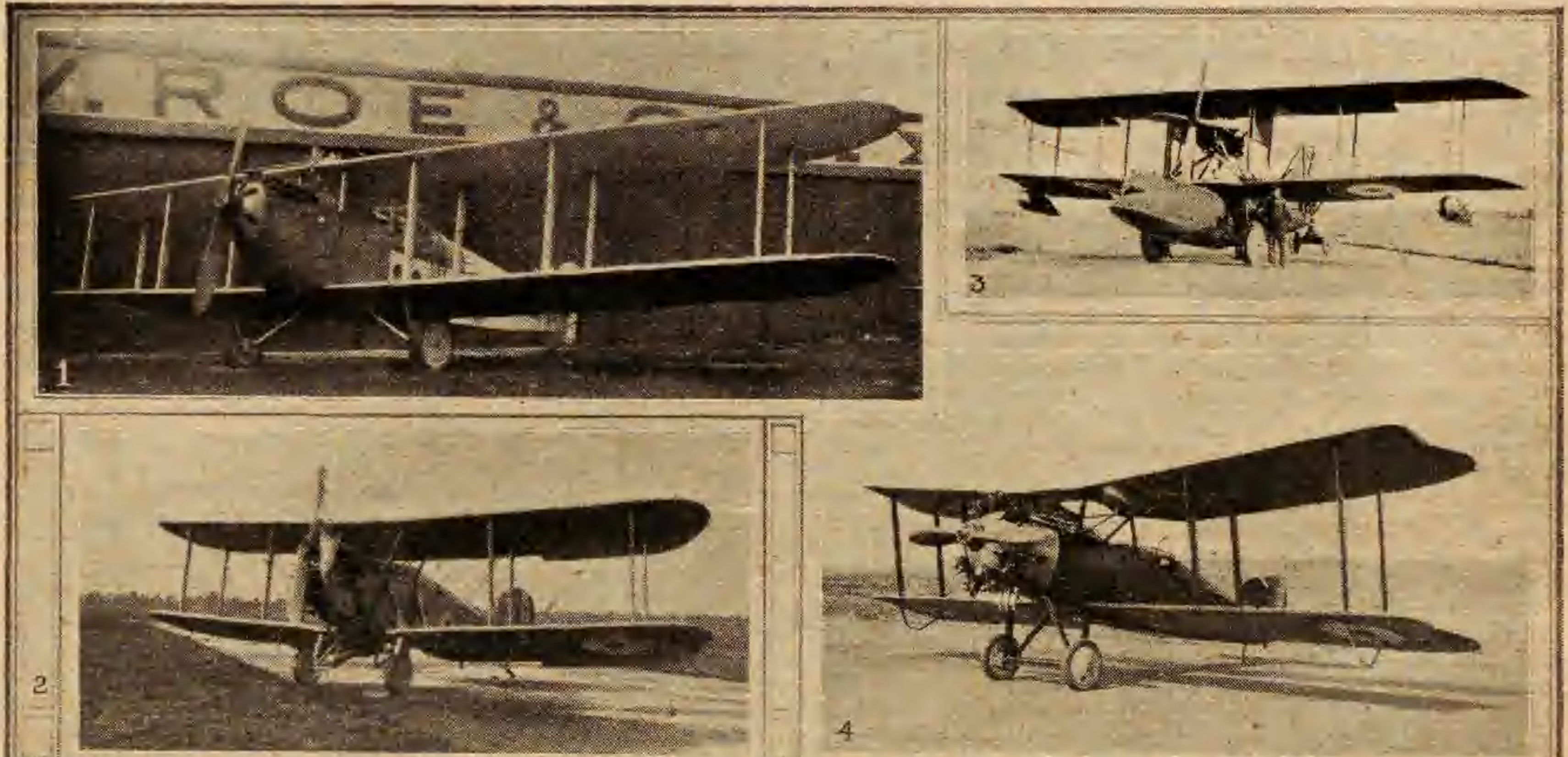
The Underground is also co-operating with greatly increased services by tube, 'bus and tram. The tube service to Golders Green is being greatly augmented, and a special 'bus service will be run from Golders Green Station direct to Hendon Church which will bring spectators to within a few minutes' walk of the aerodrome.

The following regular 'bus services are also being added to: No. 13 from London Bridge; No. 43a from Liverpool Street, and the 142 service on the Watford route.

An increased service is also being run by the Metropolitan Railway to Willesden Green Station, from which point special tramway connections are being run to Colindale Avenue, Hendon.

As regards the programme itself, it is difficult to pick on any one individual item for special mention, so it will suffice if we give below a brief summary of the proceedings.

The pageant will commence



THE R.A.F. AERIAL PAGEANT: Four interesting machines which will make their first public appearance at the Pageant. (1) The Avro "Aldershot" (650 Rolls-Royce "Condor"), designed for long-range duties. The fuselage has two decks, or floors. (2) The Blackburn "Dart" torpedo-carrier, with Napier "Lion"; specially designed for alighting on a ship. (3) The Supermarine "Seagull" (Napier "Lion"), an amphibian flying boat. (4) The Westland "Weasel," a fighting and reconnaissance machine fitted with either a 380 Bristol "Jupiter" or a 320 Siddeley "Jaguar."

at 3 p.m., but various preliminary events will start shortly after noon. The R.A.F. Band will play from 1 p.m., and the gates will be open from 11.30 a.m.

In the earlier part of the day, a photographic competition between R.A.F. units will be held and pictures of set "pin points" of interesting objects surrounding Hendon will be taken from the air. Copies of these photographs will be sold on the ground within a short time after they have been taken.

The programme has been specially devised in order to show the public all the most representative types of British aircraft engaged in various duties in the R.A.F. It is of interest to note, also, that for the first time, marine aircraft—working with or for the Navy—will be on view, and will demonstrate by actual flying the development which has taken place in this class of aircraft.

Another new feature is a landing competition, for which a part of the aerodrome, about 100 yds. square, is being specially marked off with a fence 4 ft. high, consisting of light posts and fabric, representing hedges. The competing pilots are required to ascend above 1,000 ft., and on arriving in the course of their descent at 1,000 ft. they are to switch off their engines, and to complete the landing into the special enclosure, simply by means of their controls and without using their engines again. Any pilot who uses his engine below 1,000 ft. will be disqualified, as will any who touch the fence in the course of landing. Pilots are at liberty to bring in their machines by any of the many possible ways, so that a useful demonstration of side-slipping, spiral turns and other forms of gliding will be shown. It should also make clear the comparatively small space which the modern aeroplane requires in order to land safely and quickly.

The demonstration of "crazy flying," which proved so popular last year, will again be featured, this time by Flight Lieut. W. H. Longton, D.F.C., A.F.C. It may be mentioned that various freak machines will demonstrate from time to time. A demonstration of "writing in the sky" should be another popular item. Here the spectators will be able readily to follow the rapid movements of a machine looping, spinning and rolling by the trail of smoke left by the machine. Following this demonstration, there has been arranged further illustration of the uses of smoke in air warfare, and the machines engaged will produce a novelty in the way of coloured smoke clouds.

A well-rehearsed and extremely difficult event will be a demonstration of "follow-my-leader" in the air, in which two machines will carry out intricate aerial manœuvres practically simultaneously and with the one following the other at a distance of not more than a few yards—it will, in fact, be synchronised stunting.

An instructive item will be a representation of low bombing in which a tank will be the objective of the bombers. A formation of machines will dive down and drop their bombs—practice type—with a high degree of effectiveness.

During the afternoon, three series of races will take place. In the first, the event will be confined to standard Avro machines, the competitors being the most skilled pilots from different units of the R.A.F. at home. The second race, which will follow a little later, is a handicap race between twelve different types of machines, the scratch aeroplane being one of the latest reconnaissance machines which has not so far been flown in public and the first off the mark, the Avro. This race will provide an interesting exhibition of a very complete collection of land types of aircraft used in the British Air Force, ranging from machines of tiny wing capacity to others whose planes are of large dimensions. Twin-engined machines will take part as well as those with one power unit only. The power of the engines will vary almost as much as the size of the machines.

The last race will be a relay one between home squadrons and stations, each flying three types of machines, the speedy Snipe, the Bristol Fighter, and the Avro training machine. In each of these races the course will be approximately 12 miles out and home, and it has been so arranged that in each of the events the flights will take place within full view of the spectators.

The most spectacular item which will take place just before the end of the programme will consist of a massed aerial attack on a desert stronghold erected on Hendon aerodrome. It will illustrate the type of work on which the R.A.F. has already successfully engaged as an independent force in Somaliland during the operations in 1920 against the Mullah. At that time the Mullah's forces at Modishi and Fort Jidili were located and bombed, and machines descended to low heights and inflicted heavy casualties on the fleeing Dervishes and their stock. The fort at Hendon, it may be mentioned, has been erected of large wings of obsolete aeroplanes. Palm trees, loopholed minarettes and outlook towers will rise to a height exceeding 100 ft. from within the high-walled fortress, from which the muzzles of field guns can be seen protruding. The defenders in their varicoloured Eastern raiment will add an additional touch of colour to the scene. For fifteen minutes a thrilling aerial battle will be waged between a heavily-armed squadron of bombing aeroplanes and the defenders of the fort, who will reply to their attackers with intensive bursts of anti-aircraft and machine-gun fire, and finally, as the formation approaches to close quarters, with a broadside of field artillery. The culminating thrill of this engagement will be reached when one of the attacking machines is hit by anti-aircraft fire, and spins towards the ground enveloped in flames. The rescue of the pilot from his burning machine and the final destruction of the fort will mark the conclusion of what should produce an illustration of actual desert warfare as near to reality as ingenuity can make it.

It is to be hoped that the Meteorological Office, Air Ministry, has arranged for special weather conditions on this occasion!

THE ROYAL AIR FORCE DINNER

Formation of a Dinner Club

THE arrangements for a Royal Air Force Dinner for all officers who have been or still are connected with the Flying Services, on the night of Friday, June 23, as a preliminary to the R.A.F. Pageant at Hendon on June 24, are proving highly successful. It takes place at the Connaught Rooms, and nearly every unit that existed during the War will be represented, including R.N.A.S., R.F.C., R.A.F., Balloons, Ground and other allied services. All those belonging to the same formation will be seated together, but in all probability one will meet as many friends belonging to other units as one's own, because so many served in a number of different units at various periods of the War.

It is expected that many senior officers of the Royal Air Force will be present, and it is particularly hoped among these to collect together all those who served in 1914–15, especially those who went out with the original historic four squadrons.

In all probability the occasion will be perpetuated by the formation of a dinner club to hold an annual gathering. This will enable all concerned to meet many more friends than would otherwise be possible, and, what is important in these days, they can do the Pageant and their annual squadron or depôt dinner for the one rail and hotel bill. Incidentally, the railway companies will issue week-end tickets at fare and a third from 5 p.m. on June 23, if over 15*s.* in value (or 30*s.* if first class), and as the dinners are timed to begin at 8.15, many who come from a distance will be able to make use of this concession by re-booking at an intermediate point *en route*.

A few squadrons are also holding separate dinners simultaneously, and for these the Pageant itself will provide a meeting-place for all next day.

These units comprise the old Sixth Brigade, which will hold its dinner at the Connaught, where also No. 8 Squadron will be situated. Nos. 11 and 12 are dining together at the Hotel Cecil, where will also be No. 20 Squadron and No. 62 Squadron, both well-known fighting units. At Prince's Restaurant there will be No. 47 Squadron and two famous Scout Squadrons, Nos. 24 and 80; whilst at the Holborn Restaurant there will be No. 216, an old R.N.A.S. unit. At the Savoy No. 4 Squadron will meet, and in addition, at various restaurants at present unsettled there will be Nos. 59 and 205 Squadrons, No. 8 Seaplane base, No. 1 Balloon base. In addition, the W.R.A.Fs. are holding a dance at Caxton Hall on Friday, and another is being organised in aid of the R.A.F. Memorial Fund on Saturday night, at the London Country Club at Hendon.

The price of tickets for the Royal Air Force Dinner at the Connaught Rooms is 10*s.*, exclusive of wines and cigars. Those who wish to attend should wire "Emtage, Taxomobile, London," stating their favourite unit, at once, as seating accommodation cannot be guaranteed for all at this late stage. Seats booked must be paid for whether used or not, as it is impossible to cancel the catering arrangements.

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING

A Meeting of The Committee was held on Wednesday, June 14, 1922, when there were present: Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., in the Chair; Mr. Ernest C. Bucknall; Lieut.-Col. F. K. McClean, A.F.C.; Lieut.-Col. Alec Ogilvie; Lieut.-Col. Mervyn O'Gorman, C.B.; Mr. T. O. M. Sopwith, and the Secretary.

Election of Members.—The following new Members were elected:—

Gwyn Howard Davies.
Louis de la Garoe.
Hugh Raymond Vaughan Fowler.
Paul Grosfils.

Schneider Cup, 1922.—The Secretary reported that an entry had been made for the Schneider Race, to be held at Naples on August 12, 1922.

Gordon Bennett Balloon Race.—It was reported that the following entries had been made for the Gordon Bennett Balloon Race, to be held at Geneva on August 6, 1922:—

Lt.-Col. John D. Dunville, Mr. E. Allen, Mr. Griffith Brewer.

Aviation Patents.—Correspondence between the Club and the Aero Club de France on the question of the R.E.P. Patents was submitted. As this affected British machines racing in International races in France, it was decided to press for an early decision.

Sub-Committees.—Reports from the following Committees were received and adopted:—

Racing Committee, House Committee, Banquet Committee, Flying Services Fund Committee.

RACING COMMITTEE

A Meeting of the Racing Committee was held on June 9, 1922, when there were present: Maj.-Gen. Sir W. S. Brancker, K.C.B., in the Chair; Lieut.-Col. M. O. Darby; Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S.; Col. F. Lindsay Lloyd, C.M.G., C.B.E.; Lieut.-Col. F. K. McClean, A.F.C.; Mr. W. O. Manning, and the Secretary.

Whitsuntide Races, Croydon.—The report of the races was received and approved. The question of holding further race meetings at Croydon was discussed.

Aerial Derby.—It was decided to hold the Aerial Derby on Bank Holiday, August 7, 1922, instead of Saturday, July 29, as previously announced.

The question of the course and starting and finishing place was discussed and deferred.

ROYAL AIR FORCE PAGEANT

The R.A.F. Pageant will be held at the London Aerodrome, Hendon, on Saturday, June 24, 1922. Tickets, 10*s.* (motor-cars, 5*s.*), may be obtained from the Royal Aero Club.

A special enclosure in the 10*s.* Paddock will be reserved for the Members of the Royal Aero Club and the London Country Club.

Members of the Royal Aero Club will be honorary members of the London Country Club, Hendon, on the day of the Pageant. Membership cards must be produced. Tables for lunch should be booked in advance. Price of luncheon, 4*s.* 6*d.* Telephone, 260 Kingsbury.

A Pageant Banquet and Dance in aid of the funds of the R.A.F. Memorial will be held at the London Country Club the same evening, commencing at 8.30 p.m. Tickets, £1 1*s.* each, may be obtained at the Royal Aero Club. The ticket includes free transport from Golders Green to the London Country Club and from that Club to town.

TWENTY-FIRST ANNIVERSARY BANQUET

As already announced, the Twenty-first Anniversary Banquet will be held at the Savoy Hotel on Tuesday, June 27, 1922, at 7 p.m. for 7.30 p.m.

The Navy, Army and Air Force will be represented respectively by Vice-Admiral Sir Rogers Keys, Bart., K.C.B., K.C.V.O., C.M.G., D.S.O., Lieut.-Gen. Sir Travers E. Clarke, K.C.B., K.C.M.G., Quartermaster-General, and Air Chief Marshal Sir Hugh Trenchard, Bart., K.C.B., D.S.O. Other guests include Lord Weir, Capt. The Right Hon. F. E. Guest, C.B.E., D.S.O., M.P., The Right Hon. Lord Gorell, C.B.E., M.C., Maj.-Gen. Sir W. S. Brancker, K.C.B., and The Duke of Sutherland.

The President of the Club, The Duke of Atholl, K.T., D.S.O., will preside, supported by Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., Chairman, and Lieut.-Col. F. K. McClean, A.F.C., Vice-Chairman.

The Toast of the evening, "Aviation," will be proposed by The Lord Weir.

Members who have not yet done so are requested to apply for tickets for themselves and friends at the earliest possible moment. Tickets £1 1*s.* each.

NOUVELLE COUPE MICHELIN

(*International Contest—Under the Regulations of the F.A.I. and the Aero Club de France*)

Prizes: 100,000 francs (20,000 francs per annum for five years).

General Regulations

Article 1.—Messrs. A. and E. Michelin have instituted an Aviation Contest called the "Nouvelle Coupe Michelin," for which they are presenting prizes amounting to 100,000 francs.

They have entrusted the drawing up of the regulations for this Cup to the Commission d'Aviation of the Aero Club de France. The regulations will consist of General Regulations and Special Regulations.

The Special Regulations for the year 1922–23 will be published before June 1, and for the other years before March 1. They must be ratified each year by the donors.

Article 2.—The Contest is international. It will be held over French territory.

Article 3.—The winner of the Cup will be the pilot of the machine (aeroplane with engine, Class C) which shall have achieved the best performance in accordance with the Regulations, in the twelve months July 1–June 30.

No pilot may compete unless he is a member of a national federation of the Fédération Aéronautique Internationale.

Article 4.—The winner of the Annual Contest will receive a sum of 20,000 francs and a replica in bronze of the Cup by Moreau-Vauthier.

Article 5.—If the Cup is not won in any one year the sum of 20,000 francs will be divided amongst the outstanding contests.

Special Regulations for 1922-23

Article 1.—The winner of the Cup for the year 1922–23 will be the pilot who, in accordance with the General and Special Regulations, has covered at the greatest commercial speed per hour the course in a closed circuit defined below.

The Cup will, however, only be awarded if the commercial speed over the whole circuit is at least 80 kilometres per hour.

The commercial speed is arrived at by dividing the total length of the course by the time which elapses between the departure of the aircraft from its starting-point and its return to the same point.

Article 2.—The closed circuit, called the "Tour de France," will include fifteen landings, to be made on each of the landing-grounds of the following towns:—

Versailles (Buc, Toussus-le-Noble, Saint-Cyr or Villacoublay), Saint-Inglevert, Valenciennes, Mourmelon, Metz (Frescaty), Strasbourg (Neuhof), Dijon (Longvic), Bourges (Avord), Clermont-Ferrand (Aulnat), Lyon (Bron), Nimes (Courbessac), Toulouse (Latécoère Aerodrome), Pau (military aerodrome), Bordeaux (Teynac), Angers (Avrillé), Versailles (same aerodrome as for start).

Competitors may start at any one of the aerodromes mentioned, to finish at the same aerodrome, the landings being made in the order given above, or *vice versa*.

The landings will be verified by a log-book which will be forwarded to each competitor on entering. On arriving at a landing-place the competitor must have his log-book signed by an official or by two witnesses of the landing.

Article 3.—The Commission d'Aviation reserves to itself the right to alter the course defined in Article 2 if circumstances render this necessary. Except, however, when there is no alternative, the course may not be altered when it has been properly completed by a competitor.

Article 4.—Intermediate landings, replenishments and repairs are allowed. Changing the machine is not allowed.

The crank-case and cylinders of the engine will be sealed or stamped. The fuselage and wings of the machine will also be stamped.

Article 5.—The entry, signed by the pilot, must reach the Commission d'Aviation, Aero Club de France, 35, Rue François, 1er, Paris, not later than 6 p.m. two days before that indicated for the start. Sundays and holidays are not included in this interval. Entries may not be received on Sundays or holidays. The entry must indicate the starting-point selected and the date of starting.

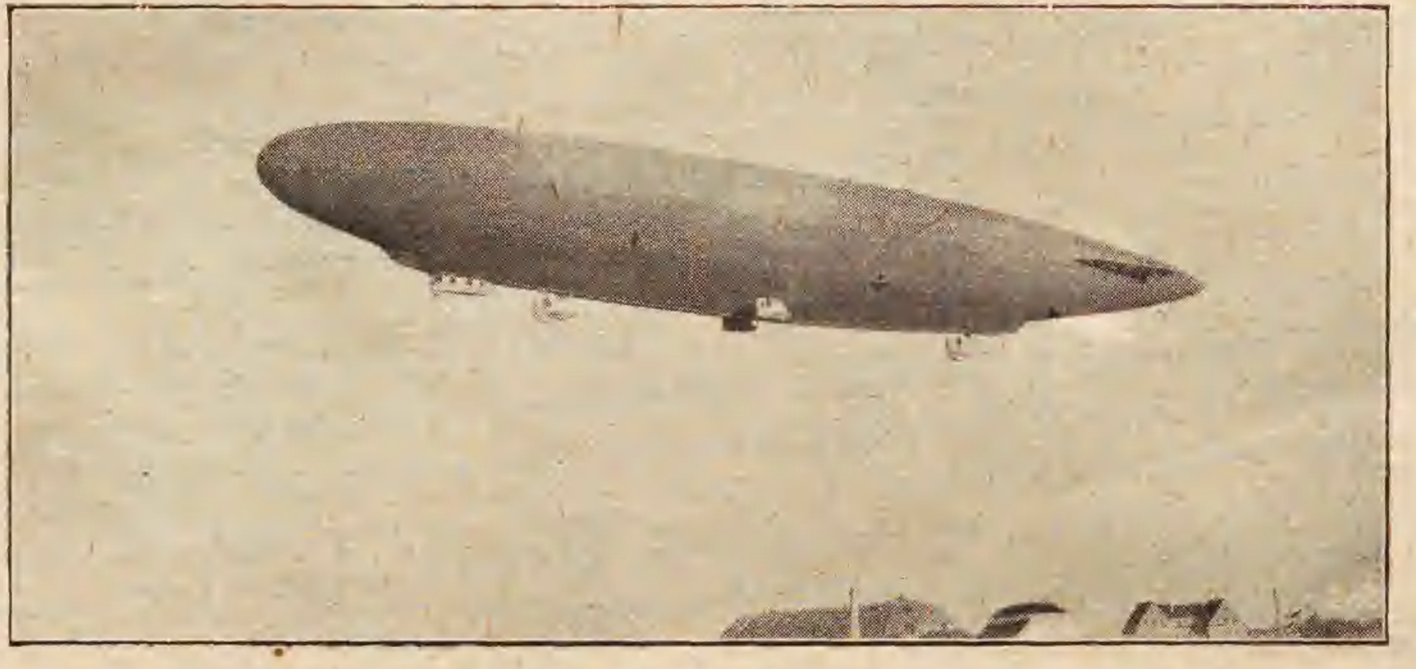
The entry fee, which is not returnable, is 100 francs. The entry is valid for all starts made during four consecutive days, the first of these four days being indicated in the entry. During this period the pilot may make as many starts as he wishes, but they must always be made from the place indicated in the entry.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

THE 18-TON PARSEVAL SEMI-RIGID AIRSHIP "PL27"

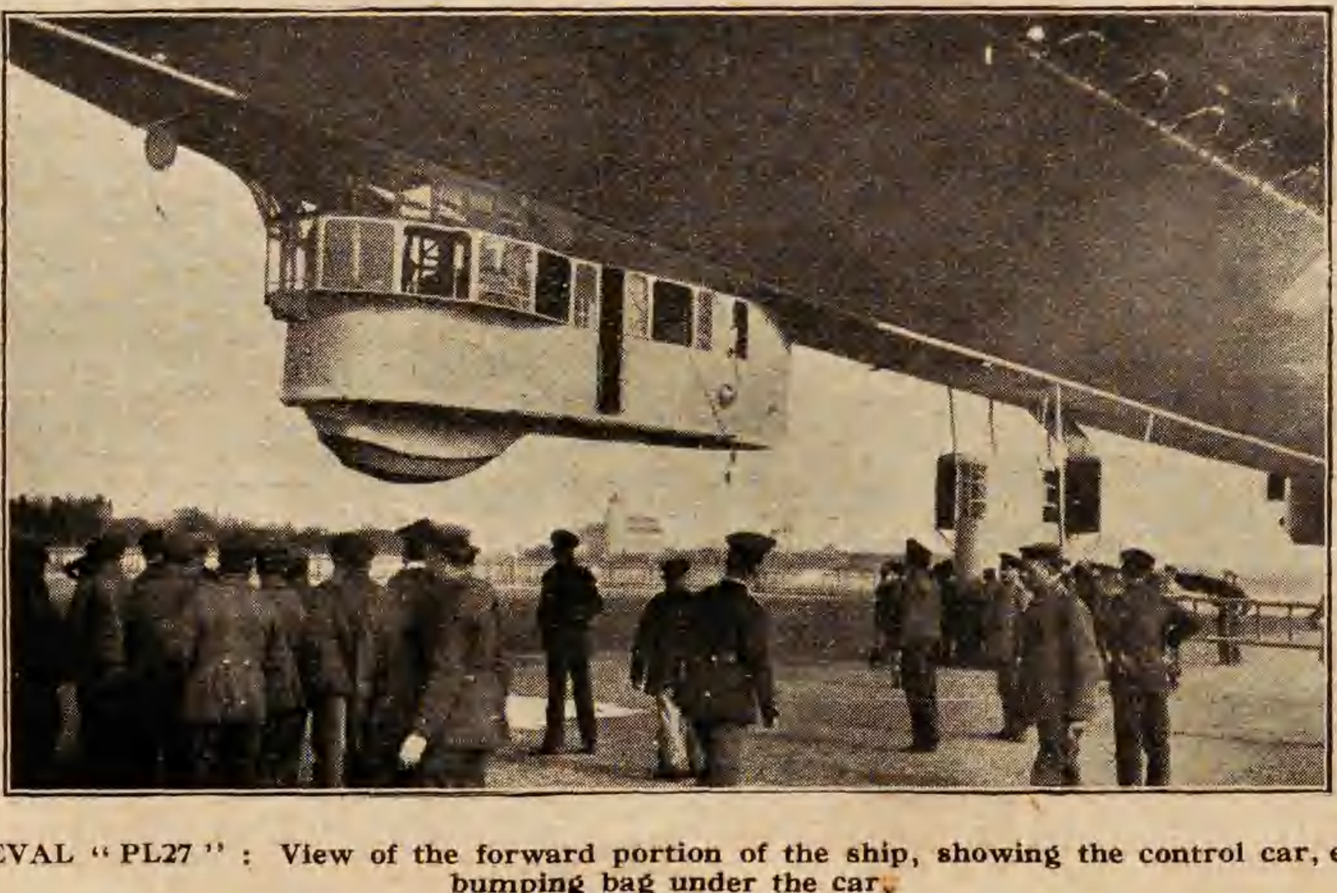
A German Experiment of Promise

ALTHOUGH built as long ago as 1916, there are several reasons why the Parseval type "PL27," designed and built by the *Luftfahrzeug-Gesellschaft* of Bitterfeld, is of sufficient interest to merit a fairly detailed description at the present time. In the first place, the airship was one of the largest semi-rigids ever built, being only very slightly smaller than the ill-fated "Roma," purchased by America from Italy some time ago. Secondly, her design was one representing a considerable departure from previous German non-rigid practice, approaching, in fact, more to the Italian than to previous German types. In spite of the accident to the "Roma," this type of airship is thought by many to have a very considerable future before it, and it is open to discussion whether the world, led by Germany, was right in deciding in favour of the rigid type of ship. In Germany at the present time, there is a strong opinion that the limits in non-rigid and semi-rigid airships have in no way been reached, and certainly one could enumerate several advantages which these types possess as against the rigid. One very important item is that of cost, and in this respect the non-rigid, and, to a somewhat smaller extent perhaps, the semi-rigid, compares very favourably indeed with the rigid. The very expensive Duralumin framework is avoided, which at once means a great saving. Col. Cave-Browne-Cave, one of our soundest, and certainly our most persistent and eloquent advocate of the non-rigid airship, stated in one of his admirable lectures before the Royal Aeronautical Society that, according to his calculations, six non-rigids, each of 500,000 cubic ft. capacity, could be built for the price of one rigid of 2,000,000 cubic ft. capacity. In other words, with the non-rigid, we should get an extra million cubic ft. capacity for the same money.



The Parseval "PL27" in Flight.

Then there is the question of useful load. Here again Col. Cave-Browne-Cave indicated that a greater percentage of useful lift is obtained in the non-rigid than in the rigid, owing chiefly to the absence of the hull structure. Thus the point where the structure weight is no more than 50 per cent. of the total lift is reached in the non-rigid with the half-million cubic ft. ship, whereas in the rigid it is not attained until one comes to sizes of about two million cubic ft. It would, therefore, appear that we may have been on the wrong track in pinning our faith almost exclusively to the rigid type. With things as they are at present, the question of the purchase, running and upkeep of a rigid is a big item. It is, at least, open to doubt whether we should not be better advised in making a start on airship services with types other than the rigid. As regards safety, there is probably little to choose between the types, and the non-rigid, apart from the advantages already outlined, has another in that, when not in use, it can be deflated and stored away in the corner of a shed. A rigid airship occupies as much space when deflated as it does when inflated. Furthermore, in the case of a forced landing, the non-rigid, and the semi-rigid which has its

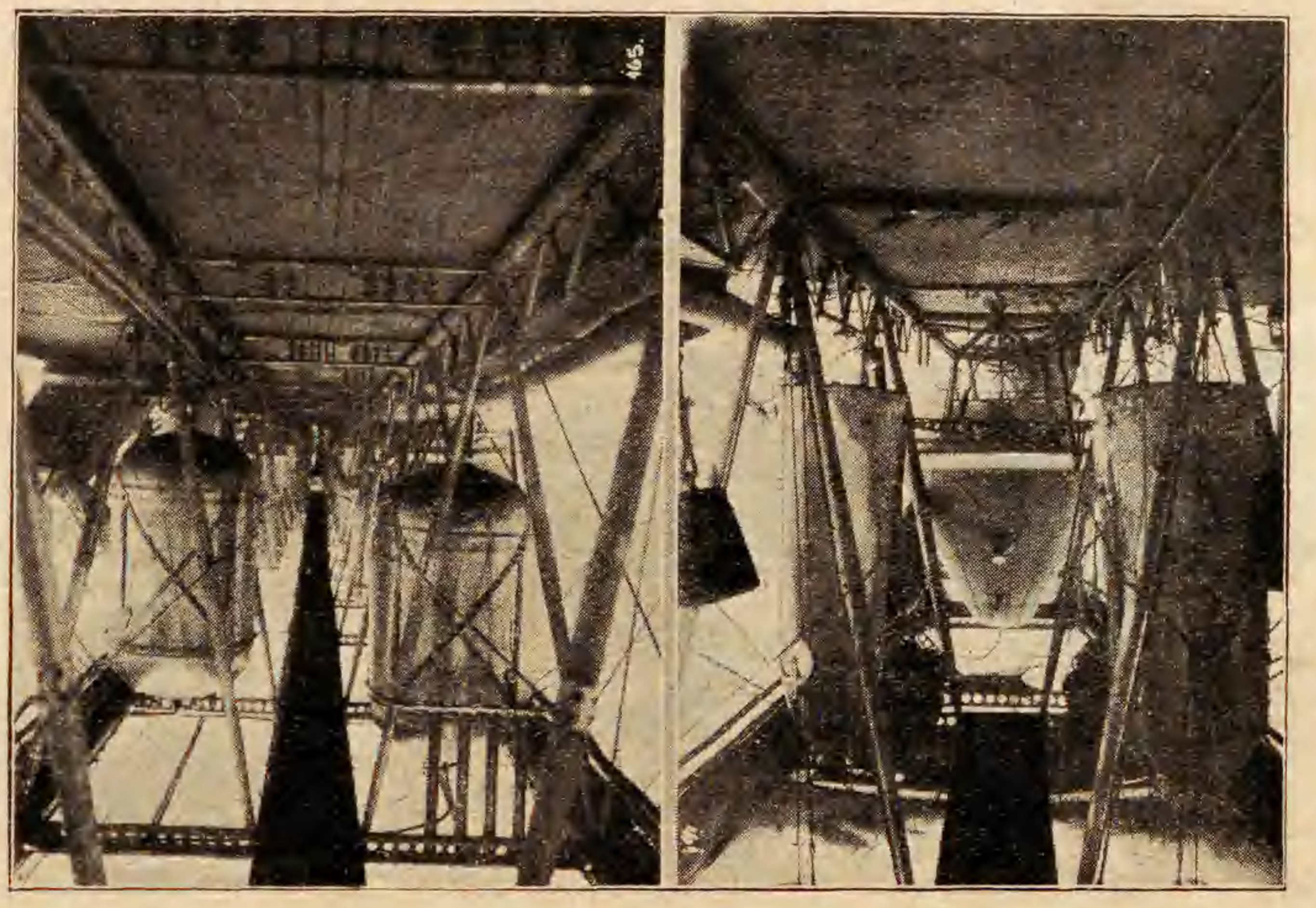


THE PARSEVAL "PL27" : View of the forward portion of the ship, showing the control car, etc. Note the bumping bag under the car.

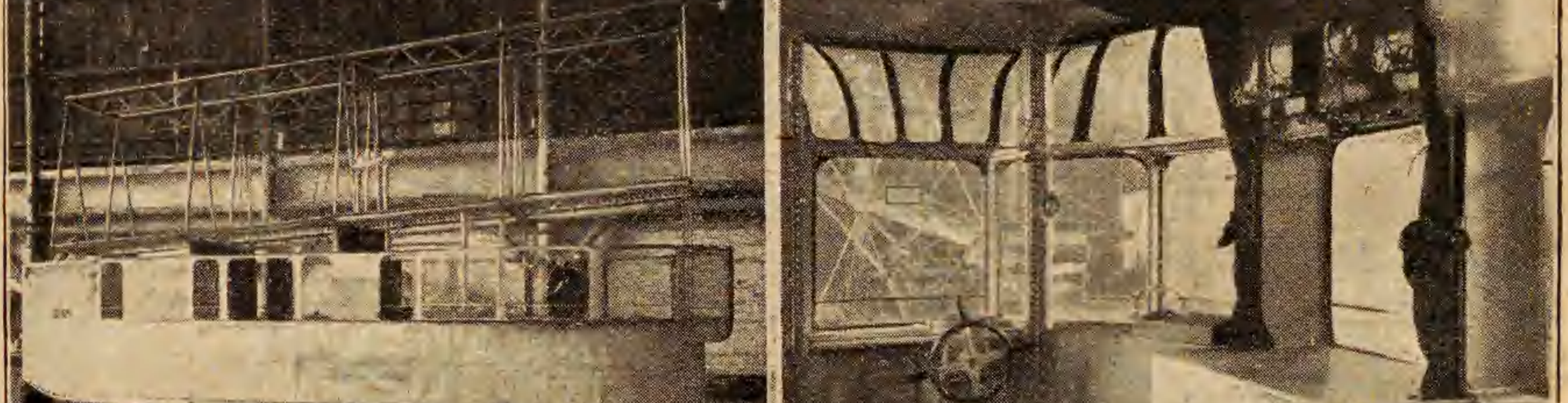
keel built in sections, can be packed up and sent home. The rigid, if it should be forced down from any cause, would almost certainly have to be written off as a total loss.

There is a great deal more which could be said about non-rigid and semi-rigid airships in general, but sufficient has, we think, been said to indicate that, as it has now been proved that these types need not be restricted to small airships, this class of airship deserves more consideration, from a commercial aviation point of view, than it has received in the past.

The Parseval "PL27" has an overall length of 157 metres (515 ft.), a maximum diameter of 19.6 metres (64 ft. 4 ins.), a greatest circumference of 61.55 metres (202 ft.) and a height of 26.5 metres (87 ft.). Its cubic capacity is 31,300 cubic metres (1,104,000 cubic ft.) and the disposable lift is approximately 18,000 kilograms (nearly 18 tons). Assuming a lift of 65 lbs./1,000 cubic ft. of hydrogen, the total lift would be approximately 32 tons, so that the disposable lift is 56 per cent. of the gross lift, which is considerably better than the figure of 50 per cent. given by Col. Cave-Browne-Cave for a 500,000 cubic ft. ship. The allocation of this 18 tons of lift would, of course, depend upon the purpose for which the airship was intended. For a very long flight a great proportion of it would be taken up by the fuel. For shorter distances the lift which could be set aside for paying load would increase. If the route on which such a ship was used were to be divided into stages of approximately 1,000 miles each, the "PL27" could carry a crew of seven, sufficient fuel to leave a safe margin, and, in addition, have accommodation for about twenty-five passengers. It will thus be seen that, as regards earning capacity, the "PL27" should be a very useful craft as a passenger and mail ship, especially as her cruising speed is said to be about 60 m.p.h. In our Editorial Comments in the August 25, 1921, issue of FLIGHT, we published some figures relating to the cost, etc., of a service run with airships of this type. It was then estimated that these airships could be built in England for not more than £30,000 each, and if built in batches, the cost should be even lower. Thus, by reducing the length of the stages flown to approximately 1,000 miles, a much more economical service should be possible than if large rigids, capable of doing the London-Cairo trip without landing, were employed. In this way, the time for the journey to Australia, for instance, would be somewhat increased, but, on the other hand, it is



The Parseval "PL27": Two views inside the keel. On the left is seen the gangway and petrol tanks; on the right the water ballast bags. Both photographs were taken before the fabric covering was put on the keel.



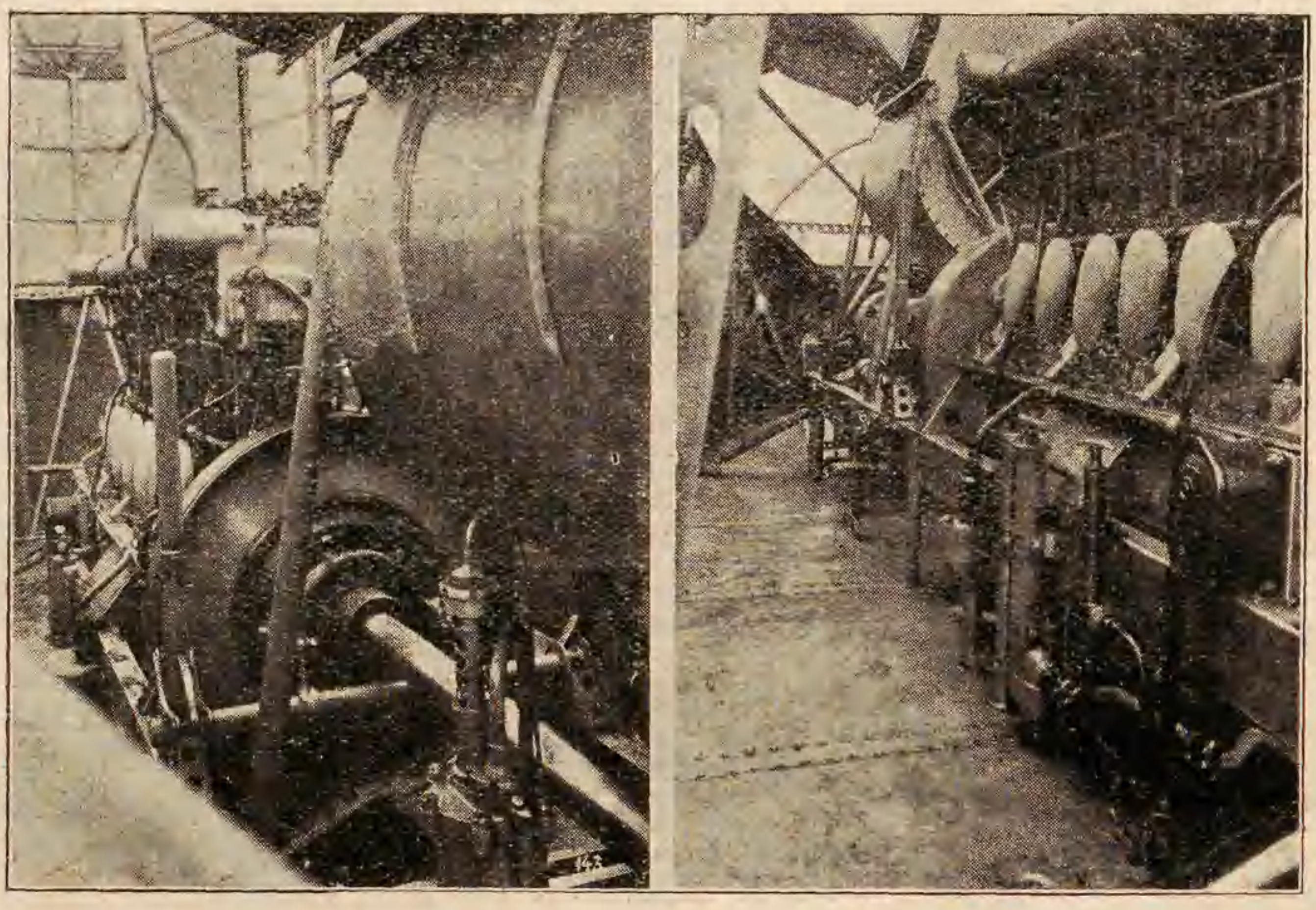
THE PARSEVAL "PL27": External and internal views of the control car. The left-hand illustration shows a portion of the keel structure above the control car.

at least conceivable that a greater revenue would be forthcoming, as it should be easier to fill up the ships with passengers for shorter distances over portions of the route.

As regards the design and construction of the Parseval "PL27," this ship is, to some extent, based upon the Italian designs in which there is a keel structure running the greater part of the length of the airship, and to which are attached some of the heavier local loads such as petrol and water tanks, central engine cars, etc. This structure is so designed that its parts form, as it were, the links of a chain. In the "PL27" the keel, which is about 330 ft. long, is divided into fifty-two separate cells or units, the whole being so designed that the keel can resist longitudinal loads, but not bending moments, owing to the manner of joining the cells to each other. The keel is built up of a tubular framework, consisting of four main longitudinals, struts and wire bracing.

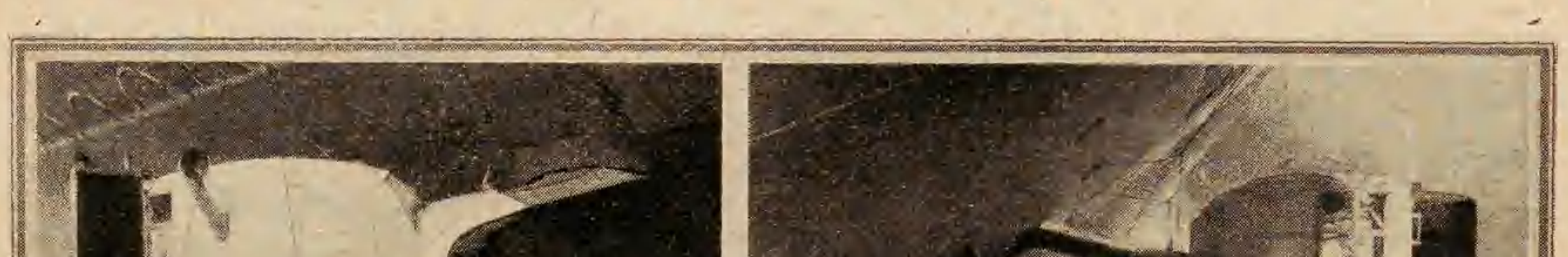
Three of the cars, the control car and the front and rear engine cars, are attached direct to the keel, while the two side engine cars are slung by cables from the envelope, and steadied laterally by struts to the keel. The attachment of the keel to the envelope is by rigging wires and fabric. As already mentioned, the keel serves to support, in addition to the three cars, the petrol tanks and water ballast bags.

The latter are of two kinds. One is known as "trouser" (*Hosen*) bags, and are emptied singly by means of a ripping line from the control car. The other kind has valves, and is emptied, also from the control car, two at a time. All the bags are of 200 kilogs. (440 lbs.) capacity. The "trouser" bags are mounted four forward and two aft. The ordinary bags, of which there are thirty-six, are distributed along the keel, the valves of every two bags being connected to one control line, so that with these 880 lbs. of water is discharged at a time. The total amount of water ballast carried is thus 8,400 kilogs. (18,500 lbs.).



The Parseval "PL27": Views inside the port engine car. On the left are shown the engine, clutch and air compressor. On the right is a close-up view of the engine and blower.

The petrol tanks are hung in the keel, as shown in one of the accompanying photographs. Normally, thirty petrol tanks are carried, twenty-six main tanks and four gravity tanks, one for each engine. The capacity of each tank is 200 kilogs. (440 lbs.), so that normally the total petrol capacity is 13,200 lbs. (nearly 2,000 gals.). Provision is, however, made for slinging another ten petrol tanks in the keel, bringing the petrol capacity up to 8,000 kilogs. (17,600 lbs., or about 2,500 gals.) if long journeys are contemplated. The lift available for paying load is then, of course, correspondingly decreased. In fact, by the time one had counted in a crew of about ten, with their provisions, there would be little more load available.



THE PARSEVAL "PL27": Two views of the port engine car. The three-quarter rear view on the left shows the cable suspension and streamlined casing around the petrol leads, etc. In the right-hand photograph can be seen the struts which brace the car to the keel structure.

As regards the placing of the petrol tanks in the keel, they are arranged in three groups, corresponding to the arrangement of the engine cars. The forward group, feeding the front engine, consists of six main tanks and one gravity tank. A similar number and arrangement feed the aft car, while the central group, which supplies the two wing engines, consists of fourteen main and two gravity tanks. All the tanks are arranged for easy slipping in case of emergency.

The arrangement of the cars will be understood from a reference to the accompanying photograph of the airship in flight. The control car is placed right forward. A short distance aft of this is the forward engine car, under the keel of the airship. Approximately half-way along the length of the ship are the two wing engine cars, some distance out from the centre line, and finally near the rear end of the keel is the aft engine car. Each of the engine cars contains one 240 h.p. Maybach engine, driving pusher screws through reduction gearing and clutches. The engines are mounted with their crankshafts about 10 ins. above the floor of the car, and the lower part of the crank-case can be reached by removing a loose floor plate. The transmission includes a reverse, two wheels being in mesh for forward and three for reverse. The reduction is such that, although the engines run at 1,400 r.p.m. at full power, the propellers run at 180 r.p.m. only. Their diameter is 14 ft. 9 ins. A blower, or fan, placed in the stern of the car, is driven at a speed of 1,850 r.p.m., by means of a silent chain, and delivers 2½ cubic metres (88 cubic ft.) of air per sec., at 100 mm. of water. The engine cars have a length of 6 metres (19 ft. 8 ins.), a maximum width of 1·8 metres (5 ft. 11 ins.), and a height of 1·6 metres (5 ft. 3 ins.).

The control car is 9 metres (29 ft. 6 ins.) long, 2 metres wide (6 ft. 7 ins.), and 2 metres high. It is divided into three compartments, of which the forward one is the control cabin, and the aft one the wireless compartment. From the central compartment access to the keel is gained *via* an automatically closing trap door, and a shaft leads through the hull to a platform on the top of the envelope. In the control cabin the rudder control wheel is placed forward and slightly over towards the starboard side. The elevator control wheel is placed on the port side. The control cabin is, of course, provided with a number of instruments, as well as with the controls for gas and air valves, etc.

The hull or envelope of the "PL27" is made of three-ply fabric, of which the inner and outer layers run longitudinally, while the middle layer is placed at an angle of 45 degrees. The tearing strength of the fabric is stated to be 2,000 kilogs. (4,400 lbs.) per metre width. In addition to this strong fabric, the hull is strengthened by so-called trajectory bands. These are bands of webbing, about 2 ins. wide, stuck to the envelope fabric and covered with water-tight cover strips. The use of these bands constitutes, we believe, a *Luftfahrzeug-Gesellschaft* Patent. The tearing strength of these bands is 1,320 lbs.

The gas space is divided, by three fabric bulkheads, into four compartments, of which the forward and aft have a capacity of 6,260 cubic metres (220,500 cubic ft.) each, while the other two have a capacity of 9,390 cubic metres (331,500 cubic ft.) each. The fabric bulkheads are reinforced with webbing, and are capable of carrying a difference in pressure between their two sides. If, for any reason, it should be necessary to equalise the pressure in two adjoining gas compartments, this can be accomplished by a hose which is normally kept closed by being tied up, but which can be opened by the crew.

Each gas compartment is provided with an air bag or ballonet, which when completely filled occupies 32 per cent. of the gas compartment volume. Thus, the capacity of the fore and aft ballonets is 3,250 cubic metres (115,000 cubic ft.) each, and that of the second and third ballonets 5,000 cubic metres (176,500 cubic ft.) each. The ballonets consist of two portions, the lower of which, attached to the envelope, is made from two-ply fabric, of a tearing strength of 1,200 kilogs. per metre width, while the upper part is in a single thickness and has a strength of 900 kilogs. (2,000 lbs.) per metre width.

Each of the gas compartments is provided with two gas valves, placed in shafts and discharging through the top of the envelope. The openings on the top of the envelope are covered with fabric hoods. Each ballonet has two air valves, built into the keel, and having discharge pipes leading into the open. In addition, each ballonet has an inlet valve of the flap type, serving to admit air from the fans. The four flap valves communicate with a common pipe or hose, into which all four blowers discharge. Each ballonet has also a pressure regulator (automatic) which ensures that there is always an excess of pressure of 25 mm. of water. Should the pressure fall to 23 mm., the regulator opens the inlet valve, which communicates with the common pipe from the blowers and keeps it open until the old pressure has been established, when the valve is closed. If the pressure rises to 27 mm., the pressure regulator opens either the air valves of the ballonet or the gas valves of the gas compartment or both, according to the setting of the switches in the control car. The actual operation of pulling the air or gas valve cords is carried out by the automatic regulator, although when required, as for instance in landing, members of the crew can operate the valves direct, without the action of the regulator.

The tail planes are so attached by struts, etc., that they cannot be pressed into the envelope. They are designed for interchangeability, the fins and tail planes being identical. The elevators are, however, different in shape and size from the rudders.

Altogether, the Parseval "PL27" is a very interesting airship, and it has proved that it is possible to design even quite a large ship without necessitating a change over to rigid construction. It is confidently expected by the *Luftfahrzeug-Gesellschaft* that, if desired, even larger ships can be built on this principle, but even taking the "PL27" as she existed in 1916, the type should have a considerable sphere of usefulness at the present time, and the type has the advantage of having been tried out to the satisfaction of the designers, behaving well during manœuvring, and showing a good turn of speed. It may be expected that when Germany is once more free to develop, without the present restrictions, more will be heard of airships of this type, and we should not be surprised to hear of regular services being established between Berlin and London, which cities are sufficiently far apart to afford a considerable saving in time by travelling by air, and yet not so far as to necessitate the use of rigid airships.

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Short Service Commissions in the Royal Air Force

THE Air Ministry announces that vacancies exist for suitable candidates between the ages of 18 and 25 for short-service commissions for flying duties in the Royal Air Force. Applicants are interviewed by a Selection Committee at the Air Ministry, and those selected and found medically fit are gazetted as Pilot Officers (on probation). The probationary period is six months, after which, subject to satisfactory progress, officers are confirmed in rank.

Short-service commissions are granted for four years' service on the active list, which may be extended by one year in the case of officers desirous and recommended. On completion of service on the active list, officers normally pass to the Reserve and receive a gratuity of £75 for each completed year's service: thus, if an officer completes four years and does not extend his service, he would receive a gratuity of £300 on passing to the Reserve.

Officers in the Reserve receive retaining fees and are required to undergo short periods of training each year. For all purposes of pay, allowances and promotion, short-service officers receive equal treatment with officers holding permanent commissions.

All officers entered under this scheme are taught to fly, and facilities are afforded, when possible, to specialise in certain other subjects. Candidates desirous of consideration under this scheme should apply by letter to the Secretary, Air Ministry (S. 7), Kingsway, W.C. 2.

Trans-Atlantic Flight Completed

COMMANDER SACADURA CABRAL and Capt. Cago Coutinho have at last successfully accomplished their flight from Lisbon to Rio Janeiro on the third Fairey (Rolls-Royce) seaplane, having, it will be remembered, started from Lisbon on March 30 last. After arriving at Pernambuco (Brazil) from St. Paul's Rock on June 5, they completed the remainder of the journey in stages along the coast, eventually arriving at Rio at 2.32 p.m. on June 17. They were given an enthusiastic reception on their arrival, being met by Brazilian warships together with a squadron of aeroplanes. Their arrival was the occasion of a general holiday in Rio, when the inhabitants "let themselves go" in true South American style. The last stage of the journey from Victoria, a distance of 280 miles, was accomplished under very bad weather conditions.

NEW BRITISH AIR SERVICE

Marine Aircraft to be Used Between Southampton and France

A scheme for the establishment of air services between Southampton and the French ports of Cherbourg and Le Havre has been approved by the Air Ministry. The services will be operated under the general terms of the subsidy scheme made public in June of last year. A new company, probably with the title of the British Marine Air Navigation Co., Ltd., is being formed to operate these new services, and in addition to the promoting company certain shipping companies will be financially interested in the scheme.

These services mark an important stage in the development of commercial aviation, as the company will use, for the first time, marine aircraft, designed and built by the Supermarine Aviation Works, Ltd. The existing British services use land types of aircraft only. The need for establishing services using this type of aircraft was emphasised in 1919 in the Report of the Advisory Committee on Civil Aviation.

The main object of the scheme is to shorten the cross-Atlantic journey by picking up passengers from Cherbourg, conveying them rapidly by air to Southampton and thence onwards to London by train. In addition, the company intend to operate a service between Southampton–Le Havre in order to speed up travel on the cross-Channel section between London and Paris for passengers proceeding by this route.

In both these schemes the company has the active co-operation of the London and South-Western Railway Company in connection with through bookings between the terminal points on each route. Subsequently it is proposed to operate a service between England and the Channel Islands for passengers, produce, newspapers and mails. This air service will also reduce very greatly the time taken between the islands and the mainland.

The company will receive a subsidy of 25 per cent. on the gross earnings from the carriage of passengers, goods and mails, and also a payment of £1 10s. per passenger carried and 1½d. per lb. of goods carried. The latter payments are half the sums paid to approved companies operating the London–Paris air services. In other respects the company will receive assistance similar to that at present provided to other approved companies.

The French authorities have been approached for the provision of the necessary customs facilities at their ports, and the French railway companies concerned are also assisting by providing suitable train connections on their part of the through route to Paris.

NOTICES TO AIRMEN

Holland : Emergency Landing Grounds

It is notified that additional emergency landing grounds have been established at : (*a*) *Bussum*, (*b*) *Rijssen*, and (*c*) *Hellevoetsluis*.

(Details are given in Notice No. 56 of 1922.)

Italy : Regulations Governing Flight of Foreign Aircraft

1. Pilots of aircraft making an isolated flight over Italian territory are required to observe the following rules :—

(*a*) *Notice to Italian Authorities.*—Previous notice of the intended flight must be given to the following authorities. As far as possible this should be accompanied by an itinerary of the route to be followed :—

(*i*) The Ministry of War, High Command for Aeronautics (Regio Ministero della Guerra, Commando Superiore di Aeronautica), Rome.

(ii) The Ministry of Finance (Regio Ministero delle Finanze), Rome.

(iii) The Commandants of the aerodromes at which it is intended to land (Commando del Campo)

(*b*) *Aerial Corridors.*—The Alpine frontier of Italy may only be crossed at the following passes :—(1) Ventimiglia ; (2) Mont Cenis ; (3) Iselle (Simplon) ; (4) Chiasso (between Lakes Lugano and Como) ; (5) Brennero (30 km. S. of Innsbruck) ; (6) Tricorno (23 km. N.N.W. of Tolmino) ; and (7) Nauport (45 km. N.E. of Trieste).

Along the whole of the Alpine frontier zone, aircraft must maintain a height of 2,000 metres (6,500 ft. approx.) *above the ground.*

(*c*) *Photographic Apparatus, &c.*—No photographic or cinematographic apparatus, or carrier pigeons, may be carried in foreign aircraft flying over Italian territory.

(*d*) *General Regulations.*—Foreign aircraft must comply with all laws and regulations in force in Italy.

2. Cancellation.—Notice to Airmen No. 33 of 1920 is hereby cancelled.

(*No.* 57 *of* 1922.)

NOTICE TO GROUND ENGINEERS

Repair or Overhaul of Licensed Aircraft : Approval of Materials

1. Ground Engineers licensed in categories " B " and " D " are reminded that, before they can certify as airworthy aircraft and/or aero-engines that have been repaired or overhauled, they must have evidence that all materials used in such repair or overhaul have been proved by test, at an approved test house, to comply with all the requirements of the appropriate specification.

2. Similar proof that the material is correct is essential for spares or fittings purchased and built into aircraft or aero engines, and, should the spares be of such a nature that a complete inspection is impossible on the finished part, the Ground Engineer should ascertain that the manufacturing process or internal workmanship, which cannot be seen in the finished article, has been satisfactorily carried out.

3. Many manufacturers of aircraft materials and spare parts are able to issue certificates with regard to material, process inspection and/or workmanship.

4. Where such certificates cannot be obtained, the Ground Engineer must make other suitable arrangements to prove the condition of the material.

5. Ground Engineers licensed only in categories " A " and " C " are reminded that they are not empowered to certify repairs or overhauls.

(*No.* 7 *of* 1922.)

CORRESPONDENCE

[*The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.*]

SOARING FLIGHT

[2058] May I take the liberty of bringing to your notice a theory of mine *re* soaring flight which has received the approval of several aeronautical experts, viz. :—

That soaring flight is caused by the eddies acting on the loose feathers and ridges on the concave surface of a bird's wing and on the ridges of the concave surface of the wings of flying fishes, etc.

Assuming a wind of 20 m.p.h. the eddies under the wing would revolve at about the same speed. These eddies acting on the rough surface and ridges would exert strong propelling effect—in fact would be much stronger than the drift caused by the wind passing over the smooth, streamlined body and convex surface of the wings ; headway could therefore be made in the face of a strong breeze, the camber of the wing enabling the bird to maintain its altitude.

F. J. Chiverton

Southampton.

Sir Ross Smith and Lieut. Bennett laid to rest in Australia

The funeral of Sir Ross Smith, which took place at Adelaide last Thursday, was an extremely impressive one. The business of the city was suspended for the occasion, and thousands of people turned out to pay a last tribute to the hero of that wonderful London-Australia flight. The official service was held at St. Peter's Cathedral, conducted by Dean Young, ex-Chaplain Bickersteth, M.C., delivering an eloquent address. The mourners included the father and mother of Sir Ross, his brother Sir Keith, and representatives of the Australian Government. The funeral procession extended for about two miles in length, and during its progress to the cemetery draped aeroplanes hovered overhead.

Lieut. Bennett, whose name is so closely coupled with that of Sir Ross Smith, was buried at Melbourne on Saturday. The funeral ceremony was likewise most impressive, and was very largely attended. Amongst the mourners was Sir Keith Smith. In the course of his address, Mr. Hughes said that the names of Ross and Bennett would always be held in reverence by Australians, and remarked upon the pathetic fact that after such a magnificent achievement two members of the party met with disaster while carrying out what appeared to be such a small task.

LONDON TERMINAL AERODROME

Monday Evening, June 19, 1922.

THERE was a welcome improvement in the number of passengers travelling on the "airways" on Friday and Saturday last. Handley Page Transport, in particular, had good loads on both days: in fact it was quite cheering to see the cars arrive and depart full of passengers.

The Instone Air Line appear to be suffering from an epidemic of forced-landings. As I have mentioned several times in these pages, there appears to be a cycle of periods in which forced-landings become numerous; and the peculiar part of the whole business is that during any one period they are confined to one particular line. At the present time the Instone Air Line are the unfortunates, their last forced-landing occurring at Lympne on Friday, when one of their D.H.18's had to descend there with something wrong with the oil supply. Mechanics were immediately dispatched from Croydon in one of the firm's "Westlands" to effect the necessary repairs.

Rumours of a Big Amalgamation

ONE hears, now, that there is a scheme on foot for amalgamating the three British companies; but, up to the present, this project is said to have met with but little success.

It is now well recognised, however, that there is not sufficient traffic on the London–Paris service to warrant the existence of three British services, in addition to the two French concerns; and I am given to understand that the British companies are now turning their attention to routes other than London and Paris or London and Brussels.

Messrs. Rowan et Cie., who run the aerodrome general store, are now adding an open-air café to their shop, where they intend serving soft drinks and ices during the hot weather. This café is to be roofed over, and will thus provide a shelter for visitors to the public enclosure in case of rain.

The temporary hangars that were erected last year near the permanent hangars on the workshops' side of Plough Lane have become extremely weather-beaten, and two of them have had the canvas fabric on the roofs torn off. These are now being re-covered, and will provide additional accommodation for the machines which, in spite of the poor traffic, are overflowing from the sheds and new hangars.

The K.L.M. were to have started their 6 a.m. service from London to Amsterdam on Wednesday, but, owing to the inclement weather, this did not get away until after 10 a.m., while on Thursday it had to be cancelled altogether. Since then, however, it has been running with the usual K.L.M. regularity and punctuality. The load for this machine is between 700 and 800 pounds each morning, which is approximately three-quarter-load.

Spraying Fruit Trees from the Air

DAIMLER AIRWAYS had a novel enquiry during the week, when a big fruit-farmer in Kent asked them to provide an aeroplane to sprinkle powder from the air on 50 acres of fruit-trees, that were over-run with caterpillars. They enlisted the aid of the De Havilland Aircraft Company, and one of this company's D.H.9's duly carried out the operation. The machine first landed in a large field on the farm and took on board half-a-ton of powder, and then, flying at a height of about 15 to 20 yards, distributed this over the fruit-trees. The experiment was a complete success, and I understand that other farmers in the neighbourhood are already enquiring the cost of similarly treating their fruit-trees and crops. It is stated, in fact, that, considering the short time the aeroplane takes to do the job—the 50 acres in question was sprayed in half-an-hour—it is actually cheaper and much more effective than by any other method.

The daily newspapers have at last got hold of the theory of the cause of the accident to the "Spad" which fell into the Channel on June 3. This theory, one may mention, has been causing much comment on the aerodrome for the past ten days. It is confidently affirmed in certain quarters on the 'drome—and in fact the opinion is so strong I understand the accidents' branch of the Air Ministry are investigating it—that the pilot of the ill-fated "Spad," M. Morin, was attacked in mid-air by one of his passengers, and thus lost control of his machine, which dived into the Channel. Incidentally, it has now become the rule on the "airways" that, in machines with accommodation for an extra person in the pilot's cockpit, on no account shall a passenger occupy this seat. Furthermore, in order to guard against failure on the part of the pilot, the Daimler Airways have now decided to carry two pilots on each machine.

Control of Traffic on the 'Drome

As a result of the conference held between pilots and Air Ministry officials with regard to the regulations governing the arrival and departure of machines from the aerodrome, one of the C.A.T.O. ground staff now stands on the tarmac and waves a flag as a signal that a machine may take off. This, however, has caused so much misunderstanding, and at times delay, that some of the pilots are now rather wishing that the new rules had not been drawn up at all.

Apropos my remark last week that the night-flying "Goliath" was the only foreign "air express" using Croydon that is fitted with wireless, M. Didier informs me that the Messageries Aériennes now have four of their "Goliaths" so fitted, and that as each Goliath comes from the factory it is being equipped with wireless before being put on the service.

The various air lines are now making arrangements to try and attract more business to the air by offering excursion facilities on special occasions. The Handley Page Transport are running a one-day excursion to the Grand Prix in connection with which the Lep-Aerial Travel Bureau are issuing inclusive return tickets covering the cost of lunch and the entrance to the Grand Stand on the race-course. Messageries Aériennes are now running regular excursions each week-end to Le Touquet at an inclusive return fare of £7 7*s*.

Capt. Muir was doing further parachute tests during the week. He tells me that the two Greek inventors whose parachute he is testing have succeeded in making a parachute with ordinary material, costing only 8*d*. a yard, that is perfectly safe and strong, in addition to being light enough for air work. I understand that they will now, as a result of these experiments, build a parachute of silk that will be an improvement, both as to cost and weight, on anything yet produced.

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S.B.A.C. Chairman and Officers

MR. C. R. FAIREY, M.B.E. (Chairman of the Fairey Aviation Co., Ltd.), has been elected Chairman of the Society of British Aircraft Constructors for the year 1922–23. Capt. P. D. Acland (Vickers, Ltd.) has been elected Vice-Chairman and Sqdn.-Comdr. James Bird (Supermarine Aviation Works, Ltd.) Hon. Treasurer.

Sir Henry White-Smith, C.B.E., the retiring Chairman, who has been Chairman of the Society since its formation in 1916, becomes Past-Chairman.

Twenty-Nine Days *versus* Eight Days by Air

THE Postmaster-General states that the air mail for Baghdad which was dispatched from London on May 18 reached Baghdad on May 26. This was a particularly notable achievement, as the normal time occupied in transmission by the combined ordinary and air route is between 11 and 18 days, and by ordinary route all the way it is about 29 days.

Note that the next air mail to Baghdad will be dispatched from London on Thursday, June 15.

A New French Flying Boat

ON June 10 the first of the new three-engined flying boats intended for the service between Antibes and Ajaccio (Corsica) arrived at the air-port of Antibes. This machine, registered as "L.E.O.6," made the journey from Saint-Raphael, about 25 miles, in 22 minutes, in spite of very unfavourable weather, the pilot being M. Martin.

The machine loaded weighs 8,800 lbs. The central motor is a Salmson 260 h.p., and the other two are Hispano-Suizas of 150 h.p. each, or a total horse-power of 560. The pilot is housed in a small separate compartment by himself with the necessary instruments and wireless outfit, and below him is a spacious cabin seating six passengers. At two-thirds of its full power the speed is said to be 90 m.p.h.

The flying boat, which has been built by Les Etablissments Lioré-Olivier for the Cie. Aéro-Navale, which has the concession for the service between Antibes–Ajaccio–Tunis, was designed largely by M. la Barthe, a director of that line, and after thorough trials will commence its duties between the Riviera and Corsica, where the air traffic is already reaching considerable proportions.

THE INDEPENDENT AIR FORCE DINNER

Fourth Annual Reunion

On Monday, June 19, about 90 members of the I.A.F. and guests gathered at the Hotel Cecil for the Fourth Annual Reunion, under the chairmanship of Air Chief Marshal Sir Hugh Trenchard. Group Capt. H.R.H. The Duke of York, a member of the Force, was present, and the guest of honour was the much beloved and great French officer, Genl. de Castelnau. Other guests present were Capt. the Rt. Hon. J. E. Guest, Secretary of State for Air; the Rt. Hon. Winston Churchill, late Secretary of State for Air; Capt. M. Sablé, French Air Attaché; Capt. de la Ferrière; le Marquis de Bonardi; Capt. de Kerrillis; Maj.-Gen. J. E. Dickie, C.B.; Group Capt. C. L. N. Newall, C.M.G., etc.; Col. Sir Walter Lawrence, Bart., G.C.I.E., etc.; Gen. Whittington, C.M.G., etc.

Capt. Guest, in proposing the health of Gen. de Castlenau said, before giving the toast, he proposed to say a few words about the Service and the development of flying generally in this country. During the last year, he said, the independence of the Ministry and the Force had become greatly and firmly consolidated. Every day new responsibilities were being placed upon them, and bravely shouldered by their remarkable and indefatigable Air Chief Marshal. He took that opportunity of offering the sincerest congratulations upon his well-merited promotion from Air Marshal to Air Chief Marshal. The filling of that post for the first time in the Air Force gave the Chief of the Air Staff the equivalent rank of full General or Admiral.

The Air Force was gaining great credit and earning fresh laurels by its performances in India, Aden, Somaliland, Egypt, Irak and Palestine, and from all quarters reports arrived which showed how high were both the morale and the efficiency of the squadrons overseas.

Continuing, Capt. Guest said it was being gradually appreciated by the public that the Air front had now no relation whatever to either the Sea front or the Land front, where we had been accustomed to expect collisions to occur. The Air Arm was now being gradually recognised as the first line of defence.

Home defence against air attack was the Air Ministry's latest responsibility, and it was from that point of view that the study and development of Civil Aviation became of vital consequence. It had been suggested that Civil Aviation should be analagous to the Merchant Service, but a moment's study would show that this could never be so until civil air transport became a commercial success. The Merchant Service of England was not built up on subsidies, or high insurance rates, nor yet to provide reserves for the Navy. Even in its infancy, a few payments for services rendered, such as the carrying of mails, were the only assistance that the great merchant and passenger sea services of Great Britain ever received. The Government paid—and pays—for the use of these great transport services just as anyone else does—no more and no less. It would, he said, be fatal if we permanently departed from the great principle that Civil Aviation, to be of any real national value, must, sooner or later, be able to fly by itself. The interim period between the "sooner or later" was, however, the one with which they were concerned at the present time, and the Government policy of giving temporary assistance to this undertaking during its infancy was only justified up to a certain point.

Capt. Guest having summarised the terms of the present subsidy granted by Parliament, said he was informed that none of the companies pay, and it was suggested by some that this failure to pay was due to competition, and that the problem would be solved by granting a monopoly. Again, this suggestion clashed with the fundamental view of British trade development. Every successful industry had been built up by healthy competition, and if Civil Aviation was ever to pay in this country, it must be on the basis of reasonable and healthy competition.

The first responsibility of the Government was to safeguard the public from avoidable risks (*a*) by guaranteeing the airworthiness of aircraft, (*b*) by the careful licensing of pilots and ground engineers, and (*c*) by satisfying themselves of the efficiency of a company before allowing it to operate.

The deductions to be drawn from these considerations, even if a little depressing, had better be bravely stated.

1. The rapidity and perfection of rail transport in our small island made this country the most unlikely of any in Europe for Civil Aviation to succeed as a commercial enterprise.

2. Our fitful climate was a still further handicap.

The British Empire, however, was not confined to the British Isles, and we had within our boundaries and Dominions more wide stretches of territory, unbridgeable except by air, than any other nation in the world. He was satisfied that Civil Aviation could be made a commercial success and Imperial asset by the development of these further routes.

Canada, India, Australasia, South Africa, all, in his opinion, offered fruitful ground for this development, and he seriously recommended British enterprise to study and develop these wider fields. It was not impossible that by the development of these Imperial routes we might be able to collect an Imperial reserve of trained pilots.

He was, however, all for the maintenance and development—even, if necessary, by higher subsidies—of the cross-Channel route, if only from the point of view of experience and illustration. It must be realised that these services were undertaken in the fiercest limelight of criticism and in the face of the most intensive land and sea competition, and he submitted with a very high degree of efficiency and success.

Capt. Guest then made an appeal for the general Press to modify their attitude with regard to the exaggeration of accidents.

Gen. de Castelnau, replying to the toast, said his first thought was to associate himself with all his heart to the respectful toast to His Majesty The King. He did so in obedience to the respectful and unalterable feelings of devotion which they had harboured in France for so long towards the glorious dynasty which directed the destiny of the British Empire. Gen. de Castelnau went on: "I want to thank Air Marshal Trenchard for having allowed me to meet you all, my dear comrades of the British Army, whose glory is inseparable from all memories of the Great War. To thank you I should like to possess a voice of gold, but my voice, alas! is made of a coarser metal of disused war weapons. I am happy for England, our neighbour and friend, and happy for my country to see assembled here so brilliant a company of heroic aviators. I am happy to see them under the auspices of the Duke of York, under the sagacious direction of Capt. Guest, Minister of the Air, and under the command of Air-Marshal Trenchard."

Air Chief Marshal Sir Hugh Trenchard, in proposing the Independent Force, said he would like to take the opportunity of saying how keen were all of them who were there that night, His Royal Highness included, that this dinner club should continue and prosper and that more and more of their members should be present year by year; and of mentioning the untiring efforts of Maj. Toc Smith, Sqdn-Ldr. Cleverly and Group-Capt. Newall to make their dinner a success.

He was glad to say that since they last met the discussions of the past were happily over. The Service was now made, and they had helped to make it. Small though it still was, it had its charter. They thanked Lord Cavan and the Army Council for the help they had given and were giving them, and that he knew they would continue to give them; and though they were still discussing with the Admiralty improvement in methods of co-operation with the Navy, he felt quite certain that they could rely on their help also.

In the past twelve months they had been by no means idle. They had been successful in maintaining peace in Trans-Jordania. Responsibility for Iraq was in process of transfer to them, and all accounts from all sources told wonderful things of the Air Force in that country. They heard how efficiently they were carrying out their work under great climatic and other difficulties, and how the Air Force had already saved large sums of the long-suffering tax-payers' money. The cross-desert route, without any organisation and practically without any money spent upon it, and in spite of all difficulties of landing in the desert, had carried the mail with a saving of an average of 10 to 14 days over the ordinary route ever since it was opened on August 1 last.

At Aden they had only three machines. The reports he had received were extraordinarily good. They had done a great amount of work, and had, he thought, incidentally prevented a renewal of disturbances in Somaliland.

Referring to the Pageant, Sir Hugh said what he wanted to impress upon them was that the Pageant was really the culmination of their training. Their training aimed primarily and chiefly at reliability and organisation. The organisation enabled every machine to start for every event within a minute of scheduled time, and that, he thought, was something to be justly proud of. It was a military asset, a military necessity—and it was done. Not only was it done at the Pageant. Recently they had occasion to move a squadron, with all its personnel and transport and everything complete.

They gave the order to uproot them from their peace station on a Wednesday evening, and by Saturday evening the whole squadron of 12 machines, personnel and everything had landed satisfactorily at their new station.

With regard to what had been done afloat it was rather harder to particularise, but they had not lagged behind afloat any more than they had on land. In fleet exercises also their aircraft were playing an increasingly important part. Deck landings had proved successful, torpedo work was becoming increasingly useful, and all this work afloat required the greatest efficiency in training.

From all sources he heard good accounts of the first lot of cadets that had left the Air College at Cranwell. The Staff College at Andover was now a going concern. He was there the other day, and he could say that he had seldom met a more brilliant set of keen young officers, all of them anxious to improve themselves for the benefit of the Air Service and to investigate every possibility of the air. The boys being trained at Halton and Cranwell were gaining a great reputation, and he did not doubt they would go on doing so. So far it was all praise, but there were many difficulties ahead; but whatever might be the controversies of the future, at any rate the Air Force had been formed. It was very small, certainly, but certainly it was very efficient. There were many mistakes that must be corrected, but the foundations were there, and it was for their successors one day to say whether they had been well and truly laid.

In conclusion, Sir Hugh said how proud they all were that General de Castelnau, Capitaine La Ferriere and Capitaine de Kerillis were present there. With regard to H.R.H. the Duke of York, he was not going to say anything about him. He was not there as a guest. He was a member of the Independent Force, and he was there as one of them. He thanked General de Castelnau and all his French colleagues for the great help they gave them in France. "May the happy *entente* that he established between the British and French Air Services continue for ever," was his heartfelt wish.

Sir Walter Lawrence in happy terms proposed "The Guests," and gave a few highly appreciated reminiscences.

Mr. Winston Churchill, responding, remarked that it was in very stern and hazardous circumstances that the Independent Air Force was born, and no one, except perhaps Sir Hugh Trenchard, could possibly have foreseen the result that would have been obtained in so short a time in the German Rhine cities. "If the Independent Air Force has been worthy of its commander," said Mr. Churchill, "the commander has been worthy of the Independent Air Force. Fine as is the reputation of the Independent Air Force, it is a great honour that General de Castelnau should come among us to-night." There was no period during the war comparable to the Marne. Upon a narrow balance an immense decision turned. No factor was too small not to be brought into the general addition of that vast calculation. But what would have been the value of that great victory had it not been for the efforts of General de Castelnau? No one had struck a greater blow for France and for the dignity and honour of his country than General de Castelnau.

A very delightful evening was concluded with thanks to the Chairman, which was accorded with musical honours in no uncertain strain, with a couple of "finals" for Lady Trenchard and Hugh Minor.

Those present at the Reunion included: Lieut.-Cols. E. B. Gordon, C.M.G., D.S.O., F. H. L. Errington, C.B., V.D., R. C. Donaldson-Hudson, D.S.O., J. Waley-Cohen, C.M.G., D.S.O., the Hon. Victor Russell, R. H. Collier, D.S.O.

Wing Commanders Louis Grieg, M.V.O., J. H. A. Landon, D.S.O., O.B.E., J. E. A. Baldwin, D.S.O., O.B.E., H. R. Nicholl, O.B.E., L. A. Pattinson, D.S.O., M.C., D.F.C., C. E. H. Rathborne, D.S.O., A. Vere Bettington, C.M.G.

Majors E. K. Brown, H. H. Smith, T. Vincent Smith, M.C., F. M. Iredale, S. A. Chambers, C. H. Nathan, Louis Reynolds.

Squadron-Leaders S. M. Cleverly, C. G. Burge, O.B.E., J. C. Quinnell, D.F.C., John Sowrey, A.F.C., H. Gardiner-Hill, A. F. A. Hooper, O.B.E., W. R. Read, M.C., D.F.C., A.F.C., W. J. Ryan, C.B.E.

Flight-Lieuts. W. E. Reason, Alec Gray, M.C., C. R. Cox, A.F.C., C. B. Dick-Cleland, C. A. Stevens, R. C. Savery, D.F.C., A. N. Benge, R. Halley, D.F.C., A.F.C.

Captains T. B. Marson, M.B.E., A. S. Keep, D. Brunt, L. C. Bygrave, H. L. Robertson, W. A. Herbert, J. E. Hume, D.S.O., E. B. Rayner, F. J. Terrell, E. D. Harding, Wm. Smith, A. G. Trussell, D.S.M., A. H. Fynn.

Flying Officers T. A. G. Hawley, R. S. Martin, E. J. McLoughlin, J. R. Bell, D.F.C., Jack Cottle, M.B.E., D.F.C., John Mitchell, D.S.O., D.F.C., W. Wild, M. Burbidge, R. Stanley-Smith.

Messrs. C. G. Grey, Stanley Spooner, C. C. Turner, E. F. Van-der-Riet.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JUNE 11 AND JUNE 17, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	40	96	16	27	38	2 30	D.H. 34 G-EBBT (1h. 57m.)	B. (5), D.H. 18 (2), D.H. 34 (2), G. (6), H.P. W.8B (3), Sp. (1), V. (1), W. (1).
Paris–Croydon	40	91	8	26	35	2 54	D.H. 34 G-EBBS (2h. 23m.)	B. (4), D.H. 18 (2), D.H. 34 (2), G. (6), H.P. W.8B (3), Sp. (1). V. (1), W. (1).
Croydon–Brussels ...	6	15	5	5	6	2 27	D.H. 34 G-EBBT (2h. 5m.)	D.H. 34 (1), V. (1).
Brussels–Croydon ...	5	6	—	5	5	2 34	D.H. 34 G-EBBT (2h. 26m.)	D.H. 34 (1), V. (1),
Croydon–Rotterdam–Amsterdam.	10	8	9	9	10	2 46	Fokker H-NABI (2h. 16m.)§	F. (9).
Amsterdam–Rotterdam–Croydon.	11	7	9	9	11	2 50	Fokker H-NABI (2h. 34m.)§	F. (8).
Totals for week ...	112	223	47	81	105			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys. § Rotterdam.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Sp. = Spad. V. = Vickers Vimy, Vulcan, etc. W. = Westland.

Incidental Flying.—During the week Capts. Muir and Stocken made several test flights on Aircraft Disposal D.H. 9's, and Mr. Hayns took an Avro over to Brussels on the 17th.

SOME ASPECTS OF AERONAUTICAL RESEARCH

BY COLONEL A. OGILVIE

THE Tenth Wilbur Wright lecture was read before the Royal Aeronautical Society by Col. Ogilvie on June 15. It had originally been intended that this year's lecture should have been prepared and read by an American, but at the last moment the arrangements made fell through and the task of giving the lecture very fittingly fell to Col. Ogilvie, who, it will be remembered, was closely associated with the Wright brothers in the early days.

The first part of Col. Ogilvie's paper was devoted to a brief account of the lecturer's first meeting with Wilbur Wright at Le Mans in December, 1908, and the lecturer then proceeded to the main points which he wanted to bring out in his paper. These were, he said, that the Wright brothers based the whole of their knowledge on solid foundations, and that if they had not done so it would not have been possible for them to have overcome the difficulties which they encountered. Col. Ogilvie said it appeared to him that there was some danger of the real lessons of the past not having been understood and taken to heart, and he therefore said he would take leave to conduct his audience over some old ground in order that they might see if there was not something there which would help us in laying our plans for the future.

By way of illustrating how thorough must have been the brothers' grasp of fundamental principles, the lecturer gave particulars of the standard Wright machine and the small racing machine produced to compete in the Gordon-Bennett Cup in 1910. The new machine represented a radical departure, being very much smaller and having a more powerful engine. Whereas the wing loading of the standard machine was 2¾ lbs. per sq. ft., the loading of the racer had been increased to 6 lbs. per sq. ft. When the racer was first flown by Orville it came up to its designed performance and was in perfect balance and control, and the lecturer thought it doubtful if any aeronautical designer of the present day could make so immediate a success of so radical a departure.

Col. Ogilvie then proceeded to give a brief history of the experimental work of the brothers from 1900 and onwards. A number of problems had to be solved and many technical difficulties had to be overcome, and the first machines could only be controlled with extreme difficulty. The 1901 machine insisted on either climbing steeply or diving, and the trouble was eventually traced to the big camber of the main planes. After this had been cured by substituting flatter wings, some good glides were obtained. But there were other problems constantly presenting themselves, particularly in connection with certain inexplicable happenings in the lateral control, and the further the Wright brothers went, the more, they discovered, there seemed to remain still to be done. It is therefore small wonder that at times they became discouraged. Fortunately, however, they were so deeply interested that they could not make up their mind to drop the subject, and they had the courage to commit themselves to a lengthy programme of laboratory research on the characteristics of aerofoils. This, the lecturer said, was the real starting-point of their ultimate success. The Wright brothers had constructed a 16-in. wind channel in which they tested a great number of small metal aerofoils. The lecturer stated that, to the best of his recollection, the models were about 6 ins. span and 2 ins. chord. That the wind-channel work carried out was satisfactory and accurate was proved, the lecturer said, by the fact that full-scale design based on the work was in accordance with expectation. He said he had been given hundreds of aerodynamical figures of all kinds by the Wright brothers, and had never known the estimated figures to be more than 1 or 2 per cent. out from the measured result.

Coming to the lessons to be learned from the work of the Wright brothers, Col. Ogilvie pointed out that the first of these was the immense importance of fundamental research work, and another important one was the value of the closest co-operation between laboratory and field work. The lecturer stated that he did not wish to exaggerate the importance of the work of the Wright brothers, but he did desire to lay the strongest emphasis on the lessons to be learned therefrom, viz., that the whole basis of aeronautical progress rested upon general research in the laboratory, on the development of mathematical lines of attack, and on full-scale research work in the field.

The lecturer then indicated briefly the position of aeronautical research work in this country between the years 1909 and 1914, and with the research during the war period. He pointed out that during the War great progress had been made in the art of flying itself and in methods of construction as well as in the actual power, reliability and efficiency of engines. In coming to a consideration of the progress in aerodynamics, however, he thought it was accurate to state that substantially there had been no progress, and he pointed out that practically as much weight per horse-power could be carried in 1914 as in 1919.

Research in the Post-War Period

Col. Ogilvie then turned his attention to research in the post-War period, and this part of his paper we quote in full, as it deals with a subject which is of the utmost importance to the future of aviation:—

"Since the War, money and the national effort, as distinct from the individual effort, put into research have steadily dwindled, until it is safe to say that it is now far below the pre-War standard, when we had, as well as the establishment supported by State fund, a large amount of work being done by private firms and individuals. At the present date the few, extremely few, private firms who are left are so hard pressed to keep on their feet at all that they find it impossible to continue to devote their resources to anything outside the fulfilment of their definite orders.

"One of the most unfortunate results of the concentration during the War of all aeronautical matters into the hands of the State is that individual effort is now almost paralysed, and it is impossible for any one man, however broad-minded and far-sighted, to sympathise with all the wide aspects of aircraft research, particularly when continually harassed by orders to cut down his expenditure by so much per cent., as if he were a commercial traveller buying fire-irons. To all persons interested in sound aeronautical development it is only too evident that the importance of fundamental research to real progress in aircraft design is not grasped by those in authority in this country. Even the word research itself is very imperfectly understood. The initial problems are solved and technical development has gone far during the last ten years, but if the flying machine is to be of real benefit to the world in peace and to be a real means of rapid communication and of increase of friendliness among peoples, then big advances are necessary. Such advances are only to be obtained by laborious and systematic researches into the problems we can see dimly, as well as those we can see more clearly immediately in front of us.

"The immediate problems are those directed towards the improvement of the present type of aeroplane so as to increase its safety of operation. The main obvious defects are, that its minimum flying speed is too great and that the stability and controllability round about this speed are insufficient. It is foolish to put the responsibility for accidents on the engine and to say that all that is necessary is so to improve the reliability of engine and installation that breakdowns cannot occur. Certainly the majority of interruptions are traceable to some breakdown in the power plant in which greater experience and care will undoubtedly make big improvements; but it can never be the case that mechanical breakdowns are absolutely impossible, and it is essential that emergency landings can be accomplished without danger to the passengers or without even anxiety to the pilot.

"To the immediate future of civil aeronautics the importance of safety is paramount and supreme over all other considerations, and the efforts which are now being made in the laboratory and on full scale to improve stability and controllability round about stalling speed are all to the good. The other main problem, namely, that of decreasing the dangers at the landing itself, cannot be attacked in an adequate manner until funds are available. This problem has two branches—one a decrease in the minimum flying speed while keeping the top speed about the same, and the other an increase in the strength and efficiency of the landing mechanism itself.

"Further off we can see the big advances which will be possible when we have a real understanding of the action of an aerofoil in the air, and how and why the air flows round it and gives it lift and drag. A brilliant experiment may show, and indeed has shown, that we are on the outskirts of knowledge, but before we can attain the citadel we must give encouragement and adequate support to the men who are devoting themselves to fundamental research of this character.

"It is conceivable that lines of advance may then reveal themselves which would make it worth while to attempt even the design of a helicopter, but let us recognise that the present time is one requiring research work into the fundamental problems which must be solved before the world at large can reap the benefits of the wonderful achievement of Wilbur Wright and his brother."

THE ROYAL AIR FORCE

London Gazette, June 13, 1922

General Duties Branch

Sqdn.-Leader W. R. Read, M.C., D.F.C., A.F.C., Capt. 1st King's Dragoon Guards, is granted a permanent commn., with effect from November 17, 1921, retaining his present substantive rank and seniority. L. H. Cooper is granted a short service commn. as a Flying Offr. for three years on the active list, with effect from, and with seniority of, June 1. Pilot Offr. C. D. Robertson, M.M., to be Flying Offr.; April 29. Wing Commander A. V. Bettington, C.M.G., is restored to full pay from half-pay; June 1.

The following officers cease to be seconded for duty with Canadian Air Board:—Sqdn.-Leader R. Leckie, D.S.O., D.S.C., D.F.C., Flight-Lieut. J. A. Glen, D.S.C.; May 27. Flight-Lieut. J. A. Barron; June 1.

Flight-Lieut. H. O. Barnaby, M.B.E., is transferred to Reserve Class B; June 14. Flying Offr. A. V. Shewell is placed on retired list on account of ill-health contracted on active service, and is granted rank of Capt.; June 14. Obsvr.-Offr. R. B. Hunter relinquishes his short service commn. on account of ill-health contracted on active service, and is permitted to retain rank of Lieut.; June 14. Flying Offr. A. Bushfield is placed on retired list; May 31.

Stores Branch

Flying Offr. S. A. Martindale is removed from R.A.F. on conviction by Civil Power; May 2.

Memorandum

Major R. A. Cockburn, O.B.E., Suffolk Regiment, R.A.R.O., is granted permission to retain rank of Lieut.-Col., R.A.F., on retirement from Army.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Wing Commander T. O. Lyons, O.B.E., from Headquarters, R.A.F., Iraq to R.A.F. Depôt (Inland Area). (Supernumerary Non-effective.) 14.4.22.

Squadron Leaders.—A. J. O. Wigmore, M.B., from Palestine Wing Headquarters (Middle East) to No. 14 Squadron (Middle East). 26.4.22. H. J. F. Hunter, M.C., from No. 12 Squadron (Rhine) to R.A.F. Depôt (Inland Area). (Supernumerary.) 25.5.22. (A./Grp. Capt.) H. C. Ellis, C.B.E., from General Services Pay Office (Inland Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) 1.5.22.

Flight Lieutenants.—R. B. Mansell, O.B.E., from No. 4 Flying Training School (Middle East) to No. 47 Squadron (Middle East). 8.5.22. E. N. E. Waldron, from No. 4 Stores Depôt to R.A.F. Base, Gosport (Coastal Area). (Supernumerary.) 22.5.22. J. M. A. Costello, M.C. M.B., from Research Laboratory and Medical Officers' School of Instruction (Inland Area) to R.A.F. Depôt (Inland Area). 22.5.22. W. Duff Miller, M.B., to Research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to short Ser. Commission. 15.5.22. W. H. L. O'Neill, M.C., from R.A.F. Base, Leuchars (Coastal Area) to No. 2 Flying Training School (Inland Area). 1.6.22. C. E. Wardle, from R.A.F. Depôt (Inland Area) to No. 24 Squadron (Inland Area). 29.5.22. P. J. Wiseman, from Central Pay Office (Inland Area) to Inland Area Aircraft Depôt (Inland Area). 25.5.22. N. R. Fuller, from R.A.F. Depôt (Inland Area) to No. 4 Stores Depôt. 29.5.22. L. Wanless-O'Gowan, from R.A.F. Depôt (Inland Area) to No. 10 Group Headquarters (Coastal Area). (Supernumerary.) 1.6.22. Andrew Ronald Mackenzie, from No. 216 Squadron (Middle East) to Head quarters, R.A.F. (Middle East). 10.5.22. K. B. Lloyd, A.F.C., from R.A.F. Depôt (Inland Area) to No. 2 Flying Training School (Inland Area). 11.6.22. A. E. Jenkins, from M.T. Repair Depôt (Inland Area) to R.A.F. Depôt (Inland Area) for duty as Medical Officer. 5.6.22.

IN PARLIAMENT

Aeroplanes for National Defence

CAPT. VISCOUNT CURZON, on June 13, asked the Secretary of State for Air what is the total number of aeroplanes available for the purposes of national defence, in a case of emergency, in Great Britain, France, Germany, and America?

Capt. Guest: I would refer to the figures given in reply to a question by Mr. L. Malone on February 24, which showed that some 775 aeroplanes were in active use in the Royal Air Force throughout the world, and that the total number of aeroplanes on the establishment of the Royal Air Force was 1,938. I do not consider it advisable in the public interests to state the number of aeroplanes available for national defence in an emergency, and any information I could give as to the number of aeroplanes available in other countries would have to be discounted in various directions before a comparison could be drawn.

Viscount Curzon: Is this question on the number of aeroplanes immediately available for national defence receiving the consideration of the Committee of Imperial Defence?

Capt. Guest: Yes, Sir, certainly.

Britain's Airworthy Aircraft

MAJ.-GEN. SEELY, on June 15, aksed the Secretary of State for Air how many civil aircraft are now licensed by the Air Ministry as airworthy, and how many of this number are of value for war purposes; and can he give the comparable figures for the two preceding years?

Capt. Guest: The figure, on June 1 are as follows:—

Number of aircraft holding Certificates of Airworthiness, 97 (1922); 137 (1921); and 240 (1920). Number of value for War purposes (including training), 83 (1922); 104 (1921); and 186 (1920).

There are probably in existence in this country at the present time considerably more than 97 airworthy aeroplanes, but owing to lack of employment and other causes, certain aeroplanes are laid up, and the owners have allowed the certificates to lapse. Though the 83 aeroplanes referred to above would be of some value for training and war purposes, it must be remembered that in this number there are no less than 28 different types of aeroplanes which reduces their military value considerably. In particular, very great difficulties would arise in maintaining and organising the issue of the necessary spares to keep all these different types serviceable for war purposes. Therefore, all that can be said is that they would be of some slight value.

Maj.-Gen. Seely: In view of the surprising and alarming decrease in our only reserve of air power, can the right hon. gentleman say, broadly—I cannot ask him to say in detail, in reply to a supplementary question—whether there is anything like that reduction in the case of other countries in their reserve fighting force in the air?

Capt. Guest: I think it would be better to study that question carefully. Perhaps my right hon. and gallant friend will put down a question.

Maj.-Gen. Seely: I will do so.

Aircraft Safety-Fuel Tanks

MR. G. LOCKER-LAMPSON, on June 16, asked the Secretary of State for Air if he has received complaints about the safety-fuel tank competition recently held at Farnborough; that tanks were selected for the final test, though they failed to pass the preliminary test for crashing; that tanks which crashed without bursting in the preliminary test were not allowed to enter the final; that only 8 out of 24 competitors were allowed to make weight and other modifications; that the tanks awarded the first three prizes failed in all tests in the final; and will he enquire into the matter?

Capt. Guest: The reply to the first question is that no complaints of the nature indicated have been received; to the second, in the negative; to the third, that a number of tanks which did not burst in the crashing test were excluded from the final test under the Regulations because they failed for other reasons; to the fourth, that all competitors were allowed to carry out any modification of detail they wished prior to the tests; to the fifth, that one design failed in the final tests, but the other two passed them successfully; and to the sixth and last, that I have already made enquiries into the matter, and I do not think that there is any reason for instituting further enquiries.

Civil Aviation

MR. MALONE, on June 19, asked the Secretary of State for Air if his attention has been called to the widespread criticism concerning the inefficiency and inadequacy of the policy of His Majesty's Government in regard to civil aviation; and when will he take an opportunity to make a statement to the House on this matter?

Capt. Guest: I have read a great many articles in the Press on the subject of civil aviation, containing an infinite variety of conflicting criticisms and suggestions, and I welcome this indication of increasing public interest in aeronautical subjects. The policy of the Ministry is, as I stated in my speech introducing the Air Estimates, to concentrate on the maintenance of the Continental air services, both in order to give experience and as a demonstration of what is now possible in competition with the most intense form of rail and sea transport in operation today. It is too soon yet to gauge the success, or otherwise, of the present subsidy scheme, as it has only been in operation a few weeks, but an opportunity can be taken to discuss the whole subject if the House so desires on the Civil Aviation Vote which is still on the Paper.

Mr. Malone asked the Secretary of State for Air if he is aware of the decreasing numbers of passengers carried on the London–Paris and other air routes; and what steps are being taken by the Controller of Civil Aviation to increase the safety and efficiency of these services?

Capt. Guest: The volume of passenger traffic across the Channel is being carefully watched. Actually, for April and May of this year the numbers carried on the London–Paris route were approximately equal to the numbers for those months last year, but there was a considerable decrease during the first two weeks of June. The British lines are carrying a larger proportion of these passengers than was the case last year. About 50 per cent. more aircraft are being employed on the Continental routes, and on an average each of these aircraft is flying more than twice as much as was the case last year. Consequently, more than three times the seating accommodation is available this as compared with last year for approximately the same traffic. An official air route between London and Paris has been settled in consultation with the French and Belgian authorities. A similar air route to Brussels has been selected this week by our experts, but must be referred to the French and Belgians for concurrence. General rules for flying along these and other official routes are being issued. New rules for taking off and landing at Croydon aerodrome have been drawn up and are now in force. All such regulations will be posted in a prominent position on the aerodrome.

Periodic conferences between the Air Ministry officials, representatives of operating firms, and pilots actually flying on the cross-Channel air routes are being arranged for the purpose of discussing measures of safety and means of obtaining reliability of service in the future. By means of these meetings, pilots will also be given instructions regarding the care and use of the latest instruments, and kept up to date in the progress of air navigation. A system is being introduced by which a pilot's licence can be endorsed, suspended or withdrawn for acts of neglect, carelessness or dangerous flying. The work of ground engineers licensed by the Air Council will be more closely supervised than formerly, and further qualifications in ability to inspect and maintain instruments will shortly be demanded from them. Operating firms are being requested to report fully on all cases of engine failure and engine trouble, and each case will be investigated by experts with a view to eliminating the causes. More stringent rules regarding the use of radio-telephony by pilots are being introduced with the objects of providing more rapid information of weather conditions along the route and of preventing interference between aircraft. A fixed time-table for aircraft flying along the route is being drawn up in order that pilots may know approximately what aircraft are flying near them at any given time. The question as to whether the provision of an assistant pilot should be made compulsory is under consideration. It is a complicated question, and cannot be decided hastily; meanwhile, the carriage of passengers seated beside the pilot has been forbidden.

Aircraft in Aldershot Tattoo

DURING the three days' Tattoo held at Aldershot on Wednesday, Thursday and Friday of last week, aircraft helped to no small extent to make this famous spectacular display a success. The principal feature of the aerial side was the wonderful flying by Flight Lieuts. T. E. B. Howe and J. A. G. Haslan, and Flying Officer A. J. Warwick—all from Andover—on Bristol Fighters.

THE LONDON AERO-MODELS ASSOCIATION

(The Society of Model Aeronautical Engineers.)

THURSDAY next, the 22nd inst., a discussion will be held on Dr. Hankin's lecture with reference to the best method of experimenting with models for the purpose of attaining soaring flight, and it is hoped that members will bring along wings built up on the flying-fish principle for demonstration purposes.

On Thursday, the 29th inst., Mr. F. Handley Page has kindly arranged for Mr. Reynolds, of the Handley Page Research Department, to read a paper before the members at Headquarters, 20, Great Windmill Street, Piccadilly, W., the title of which will be "The Handley Page Slotted Wing," illustrated by lantern slides. Dr. A. P. Thurston, D.Sc., will preside. Visitors will be welcomed, but, owing to limited accommodation, should notify the Hon. Secretary, A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6. Time of lecture, 7.30 p.m.

"Flight Golf" Competition for "Flight" Challenge Cup

Wimbledon Common, Saturday, July 8, 1922, at 5 p.m. Competitors to assemble at 4.30 p.m.

Rules

1. The Competition to be open.
2. Non-members to pay a 2*s*. 6*d*. fee for each entry.
3. The prize shall be awarded to the competitor who completes the arranged course in the smallest number of flights.
4. The course to be flown over will be in the form of a pentagon, each side measuring 150 yds.
5. The bases shall be indicated by white flags, attached to which are two cords having a radius of 10 yds. and 20 yds. respectively.
6. The models must start the course from No. 1 base with an R.O.G. flight, and must be in the air at least 10 secs. (two attempts being allowed) or be disqualified.
7. All models must arrive at each base entirely under their own power, the circle of 20 yds. radius precribing the maximum distance that may be "taxied."
8. The direction of course from No. 1 to No. 2 base will be into the wind.
9. A time allowance of 60 mins. will be allowed for rubber-driven models to complete the course, and 75 mins. for models driven by mechanical power—this time to include repairs.
10. The maximum loading allowed will be 8 ozs. per sq. ft., reckoning lifting surface only.
11. After the flight from ground mentioned in Rule 6, all models must continue the course with their landing gear intact or be disqualified.
12. In the event of bad weather conditions prevailing, the judges reserve the right to alter the course or postpone the Competition.
13. All entries for the Competition shall be numbered consecutively as received by the Hon. Competition Secretary, and duplicate numbers issued to the competitors, which must be conspicuously displayed on the entrant's model.
14. Any type of model aircraft is eligible.
15. Competitors must be at the starter's flag, ready to fly, five minutes before 5 p.m. on Saturday, July 8, 1922, otherwise they will be disqualified.
16. The closing date for all entries shall be Saturday, July 1, 1922.
17. The Cup shall be held by the competitor adjudged the winner until such time as his record shall be beaten; or in the event of no challenger appearing or the record not being broken, for a period of one year or such other period as may be determined by the Committee.

* * * *

PUBLICATIONS RECEIVED

Traite Pratique de Navigation Aérienne. By A.-B. Duval and L. Hebrard. Paris: Gauthier-Villars et Cie., Quai des Grands-Augustins, 55.

Woodwork Tools and How to Use Them. The Woodworker Series. London: Evans Brothers, Ltd., Montague House, Russell Square, W.C.1. Price 4*s*. 6*d*. net.

Report No. 125. Aeronautical Instruments: Section I. General Classification of Instruments and Problems including Bibliography. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 98. Notes on the Design of Latticed Columns Subject to Lateral Loads. By C. J. McCarthy. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

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* * * *

AERONAUTICAL PATENT SPECIFICATIONS

***Abbreviations:* cyl. = cylinder; I.C. = internal combustion; m. = motors. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.**

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(Continued from p. xvi.)

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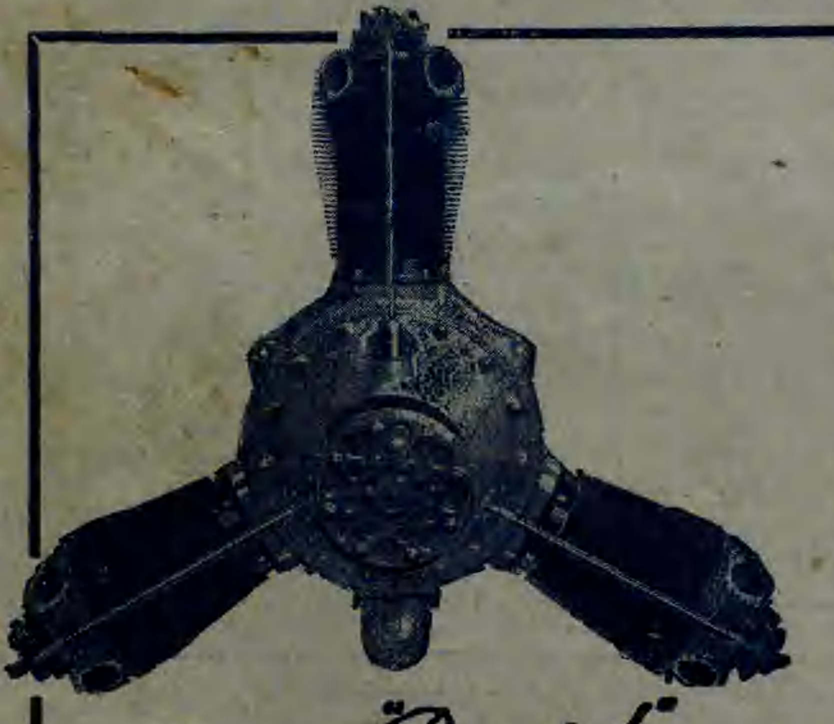

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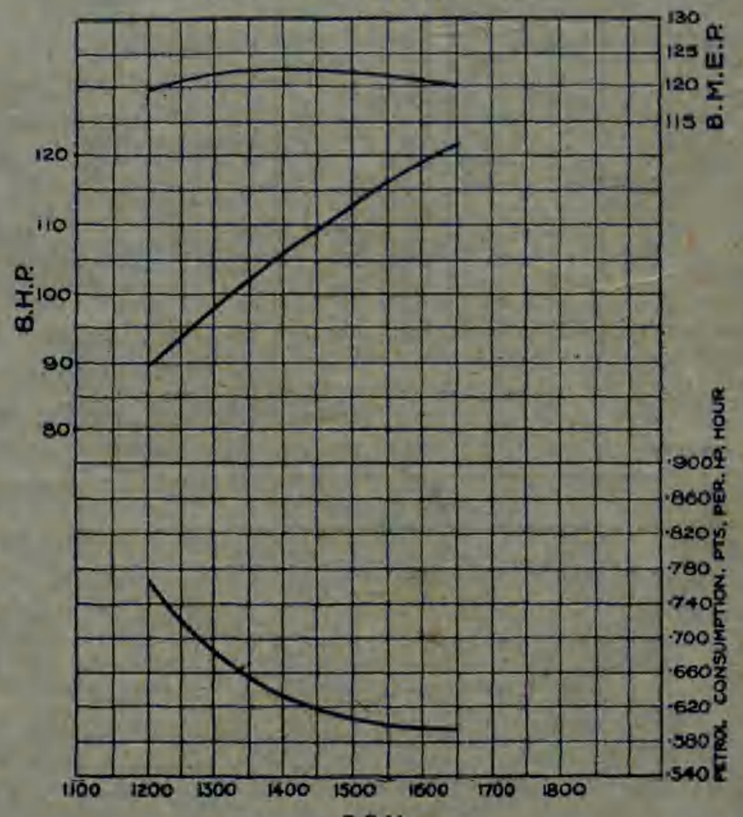

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Aug. 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**Aerial Derby Starting at Waddon**
Aug. 12	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy (1s. 1d. post free).

EDITORIAL COMMENT.

The Pageant and Our Future in the Air

APART from its immediate interest as a splendid spectacle, the Royal Air Force Pageant, held at Hendon on Saturday of last week, took place at a very opportune moment, inasmuch as it centred public attention, already aroused by articles in the general Press—for which many thanks—and by questions in the House, upon the work of the R.A.F. The eighty thousand odd who witnessed the various demonstrations cannot fail to have come away filled with admiration for the perfect "craftmanship" of the pilots, the clockwork smoothness and regularity of the organisation, and the general air of absolute mastery which pervaded the whole demonstration. And at any rate a certain proportion of the visitors must have been forced to put to themselves the question: Have we enough of these splendid pilots, and have we sufficient machines of modern types upon which to mount them so as to give them the benefit of the latest technical developments. Unfortunately, the answer to both questions must be an emphatic NO.

As regards the number of pilots, a fair idea may be formed if it be remembered that at present we have at home a mere bagatelle of twelve squadrons, while our French Allies, devoting less time to "considerations" and more to action, will shortly have 240 squadrons. These facts hardly need elaboration. The very third-rate position into which a short-sighted Government has allowed us to sink should be obvious to the meanest intelligence. And it is not as if France were the only country to grasp the value of air power. Nearly every European nation is getting into the air—within the means at its disposal. In this connection, it should be realised that the air forms one of the cheapest known forms of armed force. Countries which could afford only the smallest Army and a Navy consisting of a few obsolete ships, can—and do—find the means to build up air forces which cost far less and are far more effective. Yet this great Empire continues to blindly pin its faith to the Navy—our first line of defence in the past, but no longer so, since the advent of aircraft. Were it not for the fact that we have the greatest confidence in the sound sense of the general public, who will sooner or later force the Government to act—a promise of ten more squadrons is to be noted—the position would be intolerable.

On the second score, that of an adequate supply of modern machines, matters are, if possible, even worse. We have no fear of contradiction in stating that since the Armistice the number of machines—experimental or otherwise—of post-War type and design ordered does not reach 100. We would even go so far as to doubt if it exceeds half of that number. In the name of economy, the R.A.F. has had to be content with machines built during the War and "reconditioned," or, at best, with designs got out during the War. The result is that we have practically no machines the performance, armament, and constructional details of which are not well-known to other powers—our late enemies included. There is another side to this absence of official encouragement: Not only are our pilots and gunners mounted on obsolete machines, but the aircraft industry, upon whose skill in designing we depend, has been allowed to dwindle until it is the merest skeleton. We would not for a moment, suggest that the aircraft industry should have been artificially maintained at its War-time strength, but we do most emphatically say that there is every prospect of our depleted industry becoming further attenuated by the closing down of some of our most important firms—if the half-promised reform is not immediately brought into effect.

◆ ◆ ◆

The Remedy

If we had unlimited money to spend on armaments the remedy would be simple. But the country is not in a position to afford more than we are already spending. Nor, in our opinion, is that necessary. What is required is a re-allocation of votes. We are not among those who think that we should, even in its present form, abandon altogether the Navy for the Air. The day for such a drastic change is a considerable way off, although we should hesitate to say it will never come. But we do think that a full realisation of the change which aircraft has wrought in the position of these islands has not yet been really grasped by some of those in authority.

We would, therefore, again suggest that one remedy for the present highly unsatisfactory state of things lies ear-marking some of the Navy millions which are now being wastefully spent, and allocating them to the R.A.F. By so doing, we should be able to mount our pilots on machines worthy of their pluck and skill, and not on obsolete machines from the last war.

On the civilian side, upon which we must depend for reserves in machines and personnel, at any rate as far as bombing, troop-carrying and similar duties are concerned, it should not be necessary to ask for more taxpayers' money; it is only a matter, as has been hammered in, month in and month out, of sending *all* first-class mail by air. The volume would be such as to bring within sight the day when civil aviation could "fly by itself." This year, the P.M.G. announced a surplus of something like half a million, and he already looks like having twenty times that amount in his next year. Why not devote the half million bagatelle to defraying the small extra charge that might be required to send all first-class mail by air? The public would thus not be asked to pay more, would get the benefit of rapid transit (for with sensible organisation, air mail *can* save time, the experience with the London-Paris line notwithstanding), and would be helping to build up a reserve which might well at some future date mean the difference between safety and defeat. To derive full benefit from such a scheme it would be necessary to attack the problems Imperially, making full use of airships, seaplanes and aeroplanes. At present, we have specialised on the aeroplane at the expense of the other two types of aircraft.

A very great deal of propaganda work is necessary to convince the public that flying as passengers is safe. But when a man has been sending—compulsorily at first if necessary—his letters by air for a year or two at a greatly accelerated speed, it is fairly safe to assume that sooner or later he will decide to follow his letters into the air when making calls in person. Popularising passenger flying has been attempted, and has not proved a superlative success. Why not give the mails a real chance, and make passengers a secondary consideration?

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The Need for Making Air Mails Compulsory

Against the carrying of mails by air on a large scale, it has been argued that the experience of the air mail on the London-Paris service has not been such as to encourage further expansion. While, on the face of it, this argument may appear sound, a brief consideration will show that the London-Paris route does not give a fair test. To begin with, the distance between the two cities—about 250 miles—is too short to allow full benefit to be derived from the higher speed of aircraft; the losses in time at the terminals form too great a percentage of the whole. If the routes were two or three times as long, the saving in time would then be very appreciable indeed. An excellent example of this is provided by the Cairo-Baghdad air mail, at present operated by the R.A.F., which might at some early period be handed over to private enterprise. As recorded the other day, a recent mail despatched from London reached Baghdad in eight days, as against the 29 days of the ordinary route. If such saving can be effected by the use of the air mail over a part only of the distance, what vistas it opens out in the elimination of space when mails are air-borne all the way.

The reasons for the present scant utilisation of the air mail between London and Paris are, as already mentioned, mainly the unsuitability of the route, and perhaps to an even greater extent the fact that, the mails forming such a negligible portion, instead of the bulk, of the load, machines have been kept waiting for passengers, when they ought to have been hasting across with the mails.

By making the sending of first-class mails by air compulsory, firms would be sure of a reasonably regular load, while the fact that no passengers were carried would often influence the pilots in the direction of fewer cancelled flights. When a pilot has the responsibility of a dozen lives, he might, quite rightly, hesitate to start under any severe weather conditions, whereas if he has only himself to think of, he will rarely refuse to fly. Thus strict regularity should be ensured. Our slogan should therefore now be: "Into the air with all first-class mails."

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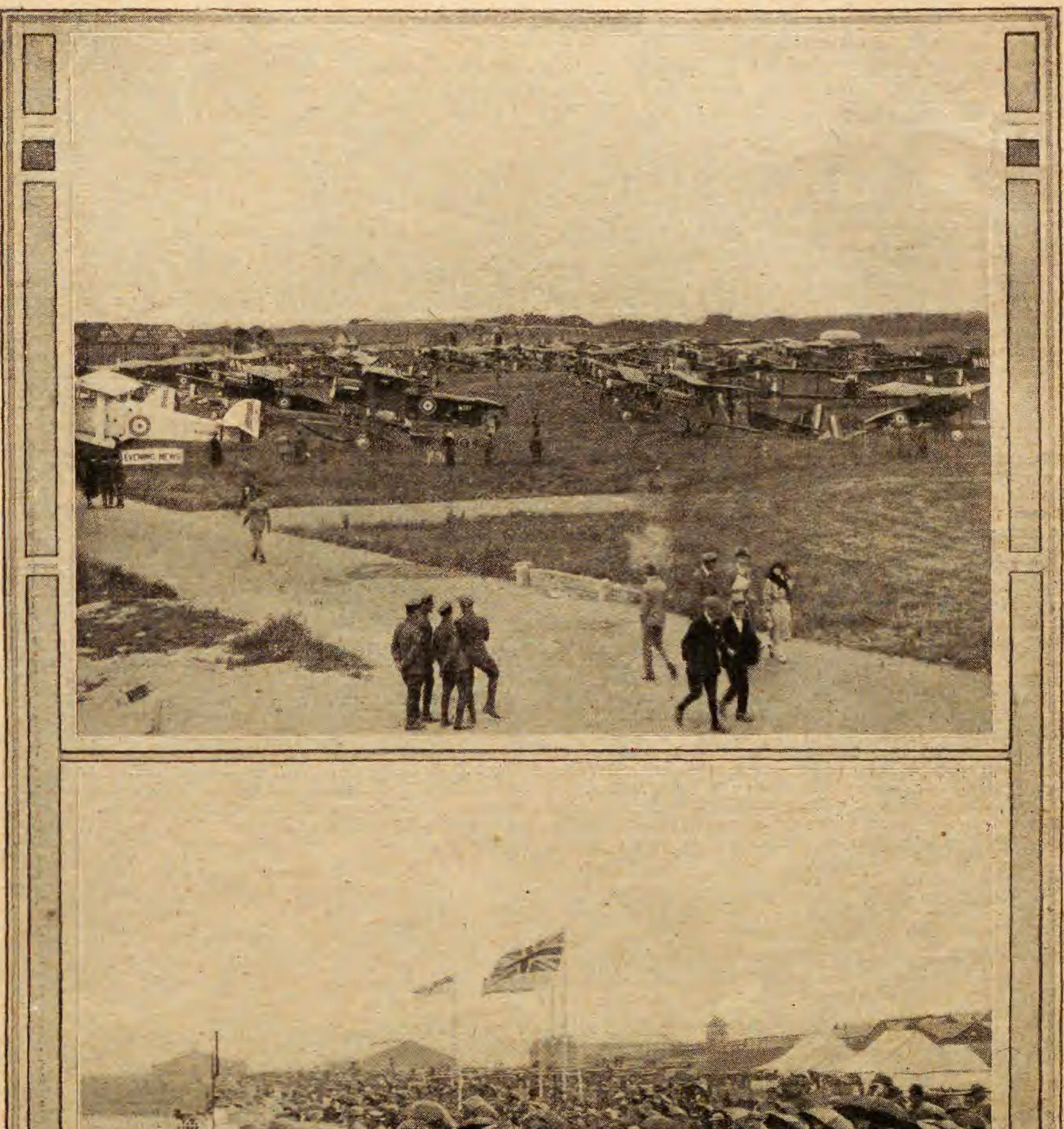
The Aerial Derby.

It has been decided, after all, to make Waddon the starting point for this year's Aerial Derby, on August 7.



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THE R.A.F. PAGEANT: General view of the machines taking part, and below a glimpse of the great crowd in the enclosures—and the rain.

THE R.A.F. AERIAL PAGEANT

It was a thousand pities, after a period of remarkably fine weather—when we were all being warned about our dripping water taps, wasting of water, etc.—that Saturday last should have been chosen by the Powers-that-be for the delivery of a plentiful supply of much-needed rain. After waiting so long for the latter, it might just as well have come a few days later. However, it is no use crying over spilt water, and after all, beyond a certain amount of personal discomfort, not very much harm was done, for the third R.A.F. Aerial Pageant was carried out at Hendon without a hitch, and not an item on the programme (excluding the sky-writing demonstration, which was cancelled the day before) was "washed out" in spite of the rain.

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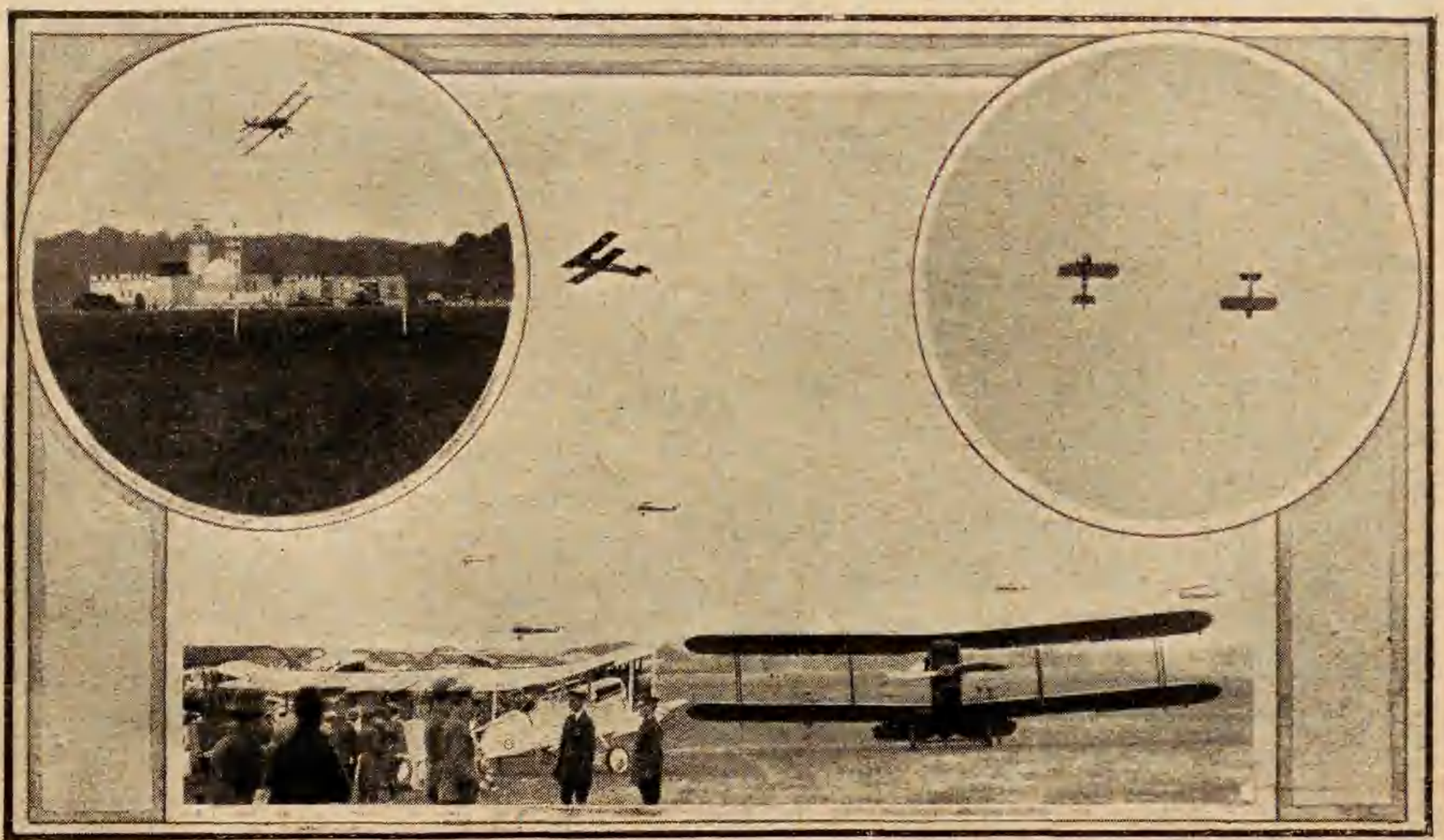
AT THE R.A.F. PAGEANT: Group-Capt. H.R.H. The Duke of York in the Royal Enclosure, with Air-Chief-Marshal Sir Hugh Trenchard, Capt. the Rt. Hon. F. E. Guest, and Air-Vice-Marshal J. F. Higgins.

Although the early arrivals did not put in an appearance in such large numbers as on previous occasions, it was quite a big attendance that watched the exceedingly active preparations that were in progress between noon and the official opening of the proceedings. During this time, indeed, there was plenty to be seen in the way of trial flights, preliminary heats for the races to be flown later, and the parking of the hundred or so machines. Many famous squadrons were represented, such as No. 4 (France, 1914), No. 39 (Defence of London), and No. 100 (Night Bombing), whilst most of the pilots had equally famous war records to their credit. An aerial photographic competition was also held, between 12 and 3, in which certain points, previously indicated on a map, had to be photographed from a certain altitude, the winner being the pilot who got these points most nearly in the centre of the negatives. The following stations were represented in this competition:—Netheravon (F/Lt. R. H. C. Usher, M.C., D.F.C.; School of Photography (F/O. V. E. Groom, D.F.C.); School of Army Co-operation (F/O. N. A. D'Aeth); Duxford (F/O. C. E. H. Allen, D.F.C.); Biggin Hill (F/Lt. C. T. Anderson, D.F.C.). The result of this competition was: Duxford, 1st; School of Photography, 2nd.

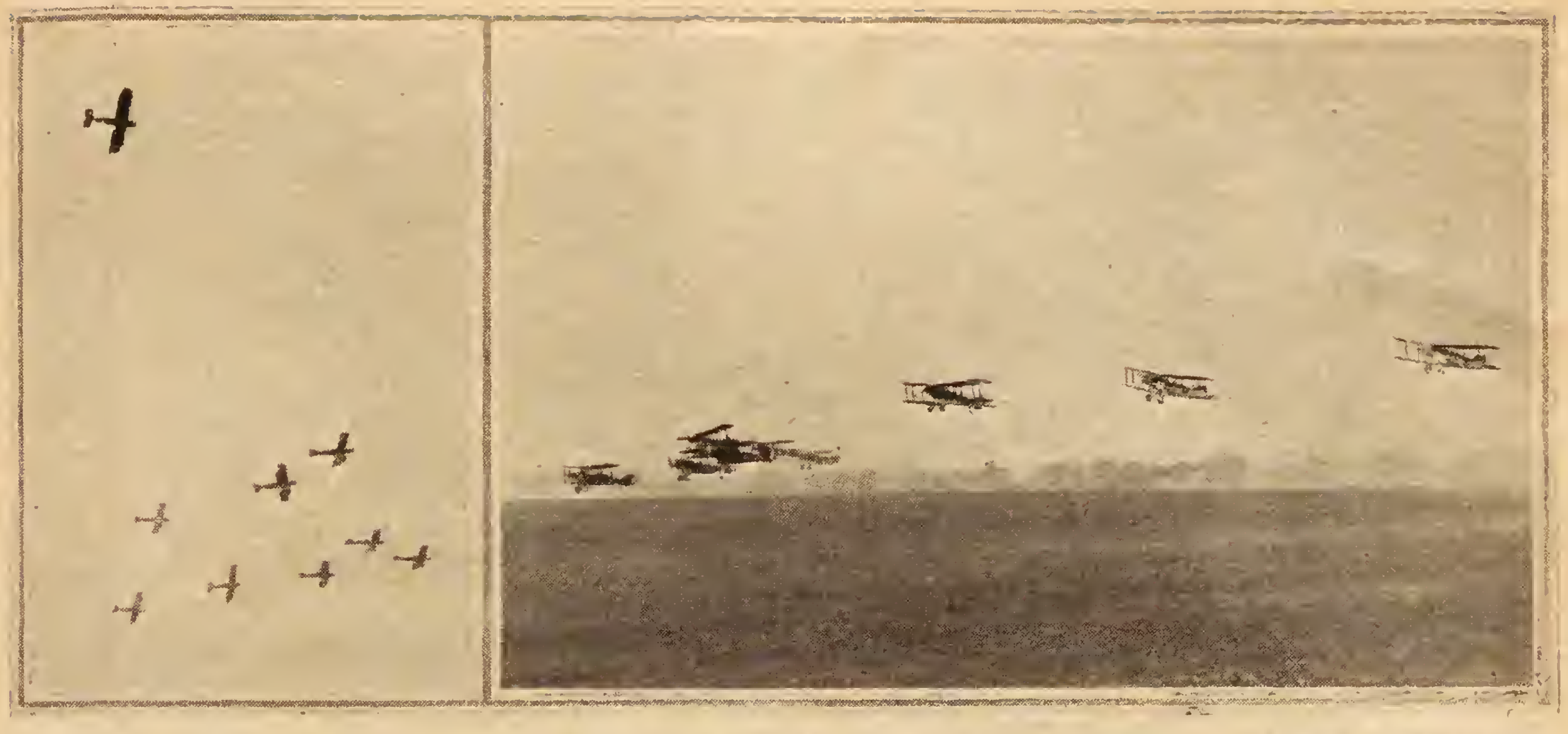
Just before 3 p.m. the enclosures began rapidly to fill with people and cars, until it looked as if the expected 100,000 would be reached in spite of the by no means promising weather outlook; rain had so far not fallen to any great extent. As a matter of fact, we understand the number of people present this year was round about 60,000! Of course this does not include the "outsiders," who congregated as usual on Hendon Hill and round about in large numbers.

The R.A.F. "Herald Angels" had no sooner announced the start of the first event, promptly at 3 p.m., than H.R.H. The Duke of York, K.G., Wing Commander, R.A.F., took his seat in the royal enclosure. He was accompanied by Capt. F. E. Guest, Secretary of State for Air. Among many other notable people present were ex-President Taft, Lord Gorell, Lord Cowdray, Lord Weir, Lord Hugh Cecil, Air Chief-Marshal Sir Hugh Trenchard, Maj.-Gen. J. E. B. Seely, Gen. Sir S. Brancker, Air Vice-Marshal Sir Geoffrey Salmond, etc. We were also pleased to see very many old friends of the aviation world during the day.

The first event was the Landing Competition, in which each



THE R.A.F. PAGEANT: Events 1, 2 and 3. Event 1 (*left*). Sideslipping into the "closed field." Event 2 (*right*). Exhibition Flying on two S.E.5a's, looping, etc. (Note the left-hand machine is just commencing to loop and the right-hand 'plane is on its back at the top of a loop.) Event 3 (*centre*). The Standard Avro Race; some of the 18 Avro 504's taking off.



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Formation Flying at the R.A.F. Pageant : A fine take-off in V formation by nine Bristol Fighters, and on the left the machines manœuvring again after an evolution for a new formation.

competitor had to land in a "field" (marked out by a "hedge" of posts 4 ft. high) 100 yards square, having switched off his engine at an altitude of 1,000 ft. This was an exceedingly instructive event, and it was, perhaps, a pity that only three or four machines were to be seen competing in the final —the preliminary heats having been carried out earlier in the day—as here was an opportunity to witness some very skilful piloting. There was something spectacular about this event, too, especially for the man in the street, and it was quite exciting to see a machine side-slipping to earth with engine cut off and getting into alarming attitudes apparently out of control. F/O. R. H. Daly, D.S.C., D.F.C., of No. 100 Sqdn., Spittlegate, was first in this event, with a really beautiful landing with his "prop" stationary. F/Lt. J. F. A. Day, A.F.C. (Netheravon), was judged second best.

After this two S.E. 5 A's, piloted by F/Lt. P. W. S. Bulman, M.C., D.F.C., and F/O. E. R. C. Scholefield, D.C.M., ascended and were put through a truly remarkable performance of simultaneous stunting. Although the weather conditions somewhat hampered their movements, they nevertheless looped, rolled, spun, etc., together at what appeared to be only a few yards apart from each other. Then they separated and literally "gamboled like mad" all over the place, so that it was almost impossible to follow every movement. Their upside-down flying was particularly noteworthy.

Item No. 3 followed immediately, this being the standard Avro Race for a Challenge Cup presented by the Secretary of State for Air. One competitor from each of 18 stations entered for this race, and in starting, on the signal being given, each pilot got into his machine, started his engine, and

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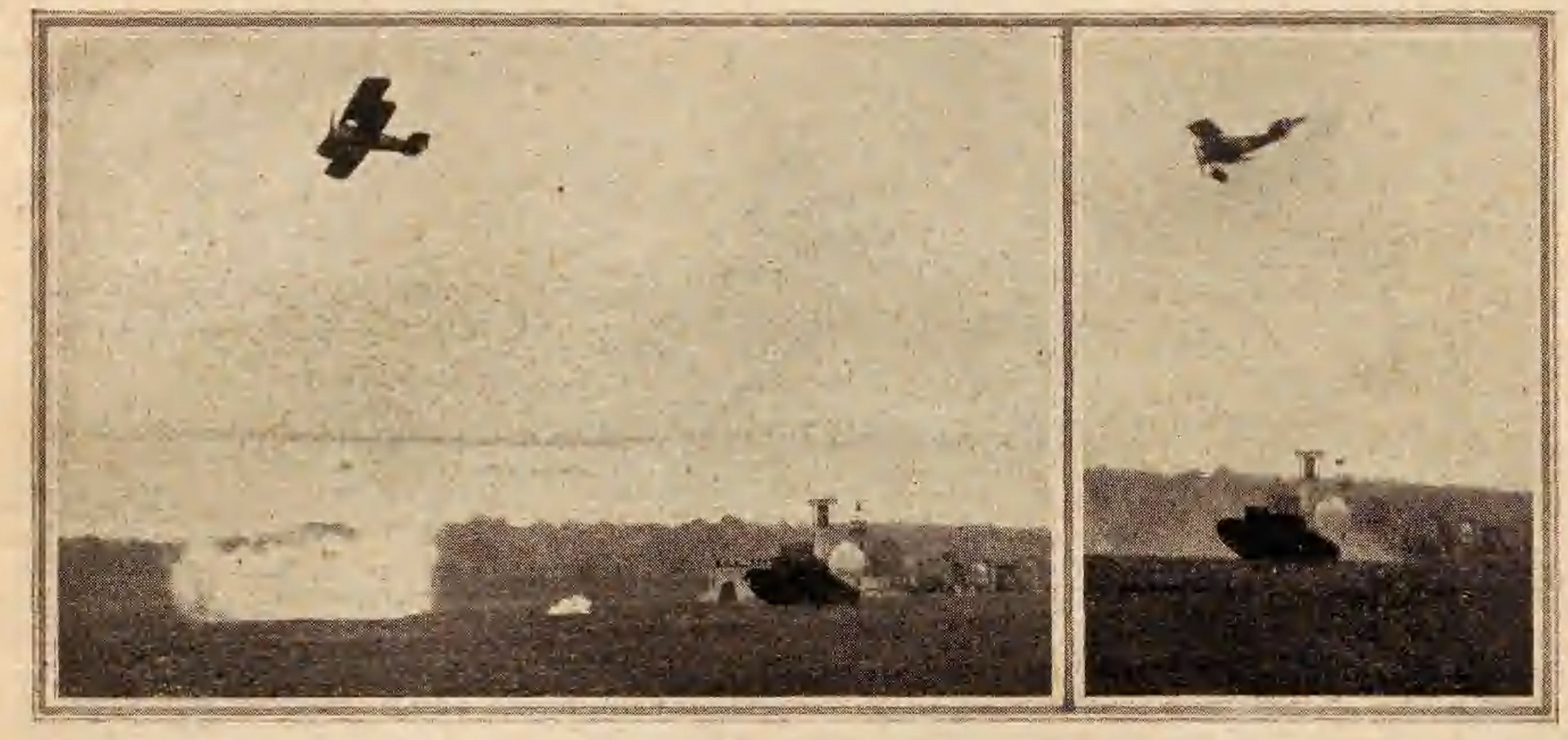
An Aerial Combat at the R.A.F. Pageant : On the right the "Enemy" Bomber (a D.H.10 piloted by Squad.-Ldr. Roderic M. Hill, M.C., A.F.C.) arrives, and on left the two fighting S.E.5's attacking. Note the S.E.5 on the right hand turning on its back to meet the Bomber.

took off. Practically speaking, they all started off together, and came bobbing along towards the enclosure like a flock of startled birds. We counted up to 14—then collapsed! Each station was distinguished by coloured flags on the rudder, but it was not particularly easy to sort them out. The old and well-known mystery of the dead donkey has always puzzled one, but now we are given to wonder if anyone ever sees a defunct Avro 504. They seem to go on for ever. Having swarmed over the aerodrome sheds with a deafening roar, they made their way in a cluster towards the Welsh Harp, turned in a haze of rain, and made their way back to another turning point on the far side of the aerodrome, after which they flew past the finishing line in front of the royal enclosure, having by then spread out, more or less.



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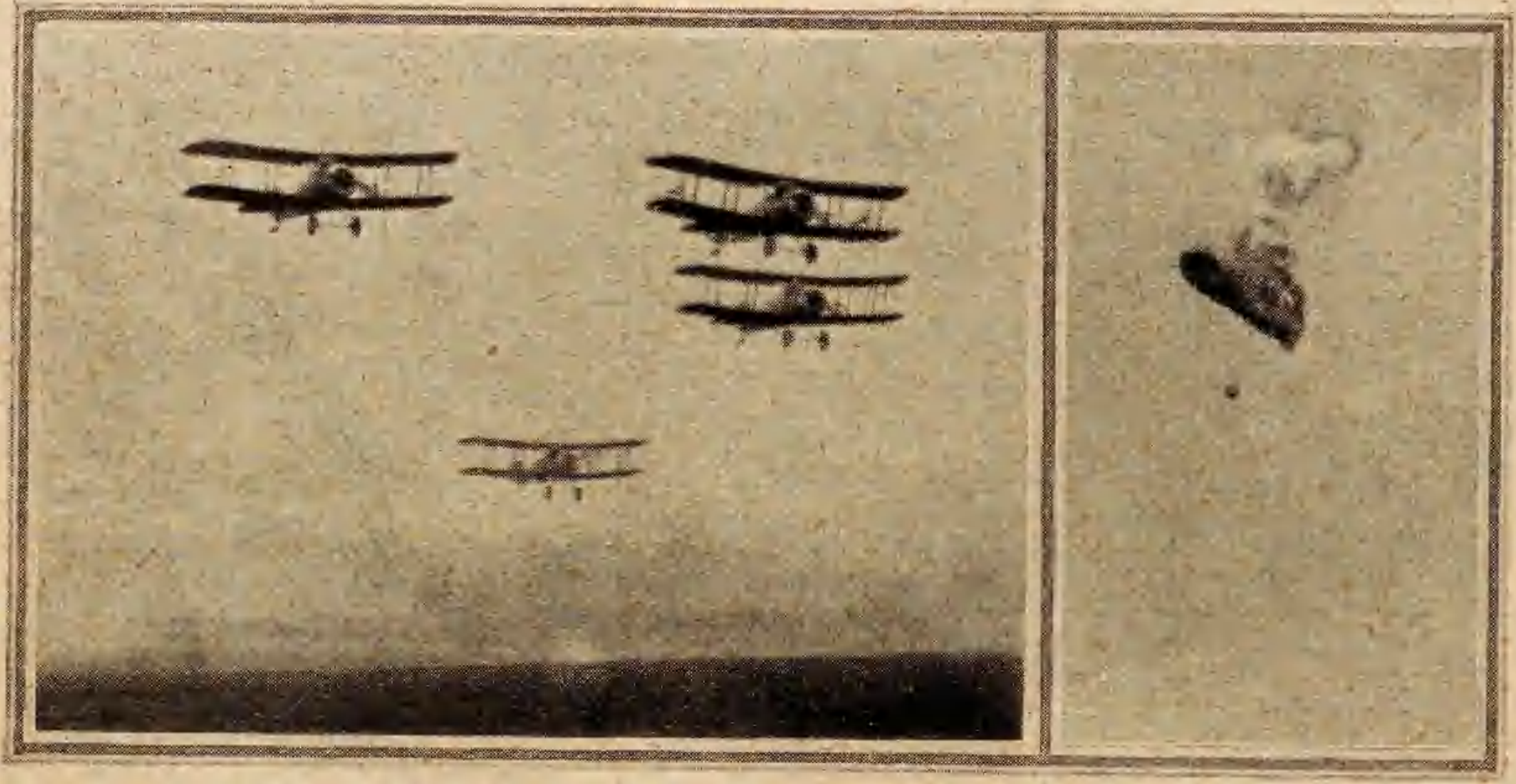
BOMBING THE TANK AT THE R.A.F. PAGEANT: Near, nearer and, on the right, too close to be healthy.

There was a very good finish, Cranwell (F/O. P. Murgatroyd) obtaining the lead and crossing the line first, with Kenley (F/O. L. Hamilton, D.F.C.) close behind, and Henlow (F/O. F. Beaumont) third. Uxbridge (F/O. S. D. Macdonald, D.F.C.) and another, colours unreadable, both came in together very close behind third man.

An aerial combat between a D.H. 10 twin-engined bomber' piloted by Sqdn.-Ldr. Roderic M. Hill, M.C., A.F.C., and two S.E. 5A's piloted respectively by F/Lts. P. W. S. Bulman, M.C., D.F.C., and D. W. Grinnell-Milne, M.C., D.F.C., was the next event on the programme, and it must be admitted that this was the best and most thrilling demonstration of aerial tactics ever presented. The manœuvres of the two smaller machines were wonderful enough, but to see the larger, twin-engined 'bus looping, spinning and rolling out of tight corners with apparently as little effort as that required for the S.E. 5's, was certainly one of the events of the day. But even apart from the spectacular point of view, Sqdn.-Ldr. R. M. Hill's handling of the D.H. 10 was, in technique, an exceptionally fine piece of work—but then, of course, this was only to be expected, coming from such a pastmaster of scientific flying.



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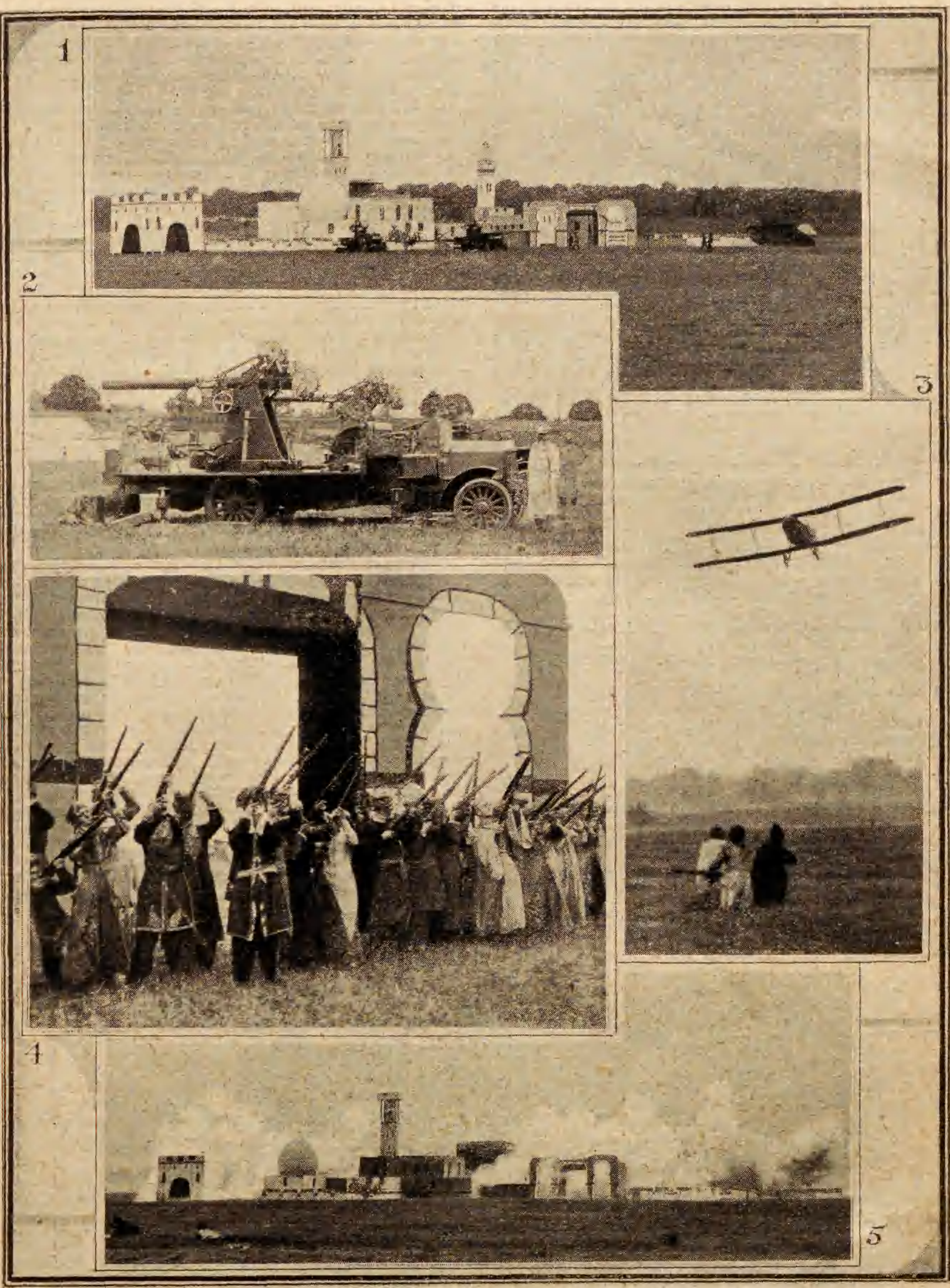
AT THE R.A.F. PAGEANT: Sopwith Snipes take off for the attack on the Kite Balloon, and on the right "Rupert" descends in flames after the attack.

The next event was a handicap race, over the same course as before, and was a most interesting one inasmuch as about a dozen different types of machines took part. The machines and competitors were as follows:—



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AN EASTERN DRAMA AT THE R.A.F. PAGEANT: 1. The "Wottnott" stronghold before the raid. 2. The enemy anti-aircraft battery. 3. A trio of "Wottnott" defenders potting at an attacking bomber. 4. Massed "Wottnotts" defending the stronghold from an aerial attack. 5. The stronghold in flames.

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Crazy flying by Flt.-Lieut. W. H. Longton at the R.A.F. Pageant on an Avro 504k.

Type of Machine.	*Pilot.*
Avro 504	F/O J. A. McDonald.
Vickers Vimy	F/O. A. L. A. Perry-Keene.
Bristol Fighter	F/O. J. W. Baker, M.C.
S.E. 5 A. (150 Viper) ..	F/O. E. R. C. Scholefield, D.C.M.
D.H. 9 A. (450 Lion) ..	F/O. H. D. O'Neill, A.F.C.
D.H. 9 A. (400 Liberty)	F/O. C. Hallawell.
Martinsyde-Buzzard (300 Hispano)	F/O H. J. T. Saint, D.S.C.
Sopwith Pup (80 Le Rhone)	F/O J. S. Chick, M.C.
Westland Weasel (320 Siddeley Jaguar)	F/O. Wallwork, M.C.
Weasel (380 Bristol Jupiter)	F/Lt. A. H. Orlebar, A.F.C.
Avro-Aldershot-Condor	F/O. C. E. Horrex.
Sopwith Snipe	F/O. C. E. Maitland, D.F.C.

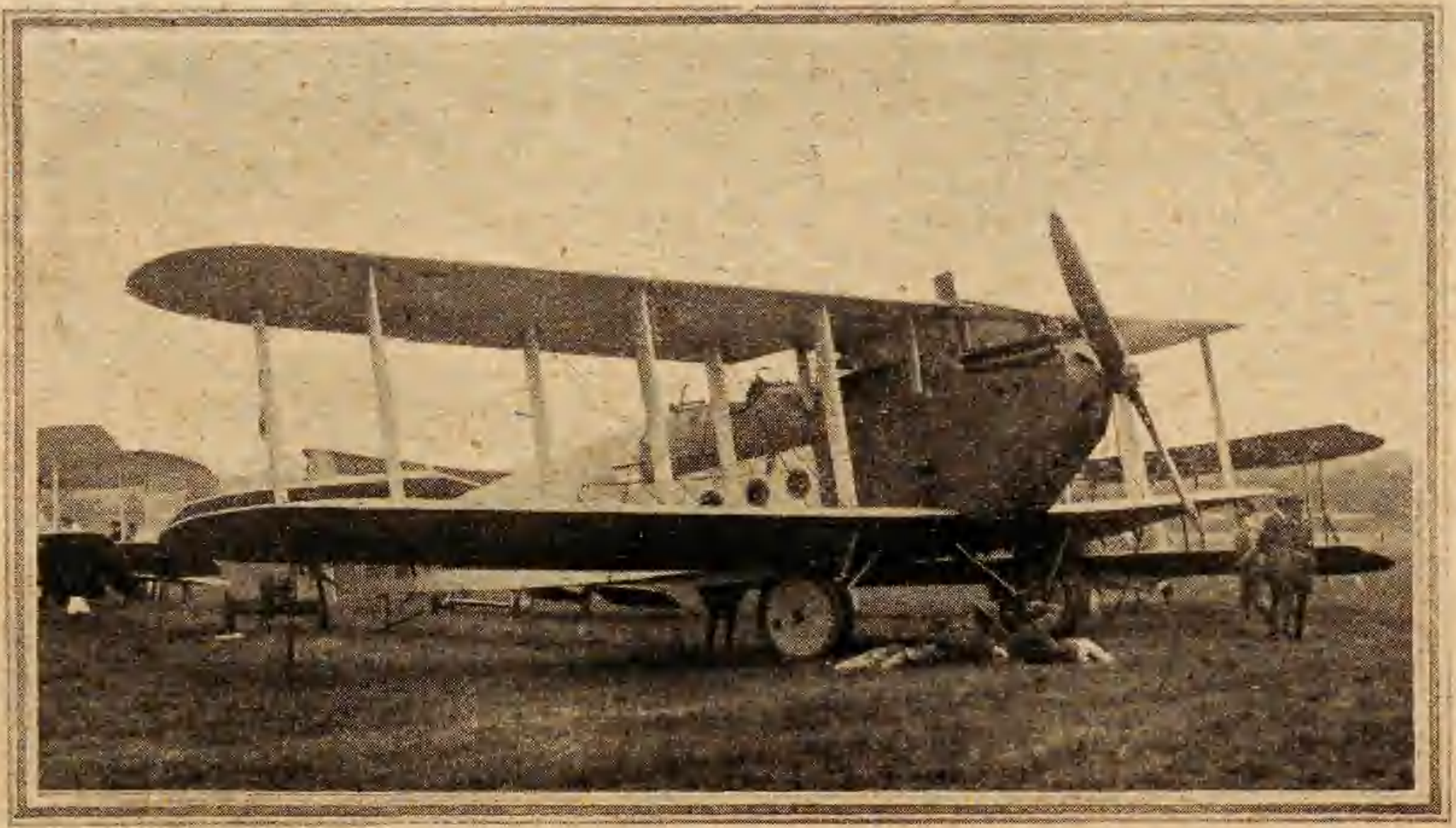
This race also provided an exciting finish, the Avro Aldershot (650 Rolls-Royce Condor), which was making its first public appearance, crossing the line first with the two Westland Weasels only a few yards behind—the Weasel-Jaguar being only slightly ahead of the Weasel-Jupiter. The Bristol Fighter came in fourth, and the S.E. 5 A. sixth, and then followed one of the D.H. 9's, the Avro 504, the Martinsyde, Snipe and Uncle Tom Cobley and all.

By this time the rain was beginning to fall in earnest, and during a short interval between events, H.R.H. The Duke of York made a tour of inspection amongst the machines, and was particularly interested in the Avro Aldershot. No. 24 Squadron (Kenley) then gave us a splendid demonstration of formation flying on Bristol Fighters. There were nine in the formation, as follows :—Sqdn. Ldr. E. H. Johnston, O.B.E. ; F/Lts. J. M. Robb, D.F.C. ; F. L. Luxmore ; R. W. Chappell, M.C. ; F/Os. M. L. T. Leroy, A.F.C. ; L. Hamilton, D.F.C. ; T. C. Traill, D.F.C. ; and G. S. Oddie, D.F.C. The get-away was very impressive, in V-formation, and climbing in this figure they were soon in contact with the low-lying rain clouds, which must have interfered with their evolutions considerably. On several occasions one or more of the machines would be lost to view when the formation was changing into some new positions, yet they managed to keep together with a marvellous degree of accuracy. But the gem of the whole demonstration was at the conclusion, when they all made a simultaneous and perfect landing in V-formation.

The next item was the extraordinary exhibition of "crazy" flying, by F/Lt. W. H. Longton, D.F.C., A.F.C., on a jazzified Avro. Gusty wind and driving rain by no means rendered conditions ideal for this particular kind of flying, yet Lieut. Longton seemed to be able to make the old 'bus fly in every conceivable way it should not. Most remarkable, perhaps, was the way he flew three-quarter-side-on.

Meanwhile an Air Ministry "Safety" Tank (caterpillar type, *not* petrol) was being manœuvred into position ready for the next event—a competition for low bombing. This was carried out by four Sopwith Snipes, piloted by F/Lt. E. L. Howard-Williams, M.C. ; F/Os. H. E. Walker, M.C., D.F.C. ; C. E. Maitland, D.F.C. ; and F. O. Travers, D.F.C. They had to dive down towards the Tank—which was supposed to be temporarily disabled—and drop bombs (practice type) on the poor thing. Each pilot was allowed three shots. With the exception of one bomb, which burst immediately at the stern of the Tank, the bombs all fell several yards away, and appeared to the onlookers as just a trifle wide. As a matter of fact, however, it should be noted that had they been "live" bombs, they fell sufficiently close to do considerable damage. This was quite an interesting event, and well worth elaborating for future occasions. Result : F/O. Travers, 1st ; F/Lt. Howard-Williams, 2nd.

It was now just on five o'clock, the rain was settling down



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THE "AVRO" ALDERSHOT AT THE R.A.F. PAGEANT : This machine—illustrated in the last issue of "Flight"—is the latest "Hush-hush" production, and is fitted with a 650 h.p. Rolls-Royce "Condor." It won the Handicap Race, event No. 5.

in earnest, and it must be admitted that the writer began to feel the unequal degree of wetness, without *v.* within, rather acutely. Some hot tea and welcome shelter within one of the hangars was, therefore, most acceptable. From here it was not very easy to follow the next two or three events very closely, and the rain-mist made matters more difficult still. However, the Pageant carried on through it all, and, what is more remarkable still, the front of the enclosures remained well thronged with spectators to the bitter end—an extraordinary and highly satisfactory proof of the enthusiastic interest in aviation taken by the public.

After the low-bombing competition the Relay Race for the Duke of York's Challenge Cup (last holder, Kenley) was flown. One team, consisting of an Avro, Bristol Fighter and Snipe, from each of 12 R.A.F. stations, took part, each Avro flying over the course and handing over a message to the Bristol of its team, which in turn flew over the course and handed over the message to the Snipe. The latter completed its course and flew past the finishing line. Result:—

	Avro.	Bristol.
1. Kenley ..	F/Lt. W. Chappell, M.C.	F/Lt. J. M. Robb, D.F.C.
2. Halton ..	F/Lt. C. A. Stevens, M.C.	F/O. H. L. Rough, D.F.C.
3. Duxford ..	F/O. J. R. King ..	F/O. W. E. Purdin.

	Snipe.
1. Kenley ..	F/Lt. F. L. Luxmore.
2. Halton ..	F/Lt. J. O. Compston, D.S.C., D.F.C.
3. Dnxford ..	F/O. F. Le P. Trench.

F/Lt. Longton then ascended once again, and gave a demonstration of instructional stunting, as now forming a part of the normal training of a pilot. These stunts included the Loop, Half-Roll on top of Loop, the Half-Roll, Stalling Turn, Upside Down Flying, Stall and Vertical Dive, Sideslip, the Roll, Flat Turn, Vertical Slip, Vertical Spin, and Falling Leaf. Unfortunately these stunts were not seen to their best advantage under the prevailing weather conditions, the machine at times being almost completely hidden from view in the mist. It was, nevertheless, a wonderful display.

The attack on a kite balloon by a formation of Snipes was very effectively carried out this year. The balloon was enveloped most of the time in the misty clouds, out of which the attacking Snipe left its formation and swooped down on to its prey with a rattle of machine-gun fire. After several bursts of the latter, a tiny speck of flame was observed in the side of the balloon. This was a signal for the observer, Maj. Sawdust, to make a graceful descent in his parachute. Immediately after, the escaping gas got well alight, and the balloon fell to earth a mass of flame and dense smoke.

Then followed the event of the day, an Eastern drama, depicting the attack and destruction of a desert stronghold. This was intended to illustrate the work that was done by the R.A.F. in the East. The "plot" of the drama was quite thrilling, and was well carried out by the "actors." A machine (Bristol Fighter) returning from a reconnaissance, had to make a forced landing near the stronghold, which opened a fierce attack on the disabled machine. The pilot of the latter had wirelessed for help, informing his squadron as to the position, etc. Fortunately an armoured car section, returning from a raid, happened to be near at hand, and rushed up to the rescue, keeping off, with heavy machine-gun fire, numbers of gaily clothed Wottnotts, who had emerged from the stronghold. After an interval of half an hour, lasting about two minutes, the bombing squadron arrived on the scene. The pilot of one of these machines landed alongside the disabled machine with a spare air-speed indicator, and soon put things aright. Both machines then got safely away. In the meanwhile the bombing squadron attacked the stronghold, under heavy fire from an enemy anti-aircraft battery, mounted on motor lorries, situated some distance away. The bombs soon began to take effect, and after a few salvos the stronghold was in flames, and the garrison was observed fleeing in all directions.

The programme concluded with an interesting demonstration, not without considerable pictorial effect, of the formation of an artificial cloud screen at about 1,000 ft. above the ground, by dropping smoke bombs from a Handley Page bomber. This is employed by attacking machines to screen them from anti-aircraft guns.

We cannot conclude without expressing our admiration for the wonderful organisation displayed throughout. Each event was carried out promptly to time and without the slightest hitch. The arrangements in the enclosures were splendid, and every effort was made to provide for the comfort of the visitors. The traffic arrangements, also, were well nigh perfect, a continuous procession of General 'buses, etc., dispatching the thousands of people to their various destinations with extraordinary speed. As we walked up Hendon Hill, damp but happy, we could not help repeating to ourselves over and over again, "Every year and in every way the R.A.F. Aerial Pageant gets better and better."

GERMAN AIR LEGISLATION

Decree Relative to Aircraft Construction

IN our issue of May 18, 1922, we published an article dealing briefly with the text of the restrictions under which, as from May 5, 1922, Germany was permitted to build and use aircraft. These restrictions were, of course, those imposed by the "Committee of Guarantees," which has now replaced the Inter-Allied Aircraft Commission. In connection with them it is not without interest to examine what steps the German Government has taken to ensure that the regulations are carried out. A Decree dated May 5, 1922, has been issued by the German Government, from which we quote. On the construction of aircraft in Germany the decree states:—

"Every person engaging in the construction of aircraft must notify the Minister of Transport within 14 days of taking up the business. Every person engaging in the construction of or importation of aircraft material is bound, at the demand of the Minister of Transport and his agents, to give all information deemed necessary by the latter with respect to the said material.

"This information may be called for by public notice or by direct enquiry from the individual parties from whom this information is required.

"The Minister of Transport and his agents are authorised to examine the books, business letters and other documents in order to ascertain important data, and also to visit and search premises known or thought to contain objects or documents concerning which information is required.

"Apart from the official report and the duty of reporting any infringement of the law, the agents are bound to maintain secrecy with respect to installations and business relations which come to their knowledge in the execution of their duties and to refrain from divulging or making use of business secrets.

"The constructor's or importer's statement and the results of investigations shall not be used for purposes of taxation."

On the use of aircraft in Germany, Article IV of the decree states: "Aircraft shall only be admitted to traffic in Germany on the condition that they fulfil the regulations in the appendix." (These conditions were dealt with in the article referred to.) Article V provides that aircraft which are constructed or imported in contravention to the regulations, or which are used in Germany in contravention to the regulations, shall, on the demand of the Minister of Transport, be brought into line with the regulations at the cost of the guilty party; in the case of refusal the Minister of Transport is authorised to take the necessary measures at the cost of the parties in question.

According to Article VI, "any person acting in contravention to the regulations will be punished with a term of imprisonment not exceeding six months, or with a fine not exceeding one hundred thousand marks. In addition to the penalty, the objects in respect of which the penalty is incurred may be confiscated, whether they belong to the guilty party or not. Confiscation may take place independently, even if no criminal proceedings can be taken against a given guilty party."

The decree is signed: "Berlin, 5th May, 1922.

"For the State Government,

"BAUER."

Abolition of the Canadian Air Board

AN Act was passed by the Canadian House of Commons on April 27, 1922, by which the duties of the Canadian Air Board and of the Naval and Military Departments are to be taken over by a Ministry of Defence.

A Defence Council is to be set up which will consist of the Minister of Defence (President), Deputy Minister (Vice-President), a member who will perform the duties vested in the Deputy Minister of the Naval Service, and four other officers.

LONDON TERMINAL AERODROME

Monday evening, June 26, 1922.

THE total passengers during one day last week actually reached 50. Such a total, although common last year—in fact, twice that number was not at all out of the way—is something to marvel at these days, so great has the "slump" in traffic been. This sudden spurt, however, has not been maintained, and there is still no sign of any permanent increase. Mr. Fox, the prominent Paris booking agent, was over in London during the week, and put forward his own theory of the "slump" in airway travellers.

He told me that the great majority of American tourists are making straight for Central Europe. They leave the liners at Cherbourg, and, travelling by train to Paris, stay there only a few hours, and then catch the train for Vienna or Berlin. The trains to Vienna, he says, are packed with Americans daily, and, if they visit London at all, they only make a short stay, whereas last year they spent most of their time between Britain and France, travelling to and fro by air. The unfortunate accidents have also had much to do with the shortage of American air travellers.

Air Specials to and from Plymouth

SOME useful incidental business, however, accrues to air firms at times, and during the week the De Havilland Aircraft Co. and the Surrey Flying Services have been making hay out of the arrival of the Prince of Wales at Plymouth. Both these companies have had machines employed by various newspapers to bring photographs from Plymouth to London, and also to set out before dawn with newspapers containing these photographs for sale in Plymouth in the early morning.

With regard to the everyday delivery of newspapers in the early morning to Paris, Amsterdam, and now to Brussels—the last-named service starting on Monday—there is some danger that this valuable traffic may be lost to the airways owing to the irregularity with which the early morning machines run. The circulation manager of one big morning paper explained the situation to me so far as he was concerned. It appears that his paper has a large circle of regular subscribers in Paris who, in the pre-aeroplane days, got their London paper about 5 p.m. Now they get it some days at 9 a.m., when the aeroplane gets through; and, when the machine does not, the paper arrives at the same time as before—that is at 5 p.m. This uncertainty naturally upsets the subscriber, who wants to know why it happens, and the Paris staff of the paper in question have now to spend most of their time explaining matters to subscribers. In consequence, the directors of the paper have become of the opinion that it is better to deliver the paper regularly at 5 p.m. than to be early some days, and thereby make the reader discontented when it is late on a "dud" flying day. They are also finding that, even at the reduced rates now in operation, air transport is too expensive.

Perfection of Wireless Position-Finding

A VERY good example of the efficiency of the wireless position-finding now in operation on the airways was provided the other day, when Mr. Hinchliffe was flying from Paris to London on the Daimler D.H. 34. The weather in the Channel was bad, so before arriving at the French coast he climbed above the clouds and steered his machine by compass. When he calculated that he was well over the Channel, he asked Croydon for his position. After speaking for the necessary minute he was told that he was 12 miles north-west of Dover, and he then dropped down through the clouds, and, upon getting beneath them so that he could see where he was, found that the wireless people had given him his exact position. He tells me that the wireless is simply wonderful, and of incalculable help to pilots flying along the airways.

Mr. Alan J. Cobham brought over a new D.H. 34 for the Instone Air Line from Stag Lane on Friday, and proceeded to give demonstrations of getting off with full load. Whatever difficulties other people may have in getting these machines off with full load, it is certainly easy as Mr. Cobham does it. With the tail well up almost immediately the machine started on its run, Mr. Cobham had the wheels off the ground, and the machine climbing steeply, within ten seconds of starting.

British Machines Competing at Brussels

THE Handley Page Transport have sent the latest of their W. 8 B's to Brussels to compete in the races at Evere aerodrome. One of the conditions of the competition was that the machine must arrive at Evere with a full load, and when the W. 8, piloted by Mr. MacIntosh, left for Brussels at 2.7 p.m. on Saturday, it carried as passengers Mr. and Mrs. Handley Page and Mr. Cogni, in addition to nine other passengers, all going to witness the competition. In addition to the competition for commercial machines, a series of races are being held during the week, and the Aircraft Disposals Co. have sent a number of machines, including three S.E. 5's and a Bristol, to compete. These machines will be flown by Messrs. Courtney, Foot, Stocken and Hayns.

The D.H. 9 which Capt. Norman Macmillan, accompanied by Major W. T. Blake and Lt.-Col. Broome, piloted from Croydon to Marseilles in his attempt to fly round the world, was apparently so badly damaged as to be considered unserviceable, and another machine has been got ready for this flight at the Aircraft Disposal Company's factory at Waddon. Capt. Rex Stocken left Croydon on this machine on Thursday at 9.10 a.m. in order to deliver it to the waiting aviators at Marseilles, and accomplished the flight the same day, arriving at Istres aerodrome, Marseilles, at 5.12 p.m., his actual flying time being 6 hours 2 minutes.

The Surrey Flying Services have now a new Avro fitted with a Renault engine in commission. This is the machine they built for Mr. Derwent Hall Caine, but which, for family reasons, he was unable to take delivery of. It is now to be used for special trips and for joy-rides at places other than Croydon. There is now too much work for the one Avro. Mr. Yule, who has been engaged for the last three years piloting machines in Norway, has joined the Surrey Flying Services as pilot, and will be in charge of the new Avro when it is away on joy-riding excursions. During the week-end Capt. Muir has been at Leighton Buzzard, taking up joy-riders in connection with a carnival that is being held there.

Record by the Daimler Airways

THE Daimler Airways have now run their services for a whole month with one machine, and, apart from occasions when adverse weather has interfered with all services, have maintained the constant regularity of their services. When it is considered that these consist of two return trips to Paris daily, with the exception of Sunday, when one return trip is run, it is possible to get some idea of this triumph of organisation and mechanical achievement. The total mileage run by this one machine in the month is just on 21,000—a figure which constitutes a record for any form of transport vehicle. During this time the engine has only been changed once, although all sorts of adjustments and replacements have been made to the machine during the hours of darkness. Great praise is due to Mr. Sergeant, who is in charge of the mechanical side of the Daimler sheds, for this remarkable performance.

On Sunday Handley Page Transport ran a one-day excursion to Paris for the Grand Prix. One of their W. 8's left the aerodrome at 9.15 a.m. with a full load of excursionists, and late in the evening—the aerodrome lighting being requisitioned—this W. 8 duly returned from the French capital, followed by an O-400, a spare machine in Paris, which had been drawn upon to accommodate an overflow of traffic. Grand Prix photographs arrived for London newspapers on these return machines, and there was an exciting rush to get them through Customs and up to town in time.

NOTICES TO AIRMEN

Aerodromes for Civil Use: Amendments

IT is notified Notice to Airmen No. 35 of 1922 (Consolidated List of Aerodromes) is amended as follows:—*List C., Licensed Civil Aerodromes.*—The following should be *added*:—Alva, King o' Muirs Farm; Cupar, Hilton of Carslogie Farm; Kincardine, Toll Road.

(No. 60 of 1922.)

Shoeburyness: Flying of Kite Balloon

IT is notified:—

A Kite Balloon is flown daily at the Meteorological Station, Great Wakering, 2 miles N.N.E. of Shoeburyness (Lat. 51° 32′ N., Long. 0° 49′ E.) for the purpose of making meteorological observations.

The balloon is normally flown at a height of, approximately, 10,000 ft. The cable is marked with red and white streamers.

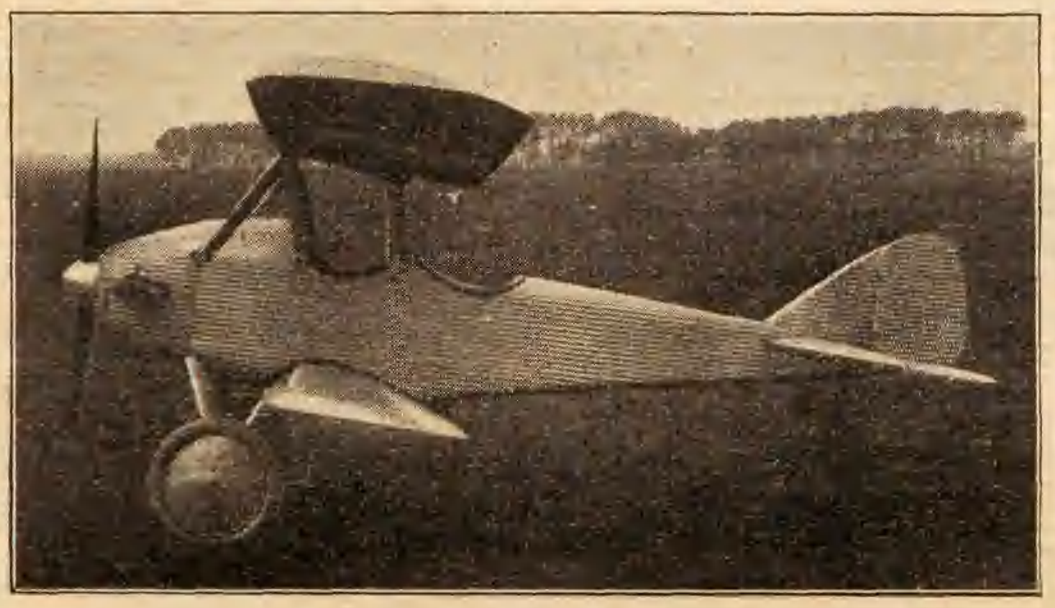
Pilots flying in the neighbourhood of Shoeburyness should keep a careful lookout, as the balloons and mooring cable constitute a danger to aircraft.

N.B.—Attention is drawn to Notice to Airmen No. 51 of 1922, warning pilots of the existence of a danger area across the mouth of the Thames, extending from Yantlet (Isle of Grain) to Foulness Sand and passing close to Shoeburyness.

(No. 61 of 1922.)

THE ENTLER ALL-METAL SPORTINC CANTILEVER BIPLANE

The aeroplane shown in the accompanying illustrations is the product of a newcomer to the German aircraft industry—the Entler-Werk, Wilhelmshaven. It is designed by Herr Victor Entler, of Bremen, who was formerly with the Junkers, Sablatnig and Hansa-Brandenburg firms. The first series of this small biplane is in the production stage, and will be produced both as a single-seater and a two-seater.



THE ENTLER ALL-METAL SPORTING BIPLANE : Side view of the latest German effort. The engine is a 30 h.p. Haacke.

The power plant fitted varies, according to the customer's own choice. Amongst others, Mr. Entler hopes to fit the 40 h.p. Green engine in these machines. The 'plane itself is sold in Germany for 250,000 marks and in Great Britain for £220, with two years' guarantee. With the present engine installation, a 30 h.p. twin-opposed Haacke engine is fitted.

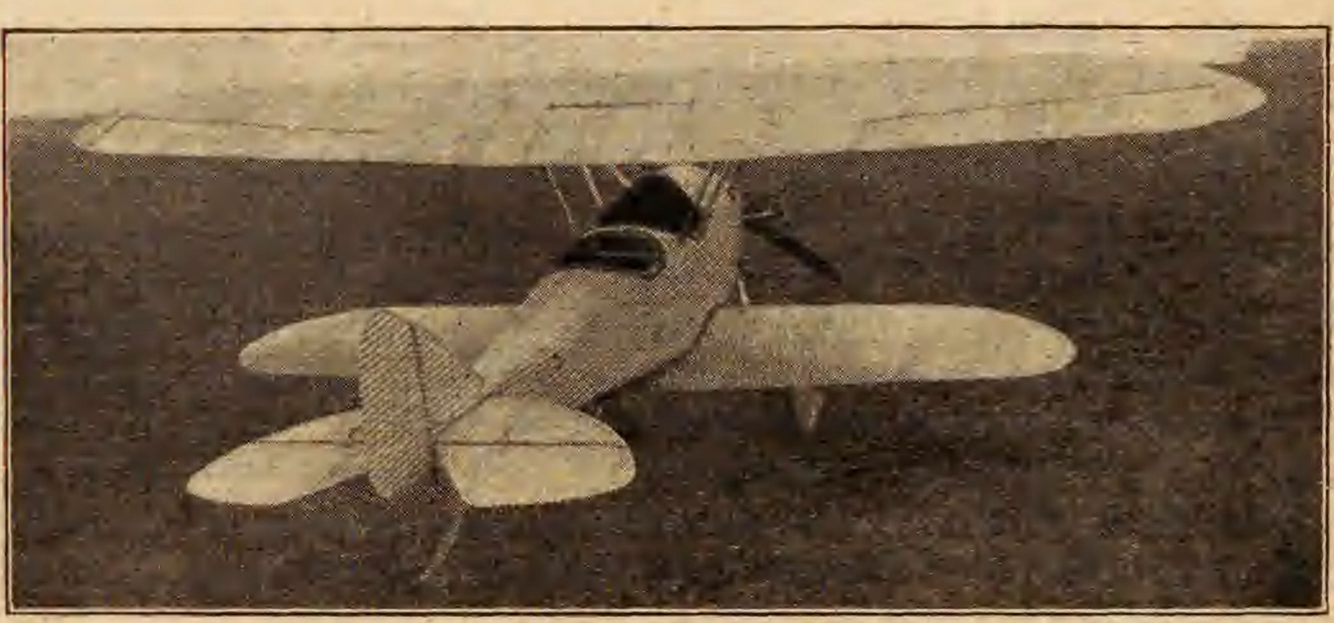
The Entler biplane has not yet been tried out in the air to its full capacity, but it has been designed for 10 hours' non-stop flying capacity. So far a speed of 65 m.p.h. has been attained with the 30 h.p. engine. It will be noted that the wheel shaft of the undercarriage is made in two parts, and that the rudder, divided elevators and the *ailerons*—which are fitted to the top plane only—are unbalanced. Both the upper and lower planes are one-piece jobs that can be mounted and removed quickly and easily. The petrol tank is fitted inside the top plane. The control of the *ailerons* is by means of duralumin rods and cables.

The interior structure arrangement of this little machine has been patented by the designer, but beyond that no further information is available at the moment. The external construction does not differ in appearance from that of the Junkers aircraft.

It must be admitted that the Entler Sporting biplane possesses a pleasing appearance, and we await with interest further news of this "novelty."

The principal characteristics of this machine are :—

Span (top)	23 ft. 0 ins.
Span (bottom)	19 ft. 6 ins.
Chord (top), 4 ft. 0 ins. ; (bottom)	3 ft. 3 ins.
Gap	3 ft. 11 ins.
O.A. length	16 ft. 9 ins.
O.A. height	7 ft. 9 ins.
Area, main planes	150·6 sq. ft.
Weight, empty	375 lbs.
Designed speed	80 m.p.h.



The Entler All-Metal Sporting Biplane : Three-quarter rear view. Externally it is similar to the Junkers construction, but differs considerably in its internal construction.

* * * *

Honouring Sir James Stevenson

Following a luncheon last week at the Savoy Hotel, Sir James Stevenson was presented with a silver salver inscribed as follows :—

"Presented to Sir James Stevenson, in recognition of his services to British aviation by his colleagues on the Air Council, February, 1919–October, 1921."

The salver bore the signatures of present and past members of the Air Council.

Irish Free State and Aviation

A second aeroplane for the Irish School of Flying, about to be established at Baldonnell, has, according to the *Derry Journal*, arrived in Dublin. It is an Avro machine, and was brought to Dublin by the British and Irish steamer "Lady Cloe." As the steamer came up the Liffey, an Irish military guard went aboard to take charge of the aeroplane. It is understood that the Irish Air Council expect to have the School of Aeronautics at work in a short time. The delay in all branches of Irish reconstruction resulting from the controversy of the last six months has held up the organisation of the new air services, both military and civil. The Irish Air Council expect to be able to push on this work immediately and begin the training of Irish airmen.

Aircraft for Exploring the Antarctic

Besides diamonds, edible fish in solid masses, 100-fathom marine trees, and other wonders of the Antarctic, from a report by Major Carr, who accompanied the "Quest" expedition to attend to the aviation side of the undertaking, it is his opinion that the opportunities for aerial work in the Antarctic Zone are wonderful. Unfortunately, owing to a change of plans, the baby seaplane and balloon sent to Cape Town for the "Quest" were never embarked. If the explorers had been able to climb to a good height and fly one hundred miles farther south they believe that they would have sighted new land.

The weather conditions were very wonderful, the air being clear as crystal and the mirage remarkable. Major Carr believes there are great possibilities for aviation work in Polar regions, and he regards seaplanes as indispensable for successful exploration.

IN PARLIAMENT

British Air Power

Major-General Seely on June 20 asked the Prime Minister whether his attention has been called to the fact that the reserve for the Royal Air Force to be provided by civil aviation has almost entirely disappeared, and that as a consequence our defensive power in the air has fallen to a dangerously low level in comparison with other countries and in relation to the other arms of our own service; and what action he proposes to take in the matter?

Mr. Chamberlain: My right hon. and gallant friend may be assured that His Majesty's Government are alive to the bearing upon national security of the developments of aviation in all their various aspects, and are giving the present position their very careful consideration. It must not, however, be taken to indicate that our defensive power is necessarily dependent to more than a limited degree upon the condition of civil aviation.

Major-General Seely: What action is the Government really taking now, apart from consideration, in view of the deplorable situation in which we stand in the air relatively to other Powers?

Mr. Chamberlain: It is generally held, I think, that consideration should precede action.

Major-General Seely: But consideration has proceeded for two years, and this is the result: I ask what action is now being taken after two years' consideration?

Mr. Chamberlain: I can give no further answer. I do not profess to be conversant with the details, but what I do know is that the position as a whole, and the serious questions involved, are under consideration at this time. Beyond that I cannot go. If my right hon. and gallant friend desires further information, apart from broad policy, I shall be obliged if he will put a question down.

Major-General Seely: I will do so for Thursday to the Prime Minister.

Foreign Aircraft

Major-General Seely asked the Secretary of State for Air if he can state the approximate number of civil aircraft of value for war purposes now available in the principal European countries and in the United States of America?

Captain Guest: The numbers of civil aircraft borne on the French, Belgian and Dutch registers on May 1 were 598, 39, and 15 respectively. In the absence of any authoritative statement by the Governments concerned, it is impossible to say what proportion of these aeroplanes would be of value for fighting or war-training purposes, but it is probable that the number fit for modern warfare would be small. As regards Germany, 225 aeroplanes were, on May 1, available for air traffic, but none of these would be of value for war purposes. As regards America, the estimated number of civil aircraft in operation in 1921 was 1,200. Of these, approximately 600 were employed by civil air transport companies.

Aeroplanes, Pilots and Wireless

Sir Harry Brittain, on June 22, asked the Secretary of State for Air the number of foreign-owned passenger-carrying aeroplanes trading between their own country and England which carry only a single pilot; what number are not yet fitted with wireless; and whether he can give approximate dates on which these essential improvements are to be remedied?

Captain Guest: The answer to the first question is 71 aeroplanes, of which 10 will eventually be replaced by aeroplanes fitted with dual control capable of carrying two pilots; to the second, 65; to the third, that it is expected that all these aeroplanes will be fitted with wireless apparatus within the next three months.

Trans-European Air Routes

Mr. L'Estrange Malone asked whether any steps are being taken to establish British air routes on any European routes other than the little cross-Channel routes London-Paris, London-Brussels, etc.; whether definite steps are being taken to establish British air routes on the important trans-European routes where French, German and Italian aircraft are already operating; and, if not, why not?

Captain Guest: The answer to the first question is that it is proposed to establish a new subsidised air route with flying boats from Southampton to Cherbourg and probably later to the Channel Islands; to the second that, except as stated above, no additions to the existing subsidised aeroplane services are at present contemplated, though these routes may be extended under the present subsidy scheme within the limits of the money available; to the last, that the Ministry has up to the present received no applications from any British firm to establish a British air line on the trans-European routes.

Mr. Malone: Is the right hon. and gallant gentleman aware, now that Germany is allowed to build aircraft, that German aircraft will be ahead of the English?

Captain Guest: I think it must be apparent to my hon. friend that European countries have a considerable advantage over us in this connection.

London-Paris Route Equipment

Mr. L. Malone asked whether any complaints have been made to the effect that the facilities as regards terminal aerodromes, landing grounds *en route*, wireless communication, fog reporting, etc., on the London-Paris route are inadequate; whether any representations have been made to the French Government to improve the wireless facilities on the French side of the London-Paris route, or what is the delay in establishing efficient communication; and whether the Air Ministry will consider setting up stations for reporting the width and altitude of fog banks on the route and otherwise dealing with the complaints made against this route?

Captain Guest: The answer to the first question is that some vague complaints, especially in regard to the French portion of the route, have been received, but, with two exceptions, none of them has been sufficiently concrete or definite to enable action to be taken on them. The two exceptions related to the defective condition of the surface of Croydon aerodrome (which steps have been taken to remedy), and to delays in wireless communication between Croydon and Paris, mainly traceable to atmospheric disturbances and in a less degree to mistakes by personnel. As regards wireless communication on this route generally, I would refer my hon. friend to my reply to him of May 4 last. That reply is also pertinent to the second question, the answer to which is in the affirmative. The delays in establishing efficient wireless communication on the French side of the Channel are due to the time necessary to reconstruct their W/T stations, but we are informed that this work is being pressed forward. As regards the last part of the question, experiments are in hand for finding a practical method of determining the vertical extent of fog, and the suggested establishment of new stations for this purpose additional to the existing five—namely, three on the 58-mile route from Croydon to the coast, reporting weather conditions every hour during daylight, and two reporting the conditions over the Channel—is not considered necessary.

Mr. Malone: Has the right hon. and gallant gentleman actually inter viewed some of the pilots about these complaints in the first part of the question: and if not, will he do so?

Captln Guest: I will certainly put myself in touch with the companies, ans ask them to inform me of what are the view of their pilots.

Thames Air Station

Mr. Gilbert asked whether any further progress has been made as to providing an air station on the Thames in the vicinity of Westminster and Vauxhall bridges; whether it has been definitely decided to establish such a station; when it is proposed to use it for a Continental air service; and can he make any general statement on the subject?

Captain Guest: Negotiations have been steadily pursued with a view to carrying out the series of experimental flights to and from the Thames at Westminster referred to in the reply I gave my hon. friend on February 22 last. These have, however, not borne fruit, and I regret, therefore, that I have nothing to add to my previous statements.

Air Service to India and Australia

Commander Bellairs asked the Prime Minister, in view of the importance of the proposed airship service to India and Australia, whether he can hasten the consideration and decision of the Imperial Defence Committee?

Mr. Lloyd George: The question of the proposed airship service to India and Australia will be considered at an early meeting of the Committee of Imperial Defence.

R.A.F. Pilots and Skilled Workmen

Sir H. Brittain asked the Secretary of State for Air whether he can make any statements as to what is being done by his Department to retain a sufficiency of skilled pilots; and whether he is also giving attention to the necessity of having available an adequate number of trained engineers and skilled workmen to deal with the manufacture and upkeep of aeroplanes, bearing in mind the needs of the future?

Captain Guest: The Short Service Commission scheme which was instituted in 1919 will provide a regular flow of qualified pilots into the Reserve. Under this scheme commissions are granted for four years' service in the flying branch of the Regular Air Force, followed by four years in the Air Reserve. A number of these short service officers will pass to the Reserve in a few months time. Skilled men who have served in the ranks as fitters, riggers, etc., are also passing into the Reserve, and will be available for service in connection with the upkeep of aircraft in a national emergency. As regards manufacture, it is the policy of the Air Ministry to support aircraft constructors to the utmost extent compatible with the needs of national economy.

Sir H. Brittain: Realising that the right hon. gentleman appreciates as much as anybody else the urgency of this question, and the impossibility of improvisation, can he say what the Ministry is prepared to do in the case of British plants having to close down while this lengthy consideration is going on?

Captain Guest: That is too important a question to answer by way of reply to the supplementary question.

Sir W. Joynson-Hicks: In regard to the personnel, is the right hon. and gallant gentleman satisfied that the flow of pilots and mechanics is sufficient in view of unforeseen contingencies?

Captain Guest: I think the annual flow of pilots will rise to about 500, and of mechanics probably to 2,000.

Naval Wing of R.A.F.

Captain Viscount Curzon asked the Prime Minister whether the Committee appointed to enquire into the position and work of the Naval Wing of the Royal Air Force has held any meetings as yet; when it is likely to conclude its labours; whether any Report will be issued; and whether the serious lack of machines and pilots for work in conjunction with the fleet has received the consideration of the Government?

Mr. Lloyd George: The reply to the first part of the question is that no Committee was appointed to consider the position and work of the Naval Wing of the Royal Air Force. A Committee was promised by the Leader of the House to examine into the system of naval and air co-operation. No formal meeting of the Committee has yet been held, but some progress has been made by preliminary exchange of views. The reply to the second part of the question is that I am unable to say when the Committee is likely to conclude its labours, and to the third part that a report will be rendered to the Committee of Imperial Defence of which this is a Sub-Committee. With regard to the fourth part of the question, I am not aware of any serious lack of machines or pilots for work in conjunction with the Fleet, and air training in co-operation with the Navy is being actively and efficiently carried on with the limited forces at our disposal.

Status of Secretary of State for Air

Mr. L. Malone asked the Prime Minister whether, in view of the present and increasing importance of the Air Force, His Majesty's Government will consider raising the status of the Secretary of State for Air to the same as that held by the First Lord of the Admiralty and the Secretary of State for War?

Mr. Lloyd George: I am not prepared to propose an increase in the salary attached to any post in the Government at the present time, nor do I think it expedient to add to the numbers of the Cabinet.

Mr. Hogge: This does not necessarily depend upon the amount paid to the Minister. Is the Prime Minister aware that the Secretary for Scotland does more work than any other Minister in the Cabinet?

Mr. Lloyd George: That is the only difference of which I know.

Captain Wedgwood Benn: In view of the importance of the Air Service, should it not receive equal recognition in this respect with the other two arms of the Service?

Commander Bellairs: If you take the First Lord of the Admiralty and the Secretary of State for War out of the Cabinet that would put them all upon an equal basis.

Air Power

Sir W. Joynson-Hicks asked the Prime Minister whether he has received a letter, dated June 2, from the Parliamentary Air Committee; and what action the Government proposes to take in regard to the air position?

Major-General Seely asked the Prime Minister if he will take steps to ensure that our safety in the air shall receive full consideration relatively to our other defensive services?

Viscount Curzon asked the Prime Minister whether the Committee of Imperial Defence has considered the adequacy or otherwise of the provision for the air defence of the country; if so, what is their decision; whether the same Committee has considered the adequacy or otherwise of the arrangement made and the provision for aircraft working with the Royal Navy; and, if so, whether the Dominions were represented at such deliberations and if they concur in the conclusion reached?

Mr. Lloyd George: Yes, Sir. I have received the letter in question. Long before this letter was written the attention of the Government had been directed to all the questions of aerial defence and development to which it refers, and a special sub-committee of the Committee of Imperial Defence had been appointed to consider and report upon the general question which is now before the Committee of Imperial Defence. The arrangement for aircraft working with the Royal Navy is being considered by a separate committee.

Sir W. Joynson-Hicks: Having regard to the very great importance which I know my right hon. friend attaches to this question, may I ask whether there is any possibility of him being able to make a statement in the approximately near future?

Mr. Lloyd George: The letter, I agree, contains some very impressive passages, and the Committee are examining the whole problem very closely. I think it would be a great mistake to be in a hurry to insist upon a report, because there are a good many considerations which must be taken into account.

THE ROYAL AIR FORCE

London Gazette, June 16, 1922

General Duties Branch

The date of effect of the commns. of the following Flying Officers is May 25, and not as *Gazette*, June 6 :—A. W. Crees, R. M. Taylor, M.C.

London Gazette, June 20, 1922

General Duties Branch.

Pilot Offr. R. E. Baugh to be Flying Offr; April 20. Flying Offr. B. Ankers, D.C.M., is restored to full pay from half-pay; April 1 (substituted for *Gazette*, May 5). Flying Offr. F. L. Pearce to take rank and precedence as if his appt., as Flying Offr., bore date Oct. 13, 1918, immediately following Flying Offr. R. Ll. Cantle. Reduction to take effect from June 7. Flying Offr T. B. Tully, A.F.C., resigns his short service commn., and is granted rank of Capt.; June 21.

Stores Branch.

Flying Offr. T. C. James is granted a permanent commn., retaining his present substantive rank and seny., and is transfd. to Stores Branch; May 15.

London Gazette, June 23, 1922

General Duties Branch

Air Commod. E. A. D. Masterman, C.M.G., C.B.E., A.F.C., is placed on half-pay, Scale A; June 10. Flight Lieut. A. H. Wann is restored to full pay from half-pay; June 16. Flying Offr. F. McQuistan, D.F.C., is removed from the R.A.F.; March 20.

Stores Branch

The name of Flight Lieut. Henry Sam Francis Temple Jerrard will be as now described, and not "Henry Vaughan Jerrard," as stated in previous *Gazettes*.

Memorandum.

Hon. Sec. Lieut. G. C. Wright relinquishes his hon. commn. on joining the Territorial Army; May 29.

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Personals

Married

Major CUTHBERT D. FELLOWES, M.C., A.F.C., second son of Rear-Admiral Sir T. H. B. Fellowes, K.C.B., D.L., of Stevenage, Herts. was married very quietly on June 22 at St. Nicholas' Church, Stevenage, to MARGARET BOGLE, widow of Lieut.-Commander DONALD OSWALD, Royal Navy, second daughter of the late Gilbert W. Don, Esq.

Flight Lieut. CRESSWELL TURNER, A.F.C., R.A.F., only son of Mr. and Mrs. J. Turner, of Edgbaston, Birmingham, was married on June 14, at St. Saviour's, Eastbourne, to NORAH ETHEL, elder daughter of Mr. and Mrs. H. RAY-ENGLEHEART, of Blackwater Road, Eastbourne, and granddaughter of the late Lieut.-Col. A. B. W. Sleigh, H.M.'s 77th and 2nd West India Regt.

The marriage arranged between Major JAMES DUNDAS-GRANT (late R.A.F.), younger son of Sir James and Lady Dundas-Grant, and Miss KATHERINE GALLOWAY, younger daughter of Sir James and Lady Galloway, took place on June 24 at All Saints', Margaret Street.

To be Married

The marriage arranged between JOHN VAUGHAN ROBERTS, R.A.F., and MARY CONSTANCE, daughter of Brig.-General and Mrs. J. H. LLOYD, of Queensbridge, Ellesmere, will take place quietly on July 4, in Ireland.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JUNE 18 AND JUNE 24, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	49	100	21	33	48	2 45	D.H. 34 G-EBBS (2h. 0m.)	B. (4), D.H. 18 (2), D.H. 34 (3), G. (7), H.P. (1), H.P. W.8B (3), Sp. (3), V. (1), W. (1).
Paris–Croydon	49	112	9	36	43	3 10	D.H. 18 G-EAWX (2h. 16m.)	B. (3), D.H. 18 (2), D.H. 34 (3), G. (8), H.P. W.8B (3), Sp. (3), V. (1), W. (2).
Croydon–Brussels ...	8	21	2	5	8	2 12	D.H. 18 G-EAWX (1h. 58m.)	D.H. 18 (2), D.H. 34 (1), H.P. W.8B (1), V. (1), W. (1).
Brussels–Croydon ...	8	17	—	5	7	3 29	Vulcan G-EBBL (2h. 39m.)	D.H. 18 (2), D.H. 34 (1), V. (1), W. (1).
Croydon–Rotterdam–Amsterdam.	12	10	12	11	12	2 35	Fokker H-NABK (2h. 0m.)§	F. (7).
Amsterdam–Rotterdam–Croydon.	11	6	11	10	11	3 10	Fokker H-NABN (2h. 30m.)§	F. (7).
Totals for week ...	137	266	55	100	129			

* Not including "private" flights. † Including certain journeys when stops were made *en route*. ‡ Including certain diverted journeys. § Rotterdam.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport. P. = Potez. R. = Rumpler. Sa. = Salmson. Sp. = Spad. V. = Vickers Vimy, Vulcan, etc. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijke Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

Incidental Flying.—A busy week was spent testing machines for the Aircraft Disposal Co. by Maj. Foot, Capt. Stoken, Messrs. Courtney, Dickinson, Hayns and Shaw. Machines out were D.H. 9's, Bristol Fighter, Martinsyde and S.E. 5a's, some of which were flown to Brussels.

The Surrey Flying Services Avro also made a flight to Brussels and back on the 21st and 22nd.

THE LONDON AERO-MODELS ASSOCIATION

(The Society of Model Aeronautical Engineers.)

COMPETITION for Camm Challenge Cup.—On account of the bad weather on Saturday last this Competition had to be postponed to Saturday next, July 1, on the same ground.

On Thursday next, the 29th inst., at 7.30 p.m., Mr. F. Handley Page has arranged for Mr. Reynolds, of the Handley Page Research Department, to read a paper before the members at Headquarters, 20, Great Windmill Street, Piccadilly, W. 1, the title of which will be "The Handley Page Slotted Wing," illustrated by lantern slides. Dr. A. P. Thurston, D.Sc., will preside.

"Flight Golf" Competition for FLIGHT Challenge Cup will be held on Wimbledon Common on Saturday, July 8, 1922, at 5 p.m. See last week's FLIGHT for full particulars.

On Thursday, July 6, a Committee Meeting will be held, when suggestions from members on future competitions will be discussed. Suggestions should be in the hands of the Hon. Secretary by Wednesday, July 5.

Mr. Felix Kelly's Challenge Cup for best duration in a single flight by compressed air driven model aeroplane, Wimbledon Common, Saturday, September 2, 1922, at 5 p.m. punctual.

Rules

The holder of the Cup for each year to be the entrant of the machine giving the best performance under the following conditions:—

(1) Models to be limited to those driven by compressed air.

(2) Minimum weight complete, 1 lb.

(3) Winning flight minimum duration, 1 minute.

(4) Minimum loading, 8 ozs., equals 1 sq. ft. for all horizontal surfaces. In the case of a dihedral or other angle, the area of such surfaces will be measured separately.

(5) Machines to rise off the ground under their own power.

(6) Flights to take place over reasonably level ground.

(7) Machines at termination of flight to be in proper flying condition, and shall make a further flight rising off the ground, of at least 15 seconds to prove its proper flying condition is still unimpaired.

(8) All air containers to be inflated by pumps operated by physical energy only.

(9) At least three attempts shall be allowed.

The Cup is won outright by the entrant holding it for three consecutive years.

* * *

British Aviation Mission to Imperial Japanese Navy

MAJ. F. B. FOWLER, late Lieut.-Comdr. (Attd.) I.J.N. and Sqdn.-Comdr. R.N.A.S., is returning from Japan, arriving in England July 1. He was one of the first officers to join the British Aviation Mission in January, 1921, as Officer-in-Charge of Flying. For the last six months he has been second in command, but had to return for business reasons, and the loss of his services, which have been invaluable, is much regretted. Maj. Fowler will be glad to give any information in his power to the relatives of those still serving or any others interested, on application to his address, Belhurst, Hurstmonceux, Sussex.

Poison Gas—Aircraft—and a Warning by Marshal Foch

A TIMELY and very earnest warning comes from Marshal Foch not to neglect power in the air, in a preface which he has contributed to a French translation of "Chemical Warfare," by Major Victor Lefebure. There he emphasises that the ever-increasing capacity of the aeroplane to carry heavier weights will supply a fresh means of spreading poison gas by the aid of ever more powerful bombs and reaching armies and populations far to the rear. Marshal Foch continues:—

"Chemical warfare is thus able to produce more formidable results over greater expanses. On the other hand, it is beyond question that this extension finds a ready realisation in a country like Germany, which devotes itself in peace time to the wholesale manufacture of chemical products which, by a slight modification of the process of reaction, can be converted into war products."

Germany, at least partially deprived of her old method of fighting by a large military force, carefully instructed, regularly organised, and powerfully armed, may well turn to the new methods of attack which chemical warfare offer. "Chemical warfare ought therefore to enter into our calculations and our preparations for the future, if we wish to avoid a formidable surprise." The work of Major Lefebure the Marshal regards as giving an exact idea of the possibilities which chemical warfare opens for Germany today, and for that reason of the danger which menaces France and Great Britain.

Will our Government *ever* realise what lies before us should they neglect to continue "supremacy in the air"?

IMPORTS AND EXPORTS, 1921-1922

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
Mar. ...	14	1,471	118,199	166,607	1,565	100
April...	1,370	3,846	138,983	139,995	450	5,880
May ...	3,350	2,416	59,624	167,999	1,818	4,254
	11,572	9,452	463,763	620,282	6,137	11,357

* * *

PUBLICATIONS RECEIVED

British Standard Specification for Materials and Constructional Strength of Chemical Fire Extinguishers. No. 138, May 1922. The British Engineering Standards Association, 28, Victoria Street, London, S.W. 1. Price 1s. net, by post 1s. 2d.

Bulletin du Laboratoire Aerotechnique de Belgique. Le Mecanisme du Vol Naturel. By M. Boel. Le Ministre de la Defense Nationale, Brussels, Belgium.

Rugby Engineering Society: Proceedings for the Session 1919-20. Vol. XIV. The Rugby Engineering Society, care of British Thomson-Houston Co., Ltd., Rugby.

Catalogues

L.P.C. Piston Rings. The Light Production Co., Ltd., 60-66, Rochester Row, London, S.W. 1.

SKF Ball Bearing Transmission Accessories. The Skefko Ball Bearing Co., Ltd., Luton, Beds.

* * *

NEW COMPANY REGISTERED.

SIBLEYS (1922), LTD., 310-314, Clapham Road, Stockwell, S.W. 9.—Capital £5,000, in £1 shares. Builders of aeroplanes, airships and engines for flying machines, manufacturers of ordnance and munitions, etc. Permanent directors: J. Dennis and T. Dennis.

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

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Telephone: Gerrard 1828.

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(*Continued from* p. xiv.)

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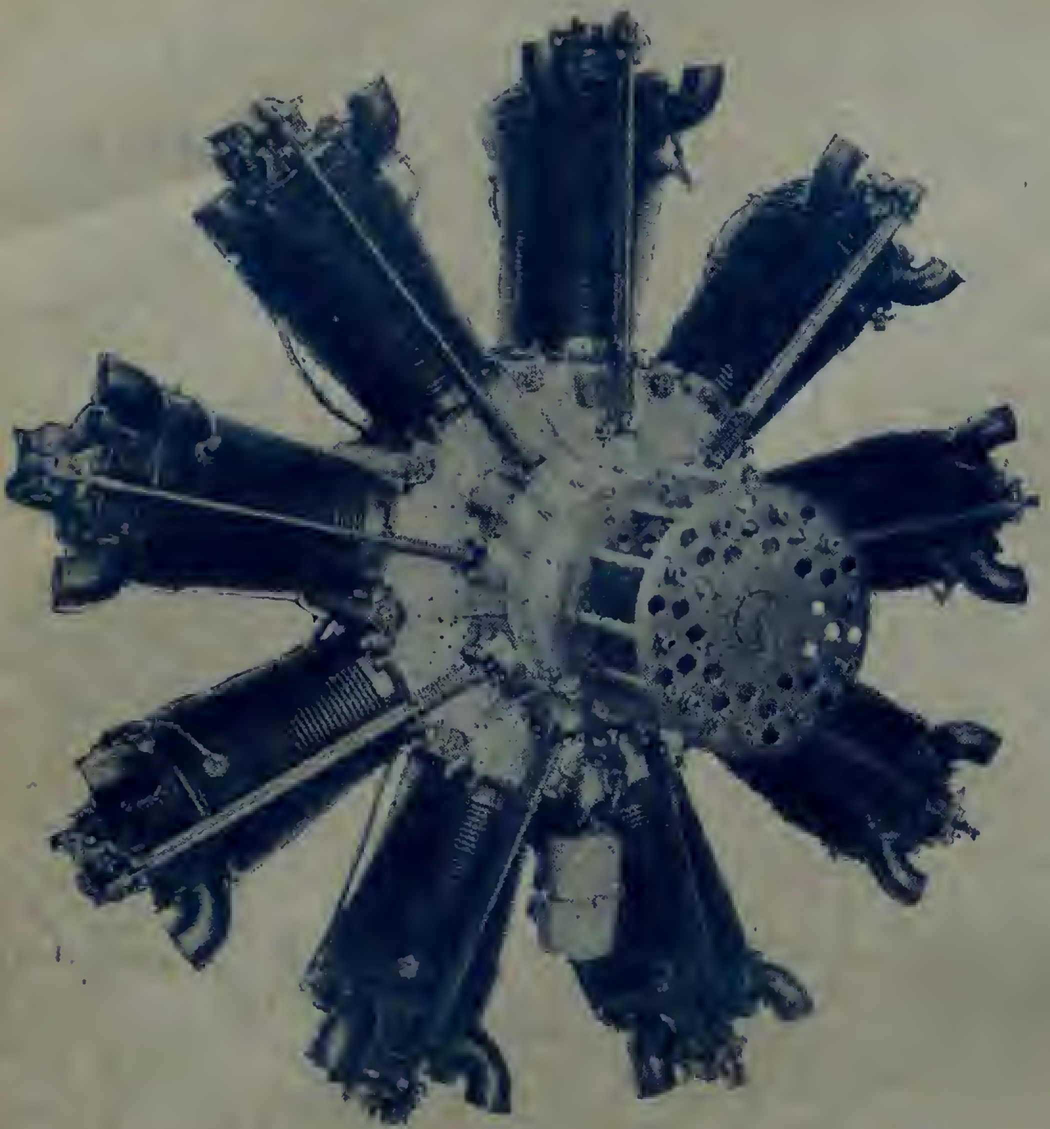

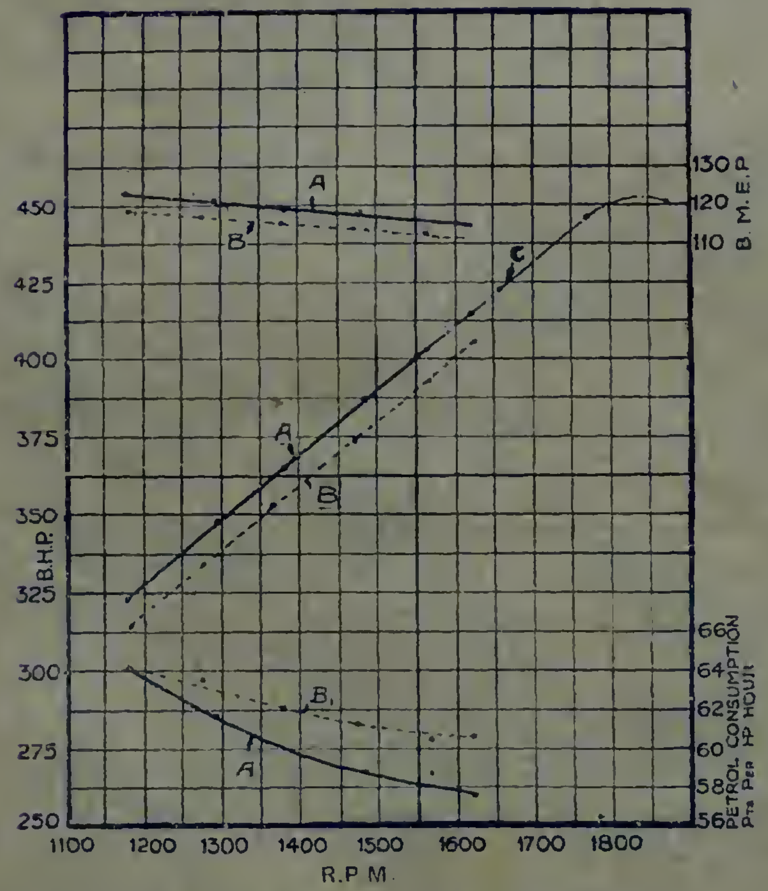

Curves "A" Readings taken at beginning of Run.
Curves "B"—Readings taken at end of Run.
Curve "C"—Power obtained after Type Test.
Power Readings corrected for Atmospheric Pressure.

The Evidence of the Air Ministry Type Test.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Aug. 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**Aerial Derby Starting at Waddon**
Aug. 12	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsche (300 kil.)**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy (1s. 1d. post free).

EDITORIAL COMMENT.

The Bristol "Jupiter" in France

It seems but a short while ago, and in point of fact it is only a matter of a little over ten years, that the majority of aeroplanes, and practically all the aero engines, used in this country were of French design and, mostly, of French construction. With the advent of the 50 h.p. Gnome an enormous impetus was given to the progress of flight, owing to the, for the time, very light weight for the power developed. Soon the Gnome became the fashion, and few thought of fitting anything else. So deeply rooted became the habit of thinking of aero engines and French aero engines as synonymous terms that, even so late as the outbreak of war, found us with but a very few British firms producing aero engines of their own design. Then came the War and its demands, which necessitated the production of British engines in large quantities. A large industry was built up, and at the cessation of hostilities British engines were generally superior to those of any other country.

Since 1919 but a very few engines have been ordered by the Air Ministry, and the number which can be absorbed by our so-called commercial aviation activities is negligible. There is very grave danger that, without Government support, more than one of the aero engine firms which established reputations during the War will have to close down their works. In the general way, keeping an aero engine factory going is far more difficult and costly than is the keeping alive of an aircraft factory. This fact sometimes appears to be lost sight of. France is offering a million francs for an aero engine. We are doing nothing. Not only so, but engines which have shown real merit and progress are allowed to remain unused.

To take one example, which is illustrative of the way in which lack of foresight on the part of the Government is forcing the industry to the wall, the Bristol "Jupiter" is now to be manufactured in France, by the Gnome and Rhone Company, after having passed the French engine tests with flying colours. The "Jupiter," upon the development and perfecting of which very large sums of money have been spent, passed the Air Ministry type test some months ago. Incidentally it was the first radial air-cooled engine to do so. Yet no orders were forthcoming. The engine had satisfied all the requirements of the Air Ministry, but, except for isolated cases, there was no money available, apparently, for placing an order with the makers for a few engines.

Seeing this the Bristol Aeroplane Co., Ltd., decided that something had to be done if all the work and money spent so unstintingly on its development were not to be entirely wasted. The result is that now, after having passed without difficulty the French tests—including five 10-hour periods of non-stop running—the "Jupiter" will be manufactured in France and used on French military and commercial machines. In the old days the position was bad. We bought French aero engines, but we bought them because there were at the time no British engines which could compete with them. Today the position is ten times worse, because, although we have the engines, we do not make use of them, leaving that to our French allies. One would have imagined that the lesson of the War would not have been forgotten so soon, but apparently it has. If something is not done, and done quickly, not only this firm but others who have produced engines of world-wide fame will undoubtedly be forced to close down. And the next time we want engines there will not be time for us to muddle through as we did in the last. Aircraft attack on a large scale will settle matters before the national character has had time to assert itself. It is almost grotesque in its baldness, and is pathetic in its tragic possibilities.

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The Paraffin-cum-Hydrogen Airship Engine

In view of the apathetic attitude taken towards existing engines of recognised types, we are forced to ask the question: Is it likely that support will be forthcoming for new developments which, although promising very considerable ultimate gains, will necessarily involve the expenditure of certain sums of money during the experimental stage? Frankly, unless the Government is forced by public opinion, we doubt if the necessary funds will be granted—or "lifted"—in these days of misguided economy. There are a number of problems awaiting solution, among which mention may be made of the Diesel or semi-Diesel type of engine for aircraft work; the increase in aero engine efficiency which has been proved by Mr. Ricardo to be possible by the admittance to the engine cylinders of a layer of inert gas above the explosive charge, thereby maintaining the high compression and thermal efficiency, even when the engine is run throttled down; and, finally, the very great advantage which arises from the use of hydrogen in combination with liquid fuel for airship propulsion.

The last-mentioned problem has received a certain amount of publicity recently, a statement having appeared to the effect that engines of this type are suggested for the airship services which Commander Burney, in connection with Vickers, Ltd., and the "Shell" group, propose to organise. As the account given in the daily Press suffers from certain inaccuracies, it appears well briefly to place on record the facts relating to the development of engines of this type.

It is not quite clear who was the first to suggest hydrogen as a fuel, but at any rate it is known that in 1918–19 the experimental staff at Pulham airship station were engaged on work along these lines, and we believe that as a matter of fact Commander Boothby holds a patent of the main idea, while other officers who were at Pulham at or about that time hold a patent for a carburettor which makes the application of the idea satisfactorily possible.

Then came the closing down of Pulham, and the scheme had perforce to be dropped, as far as the officers there engaged were concerned. Thus, although it was not generally known, the closing down of that airship station had immediate results quite apart from those arising out of letting our airship material "rot in its sheds." And still the Secretary of State for Air can get up in public and unblushingly suggest that we may as well leave airships and all questions relating to them alone for the next ten years.

All technical officers and civilians who had had experience of airship work realised that, although the use of hydrogen constituted a danger from fire, the greatest danger was a result of using petrol as a fuel. Escaping hydrogen is quickly dispersed, but petrol vapour has an unpleasant habit of hanging about for quite a long time. They realised as an obvious fact that, from this point of view alone, the employment of a heavier fuel would be a very great advantage. By combining a heavier fuel with hydrogen, not only is the fire danger greatly reduced, but a very great economy and increase in carrying capacity of paying load results, and the production of an engine which will combine these two fuels may well have the most far-reaching effects upon the future of airships.

After the regrettable accident to the "Roma," Commander Boothby thought that something ought to be done to make further progress with the hydrogen scheme. He consequently approached the "Shell" company, whose chemical expert, Mr. Kewley, in conjunction with Mr. Ricardo, set to work upon the problems, with the result that a practicable engine burning heavy paraffin in conjunction with hydrogen is now within sight. If the Burney airship scheme is approved, and with the Admiralty offer, it can hardly be doubted that it will be approved, presumably the paraffin-*cum*-hydrogen engines will be part of it. Thus this problem appears in a fair way of being solved without Government encouragement. But the others are likely to remain unsolved, unless our fatal policy of starving research is changed very speedily.

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The Grand Prix de l'Aero Club de l'Ouest

CLOSE upon forty aeroplanes took part in the Grand Prix, which was flown over a triangular course on July 2. The three turning points were Angers, Cholet and Saumur, with start and finish at Angers. Competitors had to make two laps of the course, bringing the total distance up to 315 kilometres (about 195 miles). The military competition, which was flown under the same rules, was divided into two series. The competition was, in a sense, a speed test, although relatively slow machines were used, owing to the fact that marks were awarded for each passenger carried. In the civilian section, first prize was won by Jean Casale on a Spad 46 with 370 h.p. Lorraine-Dietrich engine. His actual flying time was 1h. 58m. 33s. (handicap time 1h. 31m. 52s.). Sadi Lecointe, who was flying a Nieuport limousine with 300 Hispano, was second, with a flying time of 2h. 32m. 7s. (handicap time 2h. 4m. 17s.). The military section was won by Lieut. Borde in 1h. 39m. 3s. Lieut. Thoret was second, his handicap time being 1h. 39m. 30s. The Grand Prix was witnessed by numerous spectators and must have helped greatly to increase popular interest in flying.

THE HEATH SPORT-'PLANE

The problem of designing and constructing a successful small, low-powered sporting aeroplane is undoubtedly a very interesting one, and this week we record an effort in this direction, once again hailing from America, where this type of machine receives no small amount of attention. The machine in question, called the "Feather," has been built by the Heath Aeroplane Co., Inc., of Chicago, to the designs of Mr. E. B. Heath. Unfortunately, detailed particulars of this little 'bus are lacking at the moment of writing, but we give herewith some illustrations and the principal characteristics.

As will be seen, it is a single-seater tractor biplane on more or less conventional lines, having a single pair of struts each side and a healthy three-wheeled landing chassis. The *fuselage* is of good streamline form, and it will be noticed that the *ailerons*, fitted to the top planes only, are of substantial proportions, no doubt a desirable feature on a small span machine (24 ft.).

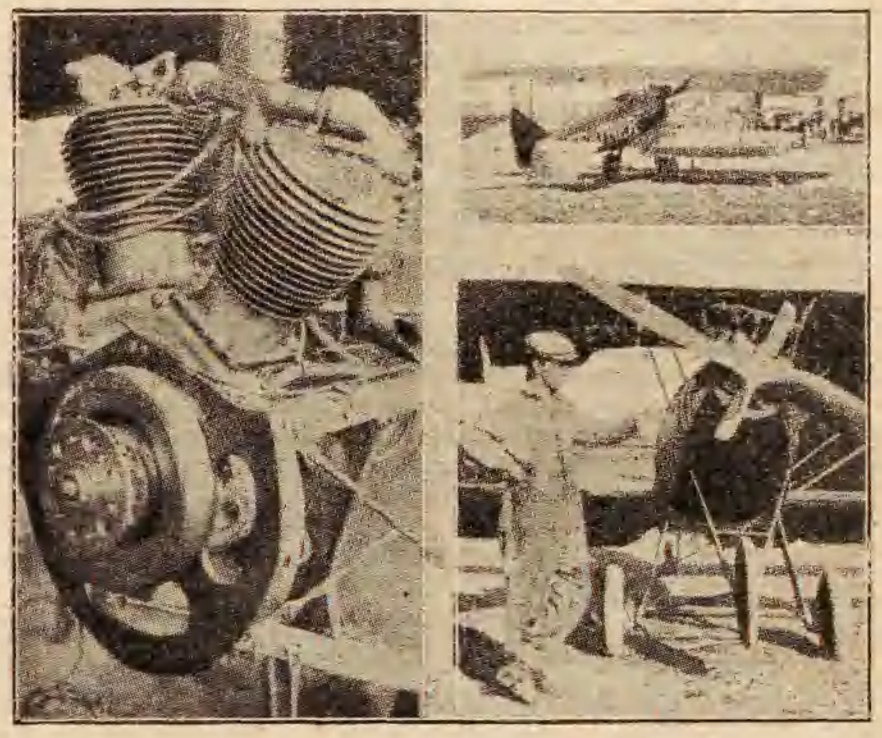
It is fitted with a 2-cyl. air-cooled "Thor" (Model 15A) motor-cycle engine—for which the machine was specially designed—modified in certain details to meet the requirements of aerial work. For instance, specially heavy gears have been fitted, the gear reduction being 3½ to 1. The engine speed is in the neighbourhood of 3,000 r.p.m.

A somewhat novel feature is to be found in the air screw employed on this machine. It will be seen on reference to the illustrations that two small blades are built into the screw at right angles to the blades proper. These auxiliary blades are provided for the purpose of increasing the slipstream over the engine cylinders, thus assisting in the cooling of the latter. It is stated that this arrangement is only necessary in the summer months, and for the cool weather an ordinary two-bladed screw, 6 ft. 6 ins. diameter by 5 ft. 6 ins. pitch, is employed.

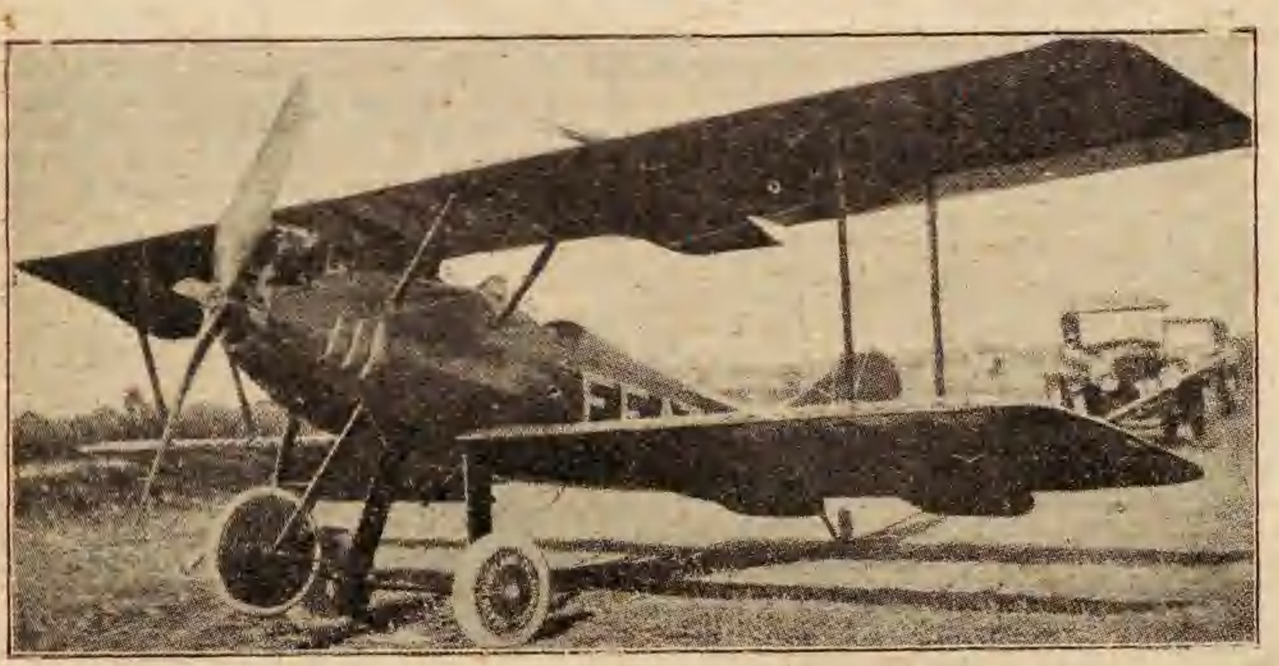
We understand that trial flights have been carried out with this machine, and that it flies remarkably well.

The principal characteristics of the "Feather" are as follows :—

Span	24 ft.
Overall length	18 ft.
Overall height	6 ft. 6 ins.
Chord	4 ft.
Gap	4 ft.
Stagger	15°
Dihedral angle (lower)	1½°
Angle of incidence	4°
Area of main planes	165 sq. ft.
Area of ailerons	20 sq. ft.
Area of tail plane	5 sq. ft.
Area of elevators	7 sq. ft.
Area of fin	2·5 sq. ft.
Area of rudder	4 sq. ft.
Weight empty	350 lbs.
Weight loaded	550 lbs.
Wing loading	3·5 lbs./sq. ft.
Power loading	27·5 lbs./h.p.
Speed range	29–60 m.p.h.
Climb	800 ft./min.
Ceiling	5,000 ft.
Range (full speed)	55 miles.



THE HEATH SINGLE-SEATER SPORT-'PLANE : Some details. On the left a view of the 20 h.p. Thor motor-cycle engine. On the right, bottom, the tractor screw with auxiliary blades for cooling the cylinders. Above, a three-quarter rear view of the machine.



The Heath Single-Seater Sport - 'Plane : Three - quarter front view.

* * *

The Coupe Deutsch

If rumour is to be trusted, there appears to be reason for expecting that this year's Coupe Deutsch, which will be flown over the Villesauvage (Etampes)–la Marmogne course on September 22, may be somewhat more interesting than has been the case hitherto. *On dit* that Sadi Lecointe and Lasne will fly Nieuport machines. Brack Papa will probably be there with his 700 h.p. Fiat, and it is reported that such famous French pilots as Kirsch (last year's winner), Madon, Canivet and Jean Casale will be entered for the elimination trials, all mounted on new machines. From this country we hope to see at least two entries. One will almost certainly be James on the Gloucestershire Mars I, which will have been considerably "cleaned up" by then, and another possible starter is a new Bristol, designed by Mr. Reid, about which no information may be published at present. It is not yet known if America will be represented, but there is, apparently, a possibility that one or two really fast machines from "the other side" will turn up. Altogether considerable interest should attach to the Coupe Deutsch this summer.

ROYAL AERO CLUB'S COMING OF AGE

MEMBERS of the Club entertained at the Savoy Hotel a distinguished company at dinner on June 27, to celebrate the twenty-first anniversary of the forming of the Royal Aero Club. The Duke of Atholl, President of the Club, presided, and after proposing a vote of condolence, which was accorded to Lady Wilson on the tragic death of her husband, announced that he had authorised the despatch of the following message to Lord Stamfordham, the King's Private Secretary :—

"The Royal Aero Club assembled together to celebrate the twenty-first anniversary of their existence, send your Majesty loyal and respectful greetings humbly submitted by the Duke of Atholl, President."

Later in the evening it was announced that the following reply had been received ;—

"His Majesty commands me to thank the Royal Aero Club for their loyal message, and in return, while he congratulates them on the splendid work in the cause of British aviation, he wishes them all success in the future."—Stamfordham.

Lord Gorell, Under-Secretary of State for Air, in the unavoidable absence of Capt. F. E. Guest, Secretary of State for Air, proposed the toast of "The Royal Aero Club," and declared that though in some respects the aerial position, both Service and civil, had been passing through times of difficulty, there was no real need for depression. It was not so many months since the Government had declared the Air Force independent of the other forces of the Crown. The air had gradually become an element which no one could disregard. In the very short history of aviation the Royal Aero Club had played a conspicuous part, and it was recorded that between 1909 and 1914 the club spent upward of £60,000 for the encouragement of competitions and the development of flying. He wished the club long life and great prosperity.

The Duke of Atholl, responding to the toast, said the club, from a very small beginning, had come to be recognised as the headquarters of British flying. He said that advisedly, for to their friends of the Royal Aeronautical Society they left the scientific side. Long before Dr. Coué was heard of they used to say, "Every day and in every way our flying gets better and better." British grit and scientific knowledge had done everything for British aviation, but today there were crass idiots so financially and strategically blind as to think that the salvation of this country lay in the starving of a force which beyond question stood between us and disaster in the initial stages of a war. It was for the people of this country to see that the false economists did not deplete our safety through wrong ideas of thrift. Flying, which was still in its infancy, could not be kept up unless it was backed by the Government, and the experience of the late war taught us that to be saved we must be prepared. Those who were interested in aviation did not ask for fleets and squadrons of aircraft, but they did ask that encouragement should be given to civil aviation to ensure that the best inventive brains in the industry should not be wasted. No institution had done more to keep this view before the public than the Royal Aero Club, from the days when flights were measured in seconds and occasionally in minutes. Today their chief activity was in promoting competitions, and they were most grateful to the King for the lead he had given them by presenting a cup for their next big competition.

Lord Weir afterwards delivered an address on aviation. If they were to believe one section of the Press, he said, British aviation was practically dead. Narrow and unimaginative people were said to have ruined it. It seemed to him that these newspaper critics were no better informed than the lady who could not remember the name of the Derby winner, but was able to say that Donoghue was the name of its caddie. He could recall no subject which had received more real help from the majority of the newspapers of this country than aviation, and even if Press criticisms were uninformed at times, they did good because they stimulated public interest. So far as he could gather, the main line of recent criticism was that we were falling into a dangerously weak position in comparison with France ; that civil aviation, upon which we must largely rely, had declined, and that the British aircraft industry was practically ruined. He held a profound conviction that the country which, in the war, did more effective and greater work in the air than any other country, would continue to hold a position of supremacy in the air, in keeping with its great position amongst the nations of the world.

In regard to France's squadrons, he refused to conjure up visions of menace—he preferred to recall that France owed us £500,000,000. If the interest on that was assessed at £25,000,000, was it not a legitimate reflection that we had in effect paid for those 220 squadrons ? It had to be remembered, too, that a French squadron cost but a quarter that it cost to maintain a British squadron. He was inclined to reflect that if taxation was the price of Admiralty, then indeed we had paid in full.

He urged that in regard to the Service votes the question of national defence should be considered a single problem, and the distribution of the vote decided by the best results from the economic standpoint. If that were done there would be no fear for the Service side of British aviation.

In any calm and dispassionate appraisal of relative effectiveness for national defence, the air would justify more easily year by year its claim for more and more substantial consideration. All he would suggest was that its claims be given calm and dispassionate consideration, and that national defence be the predominant factor rather than the interests of any of the three Services. It was because he thought our Government was in the fortunate position of being able to have the case for the air separately presented to them to secure proper consideration, that he was one of those who believed we did the right thing in becoming the first nation, and even today the only nation, to have a separate Air Service. When Great Britain was charged with lack of imagination in regard to the air, that at least should be reckoned in its favour.

He was convinced that the services of aviation should be considered entirely apart from the civil side for some time to come. It was not wise for the Royal Air Force to rely in any way on civil air transport as a reserve in times of emergency ; he could find nothing in the development of civil air transport that could be regarded as offering effective assistance to the fighting services. He had a feeling that the commercial aeroplane would, as it developed into an economic success, become in its design and structure of less and less value as a weapon of war. He hoped that the successful aeroplane of the future would be as useful for bomb-dropping and purely offensive purposes as the "Mauretania" might have been at the Battle of Jutland.

The most discouraging experience of private enterprise today was the apathy of the travelling public. According to the newspapers, the community called for more and more aeroplanes, but they were not using the aeroplanes that were in existence. The simple way of helping British air transport was to use the service provided and so help its development. It was to countries like their own that they must look for any development, and they must look to their designers and scientists for a real basic solution of commercial air transport. It was a matter for the technician and engineer, and if we spent our money with that end in view we should be repaid a hundredfold. He regarded the exhibition at Hendon last Saturday as a great performance. It suggested to him new hope for the aircraft industry. The Royal Air Force must not live much longer on the old war machine. There need be no fear for British aviation if there was first given a calm and dispassionate judgment on the effectiveness of the air as an arm of national defence ; next the maintenance by State support of our administrational civil air services, and perhaps an expansion to the Cairo-India route ; further, a practical appreciation of the necessity of supporting technical development and research ; and finally, an active policy of replacement of the old Service type of machine.

M. Flandin (President, Aero Club de France) addressed the company on aviation, and was followed by Vice-Admiral Sir Roger Keyes, who said that the Air Force was an essential protection for these islands, because attacks from the air could not be met by any other Service. As a member of the Board of Admiralty, he said that body looked to an efficient air service in maintaining sea supremacy. An inferior fleet equipped with an efficient air service would be a serious menace to a superior fleet lacking such equipment. The power of the Navy to maintain the sea supermacy of the Empire was vitally dependent upon the efficiency of its air units. The Empire would fail to exist when its sea power failed.

Lieut.-Gen. Sir Travers E. Clarke said the Army fully appreciated the value of the airmen and their craft. He was told that every man in the American army was to be capable of flying. He left it to the judgment of each individual to decide when that really came about, as to which branch of the American forces those men would belong.

Air Chief Marshal Sir Hugh M. Trenchard also replied.

Lieut.-Col. J. T. C. Moore-Brabazon, M.O., proposed "The Chairman," to which the Duke of Atholl briefly replied.

Among those present were :—The Earl of Caledon ; Mr.

C. R. Fairey (Chairman of the Society of British Aircraft Constructors); Lieut.-Col. A. Ogilvie; Mr. Roger W. Wallace, K.C. (past-Chairman of the Royal Aero Club); Lieut.-Col. J. T. C. Moore-Brabazon, M.P. (Chairman of the Royal Aero Club) and Mrs. Moore-Brabazon; Brig.-Gen. Sir Capel Holden (past Chairman of the Royal Aero Club); Lady Weir; Lieut.-Col. F. K. McClean (Vice-chairman of the Royal Aero Club) and Mrs. McClean; Brig.-Gen. P. R. C. Groves; Rear-Admiral Sir Godfrey M. Paine; Lieut.-Col. M. O'Gorman, C.B. (Chairman of the Royal Aeronautical Society); Lieut.-Col. L. F. Blandy; Maj.-Gen. Sir W. S. Brancker (Director of Civil Aviation); Admiral the Hon. Sir E. Fremantle; Commander Kenworthy, M.P., and Mrs. Kenworthy; Sir John Leigh, M.P.; Lady Llangattock; Mr. and Mrs. S. Spooner; Mr. A. Lyle-Samuel, M.P.; Lieut.-Col. C. L'Estrange Malone, M.P.; Mr. F. Handley Page; Mr. and Mrs. C. G. Grey; Commander J. Bird; Commander Burney; Dr. Quintin Chalmers; Admiral Mark Kerr; Sir David H. Kyd; Sir James Percy; Sir John and the Hon. Lady Shelley-Rolls; Mr. T. O. M. Sopwith and the Hon. Mrs. Sopwith; Mr. H. T. Vane; Brig.-Gen. J. G. Weir; Sir Henry White-Smith; Mr. C. V. Allen (Secretary, Society of British Aircraft Constructors); Lieut.-Col. C. Crookshank; Lieut.-Col. J. A. Cunningham; Lieut.-Col. and Mrs. Darby; Commander and Mrs. Davies; Commander E. B. Gardyne; Commander H. D. Grant; Lieut.-Col. Spenser Grey; Messrs. F. S. Bennett, R. Blackburn, G. Bradshaw, John Cates, E. C. Gordon England, V. Ker Seymer, H. Leitner, F. May, Harry J. Preston, J. D. Siddeley, G. Holt Thomas, J. E. Withers; Lieut.-Col. W. L. Marsh (Secretary, Royal Aeronautical Society); Major C. C. Turner; and Mr. H. E. Perrin (Secretary, Royal Aero Club).

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THE AERIAL DERBY, 1922

THIS popular International "Annual" organised by the Royal Aero Club, and held under the Competition Rules of the Club and the Regulations of the F.A.I., takes place, as already announced, at Waddon Aerodrome, Croydon, on Monday, August 7. Prizes presented by the Royal Aero Club are as follows:—

Fastest Time (Winner of the Aerial Derby), Trophy and £300.

Handicap: First Prize, Trophy and £150; Second Prize, £75; Third Prize, £50.

The Regulations specify:—

Qualification of Competitors.—The Competition is open to persons of any nationality holding a licence issued by any Aero Club affiliated with the Fédération Aéronautique Internationale.

Organisation.—The Competition shall be conducted by the Royal Aero Club under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aéronautique Internationale.

Entries.—The Entry Fee is £10. Entries close on Wednesday, July 26, 1922, at noon. Late entries will be received up to 12 noon on Monday, July 31, 1922. Late Entry Fee £15.

Course.—The Course is approximately 200 miles, and will consist of a double circuit of London, starting from Waddon Aerodrome, Croydon, with the following turning points:—West Thurrock, Epping, Hertford, Brooklands Aerodrome, Weybridge.

Air Navigation Regulations.—Competitors must comply with the Air Navigation Regulations in force.

For any further information application should be made to the Royal Aero Club.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JUNE 25 AND JULY 1, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods				
						h. m.		
Croydon–Paris	43	128	20	31	42	2 46	D.H. 34 G-EBES (2h. 3m.)	B. (6), D.H. 18 (2), D.H. 34 (2), G. (7), H.P. W.8B (3), Sp. (2), V. (1).
Paris-Croydon	44	111	10	33	41	2 54	D.H. 34 G-EBBS (2h. 0m.)	B. (6), D.H. 18 (2), D.H. 34 (2), G. (8), H.P. (1), H.P. W.8B (3), Sp. (3).
Croydon–Brussels ...	11	12	9	10	11	2 10	D.H. 34 G-EBBR (2h. 1m.)	D.H. 9 (1), D.H. 18 (2), D.H. 34 (1), W. (1).
Brussels–Croydon ..	11	9	—	7	11	4 5	D.H. 34 G-EBBR (2h. 41m.)	D.H. 9 (1), D.H. 18 (2), D.H. 34 (1), W. (1).
Croydon–Rotterdam–Amsterdam.	12	13	12	12	11	2 12	Fokker H-NABN (1h. 58m.)§	F. (6).
Amsterdam–Rotterdam–Croydon.	13	6	11	12	12	3 20	Fokker H-NAIS (3h. 2m.)§	F. (8).
Totals for week ..	134	282	62	105	128			

* Not including "private" flights. † Including certain journeys when stops were made *en route.*

‡ Including certain diverted journeys. § Rotterdam.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Sp. = Spad. V. = Vickers Vimy, Vulcan, etc. W. = Westland.

Incidental Flying.—During the week Maj. Foot and Capt. Stocken were testing machines for the Aircraft Disposal Co. at Croydon—the former a Martinsyde F4, and the latter the same machine, an Avro and a Bristol Fighter. On the 30th Stocken left for Brussels on the Bristol.

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The Nation Saved!

"THE Army Council have decided to call on the London Territorial Associations to raise two anti-aircraft brigades to defend London in the event of an air attack."—*Daily Paper.*

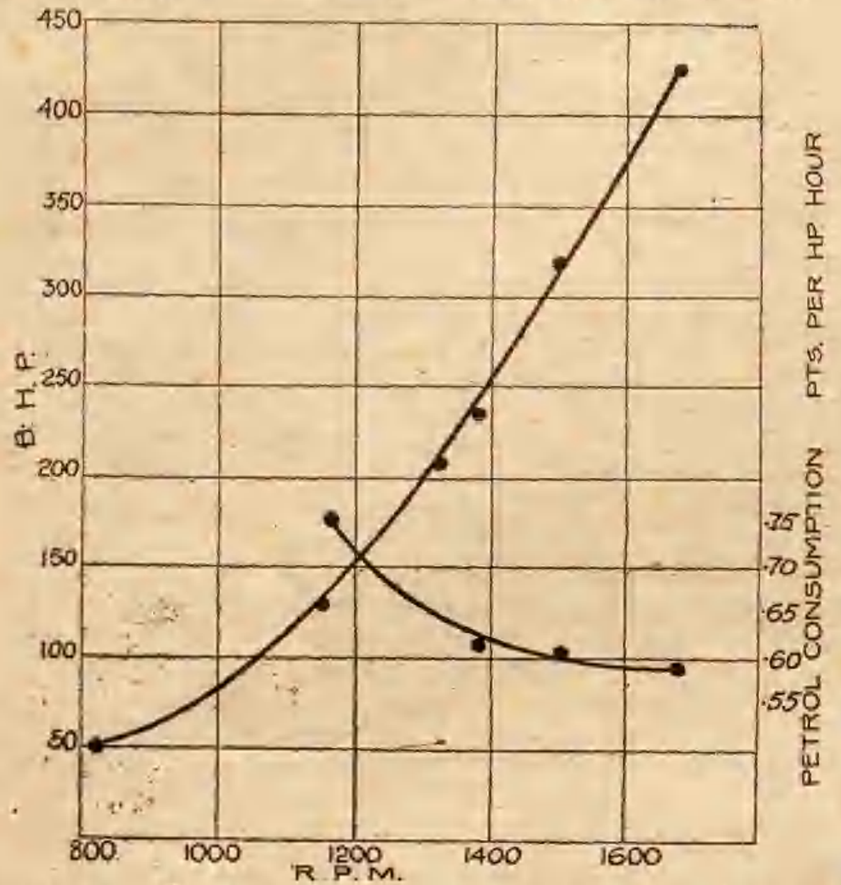
This somewhat reminds us of the story of the R.F.C. mechanic who, in the early days of the War, when the station was being bombed, got out his revolver, and, in order to get a little nearer to the enemy aeroplane, stood up on a petrol-tin while he blazed away with his six-shooter.

But, seriously, even this departure gives a little hope as an indication of a move in the right direction—provided the new units are equipped with something other than pop-guns. As a beginning of recognition by the Government of its responsibility, it is to be welcomed, although it does not avoid the need for an aerial defence of London.

THE BRISTOL "JUPITER" IN FRANCE

As no doubt many of our readers are aware, the Bristol "Jupiter" engine has scored another success, having just passed, with flying colours, the French 50-hrs. Type Test—and in so doing claims the distinction of being the first British engine to go through such a test in a foreign country. Whilst this is extremely gratifying as regards British progress in aviation, the gilt is taken off the gingerbread somewhat by the rumour that most, if not all, of the subsequent results of this achievement may be transferred to France and will not directly benefit the British industry. We refer to this matter elsewhere, and do not propose to dwell further upon it here, simply presenting the results of the test in question.

As regards the engine itself, we have previously described the "Jupiter" in FLIGHT, so that it should suffice to recall that it is a 9-cyl. air-cooled radial engine of 5¾ ins. and 7½ ins. bore and stroke respectively, and weighs (minus fuel and oil) 729 lbs. The rated h.p. is 400, and the normal r.p.m. 1,575, the maximum permissible r.p.m. being 1,650.



Power and Consumption curves of the Bristol "Jupiter" taken at the French Type Test

Previous to the type test, engine No. 821 had been manufactured under conditions complying with the directions A.N.D. 1 of the Air Navigation Regulations, 1919. The total number of hours the engine had run previous to the type test was 28 hours 17 minutes, including 13 hours in England before being sent to France, and also the engine had done one 10-hour non-stop period in France, in order to test out the French test stand.

The engine was a standard production type, and the "Bristol" gas starter was used on every occasion for starting up the engine, and gave full satisfaction.

The power was measured on a torque reaction stand, the power being absorbed by a tractor airscrew, this propeller having been made by the Bristol Company and calibrated by the British Air Ministry.

Owing to the propeller being a left-hand tractor, the slipstream therefrom impinging on the cylinders caused a negative torque, and consequently the b.h.p. readings on the torque arm were appreciably reduced. In every instance allowance has been made for this negative torque, and the b.h.p. readings shown in the test are the actual power developed after making allowances for the negative torque and barometric pressure.

Previous to the endurance test a power curve and consumption curve were taken of the engine, which are shown in the accompanying diagram, and a slow-running test was made of 15 minutes' duration at 350 r.p.m.; the acceleration at the end of this test was good.

The endurance test was made in five periods of 10 hours' non-stop, 12 hours' stop being allowed between each test; 12 hours' duration was exceeded in one case owing to the fact that when the test was started up it was found that there was a stoppage in the main oil tank.

The five periods of 10 hours' non-stop were carried out without any replacements whatsoever, and without any adjustment beyond lubrication and examination of sparking plugs. This is the first time that this test has been carried out in 10-hour periods without any adjustments or replacements.

At the conclusion of the test the remarks on the official report were as follows:—

"The five tests of 10 hours were carried out without stop of any sort. Nothing to report. The engine behaved itself perfectly; there were no replacements of any sort in the course of the trials. It is regrettable that this test remains at 50 hours; this duration could have been doubled, which would have been a still better testimony for the engine."

At the conclusion of the test the engine was dismantled for examination. The engine was in excellent condition throughout, and the highest satisfaction was expressed at the general condition and wear of the parts.

Synopsis of 50-Hours Endurance Test

	Speed.	Torque (kgm.).	B.h.p.	
First 10 *hours. Press.* = 30 *ins. Temp.* = 18° *C.*				
First ½-hour ..	1610	158·25	358	(418)
9½ hours ..	1510	135	286	(330)
2 minutes ..	1610	162·75	365	(418)
Second 10 *hours. Press.* = 29·9 *ins. Temp.* = 20° *C.*				
First ½-hour ..	1585	151·5	338	(398)
9½ hours ..	1505	129·75	273	(325)
2 minutes ..	1620	165	373	(428)
Third 10 *hours. Press.* = 29·8 *ins. Temp.* = 17° *C.*				
First ½-hour ..	1600	151·5	345	(410)
9½ hours ..	1525	139·85	298·5	(342)
2 minutes ..	1610	162·75	365	(418)
Fourth 10 *hours. Press.* = 29·8 *ins. Temp.* = 17·5° *C.*				
First ½-hour ..	1615	148·5	335	(420)
9½ hours ..	1515	132·75	285	(325)
2 minutes ..	1610	159	357	(418)
Fifth 10 *hours. Press.* = 29·9 *ins. Temp.* = 17° *C.*				
First ½-hour ..	1610	153	344	(418)
9½ hours ..	1525	134	289	(342)
2 minutes ..	1610	162·75	365	(418)

Consumption.

10 hours.	Full Throttle. Petrol (pts.). Total.	Full Throttle. Oil. gal/hr.	First ½-hour. Petrol (pts.). Total.	First ½-hour. h.p./hr.	First ½-hour. Oil. gal/hr.	Slow. Petrol (pts.). Total.	Slow. h.p./hr.	Slow. Oil. gal/hr.
1 ..	243	1·36	228	0·65	1·32	189	0·58	1·21
2 ..	249	1·36	226	0·672	1·32	191	0·7	1·21
3 ..	243	1·36	228	0·657	1·32	202	0·675	1·23
4 ..	229	1·36	226	0·678	1·32	198	0·708	1·23
5 ..	243	1·36	237	0·69	1·32	200	0·693	1·24

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A DUTCH COMPETITION

THE Royal Dutch Aero Club has opened a competition, which has for its object the advancement of the safety of commercial aviation by reducing the risks encountered when landing in fog. It is open to competitors of all nationalities. The chief prize of 3,000 f. (3,000 guilders) will be awarded to the competitor sending in the best apparatus (instrument or set of instruments) with which, in an aeroplane flying in a thick fog, the height above the ground, or the surface of the water, can be measured.

The conditions are as follows:—

(1) The indication must take place independent
- (*a*) of any installation on the ground or on the water;
- (*b*) of the atmospheric pressure.

(2) The error of the indication may
- (*a*) not exceed 1 metre on a height below 10 metres;
- (*b*) not exceed 10 per cent. of the true height at an altitude between 10 and 300 metres.

(3) The indication, as mentioned above, must take place in an aeroplane, of which the velocity has
- (*a*) a horizontal component of 10 to 50 metres per second;
- (*b*) a vertical component of 0 to 5 metres per second.

Entries close on March 15, 1923, and further particulars may be obtained from the Secretary, Technical Committee, Royal Dutch Aero Club, Heerengracht No. 13, The Hague, Holland.

STRUCTURAL STRENGTH OF AIRCRAFT

Requirements for Certificates of Airworthiness

WE have received from the Air Ministry the following announcement in respect to the granting of certificates of airworthiness :—

Early in 1920 a Sub-Committee of the Advisory Committee for Aeronautics reported upon the Load Factors that should be adopted as the basis upon which to determine the strength of civil aircraft, and the recommendations embodied in that report (R. & M. 673) were adopted by the Air Council. Experience having shown that alterations were desirable, the Load Factors Sub-Committee of the Aeronautical Research Committee was re-convened in 1921 with a view to the revision of the previous scheme in so far as it related to aircraft of the "Commercial" class. The Report of this Committee has now been received, and will shortly be published in full.

While considering that it will eventually be found possible to standardise a more logical scheme, the Committee recommend that in the meantime the existing schedule (R. & M. 673) for the commercial class of aircraft should be retained subject to certain revisions. The Air Council have adopted these recommendations, and propose to apply them forthwith in the case of new designs submitted for certificates of airworthiness.

The following summary of these requirements, to which the Air Council have added further requirements relating to the "general" and "racing" classes, is therefore issued for the information of those concerned.

New type aircraft submitted for Certificate of Airworthiness are divided into two classes as under :—

(1) *General Class.*—Aircraft granted a general class certificate are certified airworthy for general use, including exhibition flying and aerobatics.

(2) *Commercial Class.*—Aircraft granted a "commercial class" certificate are certified airworthy for "straight flying" only, and must not be looped, rolled or put to any aerobatic manœuvre involving sudden change of attitude. The standard of strength is lower than that for the general class.

In Tables I and II the load factors required in these two classes are given. These are graduated according to the total weight of the aircraft. A brief description of the cases to be considered is given below.

Case (a 1). Centre of Pressure Forward, Engine Off.—The aircraft is assumed to be in a condition of equilibrium at an attitude corresponding to steady horizontal flight, with the centre of pressure in its most forward position. The engine is to be assumed cut off, and the drag of the airscrew is to be included.

Case (a 2). Centre of Pressure Forward, Engine On.—This condition is identical with (*a* 1) except that the engine is assumed to be running. The airscrew drag is thus replaced by airscrew thrust; this and the torque are given by the formulæ :—

$$\text{Thrust} = \frac{2 \times \eta \times 550 \text{ h.p.}}{V\sqrt{\frac{N}{2}}} \text{ lbs.}$$

$$\text{Torque} = \frac{33{,}000 \times \text{h.p.}}{\eta \times \text{r.p.m.}} \text{ ft. lbs.}$$

where V is velocity of normal flight with centre of pressure in its most forward position in feet per second.

N is the load factor.

H.P. is brake-horse-power of the engine.

η is the airscrew efficiency, which in the absence of special data may be taken as 0·8.

The thrust and torque given by these formulæ are twice the actual values.

Case (b). Centre of Pressure Back.—The aircraft is assumed to be flying at maximum horizontal speed at ground level. The load factor in this case applies only to the wings.

Case (c). Limiting Nose Dive.—The aircraft is assumed to be diving at limiting velocity. In calculating this velocity the airscrew drag may be included.

The above cases cover the wings and tail plane and the *fuselage* for certain flight loads.

Case (d). Side Load on Fin and Rudder.—For this case a lift coefficient is given which when the stalling speed of the aircraft is known determines the load which the fin, rudder and *fuselage* must withstand. This load is given by :—

$$\text{Side load} = k_1 \rho S (1–4\ V_s)^2$$

where k_1 is lift coefficient (from table),

S fin and rudder area in sq. ft.,

V_s stalling speed of aircraft in ft./sec.,

ρ air density in slugs per cubic ft.

Under this load the load factor throughout should be 2.

Case (e). Landing.—For this case the aircraft must be assumed to land in the two following ways :—

(i) On an even keel with the chord of the main planes horizontal.

(ii) On an even keel so that the tail skid and undercarriage touch the ground simultaneously.

The vertical travel of the under-carriage should be such that the total energy absorbed is not less than $\frac{1}{2} W V^2$ where V is a velocity given by :—

$V = 3 + \cdot 1 V_s$.

V_s = is the stalling speed in ft./sec.

W = is weight of aircraft in lbs.

TABLE I.—*Schedule of Load Factors (General Class)*

	Total Weight of Aircraft in lbs.			
Case.	Up to 2,500 lbs.	2,500 to 5,000 lbs.	5,000 to 10,000 lbs.	Above 10,000 lbs.
(*a* 1.) Load factor with C.P. forward—engine off	7·5	7·5–7	7–6	6
(*a* 2.) As (*a* 1)—engine on. .	7·5	7·5–7*	7–6*	6
(*b*.) Load factor with C.P. in most backward position in horizontal flight	5·5	5·5–5*	5–4·5*	4·5
(*c*.) Load factor in nose dive at terminal velocity	1·5	1·5	1·5	1·5
(*d*.) Specified lift coefficient for fin and rudder; under this loading the load factor should be 2	0·5	0·5	0·5	0·5
(*e*.) Load factor on under-carriage when subjected to the maximum forces of compression	1·15	1·15	1·15	1·15

* The decrease in load factor from the large value is directly proportional to the increase in the weight of the craft.

TABLE II.—*Schedule of Load Factors (Commercial Class).*

	Total weight of Aircraft.				
	Up to 2,500 lbs.	2,500–5,000 lbs.	5,000–10,000 lbs.	10,000–30,000 lbs.	Above 30,000 lbs.
(*a* 1.) Load factor with C.P. in its most forward position, engine *off*	5·5	5·5–5*	5–4*	4	4
(*a* 2.) Same as (*a* 1), but with engine *on*	5·5	5·5–5*	5–4*	4	4
(*b*.) Load factor with C.P. in the position corresponding to maximum horizontal speed at ground level	4		4–3·25*	3·25–3*	3
(*c*.) Load factor in vertical nose dive at terminal velocity	1·25		1·25	1·25	1·25
(*d*.) Specified lift coefficient for fins and rudders. (Under this loading the factor of safety of the fuselage should be 2)	0·5		0·5	0·5	0·5
(*e*.) Load factor on under - carriages when subjected to the maximum forces of compression	1·15		1·15	1·15	1·15

* The decrease in load factor from the larger value is directly proportional to the increase in the weight of the craft.

The under-carriage, under the maximum load brought about by the absorption of this amount of energy, must have a load factor not less than 1.15. The remainder of the structure under the same load must have a load factor of at least 1·25.

With the aircraft resting on the ground the under-carriage must in no case have a load factor less than 4, nor the rest of the structure a load factor less than 4·5.

To ensure adequate strength against side load, the under-carriage must be sufficiently strong to withstand a side load equal to the weight of the aircraft applied at the axle.

In cases (*a* 1), (*a* 2) and (*b*) above the load factor on the wings, with any one flying wire or pair of duplicate flying wires removed, must not be less than one-half that required in the normal case.

The above instructions, together with Table I, embody the recommendations of the Load Factor Sub-Committee for Commercial Heavier-than-Air Craft.

Racing Aircraft.—Aircraft which require a Certificate of Airworthiness in order to compete in public air races will be granted a special form of certificate, the strength requirements being as under:—

Load factor throughout structure with centre of pressure in the most forward position in horizontal flight	4
Load factor on wings with centre of pressure in the furthest back position in horizontal flight	3
Load factor in terminal nose dive	1
Load factor on fin and rudder and fuselage under side load of 30 lbs. per sq. ft. on fin and rudder . .	1

Methods of Calculation.—The above factors apply to aircraft with two or more main planes and of normal construction. The factors are to be determined by the official methods published by the Directorate of Research. In cases of novel or unusual construction where the usual assumptions and methods of calculation cannot be directly employed, reference should be made to the Directorate of Research for a ruling as to strength requirements and methods of calculation.

NOTICES TO AIRMEN

Aerodrome Control: Croydon and Lympne

IT is notified:—

1. *Taking off—Croydon.*

(*a*) All pilots in charge of aircraft about to leave the aerodrome will obtain their order of priority in taking-off from the Civil Aviation Traffic Officer on duty for this purpose.

(*b*) Pilots ready to take-off will await a signal from the C.A.T.O. to do so. Signals will be given to pilots in the order of priority allotted, and on receiving the signal pilots will take-off without undue delay.

(*c*) In no case, however, will pilots take-off when other aircraft are about to land.

2. *Landing—Croydon and Lympne.*

All pilots on arriving at the aerodrome will make at least one complete left-handed circuit of the aerodrome before landing, and will continue this circuit until in their opinion landing can be effected without risk of collision.

3. *Landing and Taking-off in Calm Weather—Croydon.*

(*a*) In calm weather at Croydon aerodrome all machines will take-off and land on some bearing between North-West and West.

(*b*) Calm weather will be indicated by a white ring on the aerodrome in front of the Traffic Office.

4. All pilots in charge of aircraft using the aerodromes at Croydon and Lympne will conform to these regulations.

(No. 62 of 1922.)

London-Paris: Official Air Route Directions

1. With reference to the Convention for the Regulation of Aerial Navigation, October 13, 1919, Annex D, Section 5, para. 31, which reads as follows:—

> "In following an officially recognised air route every aircraft, when it is safe and practicable, shall keep to the right side of such route";

an agreement has been reached between the British and French Governments whereby certain portions of the London to Paris air route have been defined as the officially recognised route, namely:—

London to Paris

Croydon to Oxted.—No official route.

Oxted to Ashford.—The main railway line connecting these places.

Ashford to Etaples.—No official route.

Etaples to Abbeville.—Main railway line connecting these places.

Abbeville to Ecouen.—The main road running through Abbeville, Poix, Grandvilliers, Beauvais to Paris.

Ecouen to Le Bourget.—No official route.

2. The following supplementary rules of the air have been agreed upon by the British, French and Belgian Governments:—

Where an official route has been defined, every aircraft shall:—

(*a*) Keep at least 100 metres from the route when following such route.

(*b*) Should the pilot deem it necessary to cross from the right side to the left side of the route, he must cross the route at right angles and as high as possible. Flight should not be resumed on the left of the route in a direction parallel to the route until the aircraft is at least 10 kilometres distant from it.

(*c*) Similarly, should the pilot wish to cross from the left to the right side, the direction of flight must be at right angles to the route and as high as possible.

(*d*) Where an aircraft is flying beneath low clouds, it shall be flown, as far as possible, below the cloud base in order to see and be seen.

(No. 64 of 1922.)

Wireless Telegraphy Stations in Operation in Connection with Civil Air Routes: Amendments

IT is hereby notified:—

(1) With effect from July 1, the Synoptic Reports and General Inferences issued on 1,400 metres C.W. by Air Ministry daily at 0600, 0800, 1400 and 1900 (G.M.T.); and 0915 and 2000 (G.M.T.) respectively will be transmitted on 4,100 metres C.W. The Synoptic at 0200 will continue on 1,400 metres as hitherto. The 0830 report will cease.

(2) In cases where breakdown of the main set, or other delay in commencing transmission on 4,100 metres is occasioned, should transmission not have been commenced at the expiration of ten minutes, the message will be issued on 1,400 metres commencing at ten minutes after the routine hour.

(3) Previous Notices affected:—

The table in para. 1, Notice to Airmen, No. 43 of 1922, is amended accordingly. (No. 65 of 1922.)

ROYAL AERONAUTICAL SOCIETY NOTICES

Examination.—The first Associate Fellowship examination of the Royal Aeronautical Society, in accordance with the new regulations, will be held on September 25 (Part I) and September 26 (Part II), in the Library at 7, Albemarle Street, London, W. 1. Entries, accompanied by the prescribed examination fee, should reach the Secretary at that address not later than Monday, August 28.

R. 38 Memorial Research Fund.—It has been decided to utilise the Royal Aeronautical Society's R.38 Memorial Research Fund as follows:—

(*a*) To the placing of a memorial tablet in the Society's offices.

(*b*) To the awarding of an annual prize of 25 guineas for the best technical paper on aeronautics, preference being given to those dealing with an airship subject. This prize to be open to international competition.

(*c*) To the selection and collation of information on the development of design of airships to the present stage.

The balance of the income being allowed to accumulate for the present.

Usborne Memorial Fund.—The interest of the Usborne Memorial Fund is to be devoted to the award of a prize in every alternate year (unless the amount be such as to allow of an annual prize to the value of £10) for a historical paper on any aspect of aeronautics. This prize will also be open to international competition. Detailed regulations for these two prizes are being drawn up.

W. LOCKWOOD MARSH,
Secretary

LONDON TERMINAL AERODROME

Monday evening, July 3, 1922

HANDLEY PAGE TRANSPORT continue to carry the bulk of the passenger traffic, and are getting something like full loads for their new 12-seater " W.8B's." Passenger traffic, as a whole, has improved slightly during the week. Even the K.L.M., whose traffic is so largely goods, have had a considerable increase in their passengers. The Instone Air Line have now a regular morning newspaper service to Brussels, but, owing to the shortage of machines, they are unable to take all the traffic that would be forthcoming for this service. As it is, they have to limit their load to the capacity of one of their Westland limousines, with which they are carrying out this service.

There have been one or two sensational " take-offs " during the week, emphasising the need for strong nerves in those whose business keeps them regularly on the aerodrome, and also lending point to the general opinion that " someone is going to hit the fence " sooner or later. The Vickers " Vimy " which has been built for the Grands Express, and has had her two Napier " Lion " engines replaced by 400 h.p. Lorraine-Dietrich engines, was taking off into a south-west wind, and appeared to only just clear the Customs House, and to narrowly miss the giant Handley Page sign. This same machine went off to Paris on Saturday, piloted by Mr. Cockerell, and this time took off quite well.

A Rather Too Exciting Moment

THE second sensational take-off occurred on Saturday, when a Breguet was taking off in the same direction. M. Didier and several others were standing on the tarmac, when it suddenly dawned on them that the machine was not rising and was hurtling along the ground straight towards them. There was a sudden rush as they scattered in all directions, while a little group of people by the weather-hut endeavoured to get into the next county in quick time. The machine, however, rose just as it reached the tarmac, and managed to scrape over the top of the weather-hut by inches. Had the pilot been a few yards to the right, he would have caught the wind indicator mast, as he was well below the vane.

The K.L.M. continue to carry big loads of goods to and from Holland. On one of the early morning machines, there was a load of 900 lbs. weight, which Mr. Hofstra took off the ground in the " F.3 " with ease. The parcel post by aeroplane to Holland is, apparently, becoming popular. One day's consignment, recently, weighed as much as 130 lbs. This is a very encouraging sign, as, with the facilities of the Post Office for collecting and delivering from all parts of the country, there is no reason why this traffic should not become a mainstay for all the airways. It is free of a great drawback that attends ordinary goods traffic—this drawback being that goods require so much expenditure in motor-vans for collection and delivery that it costs as much, if not more, to collect goods by motor transport as the entire charge for conveying them to Paris by air, leaving nothing for the flying portion.

The Instone Air Line have, apparently, over-staffed themselves with pilots, and are now having to reduce their numbers. Messrs. Bradley and Keys are, I understand, leaving the firm, and are open to engagement as pilots either at home or abroad. Mr. Keys flew over to Stag Lane in one of the Surrey Flying Service's Avros, in order to take a " D.H.9 " belonging to the " taxi " service of the De Havilland Aircraft Co., to Dublin. As it happened, however, when he arrived at Stag Lane, it was decided that, as two of the De Havilland taxiplanes were already held up in Dublin by the authorities, no more should be sent; and so Mr. Keys took a machine out for photographic work instead. He is delighted with the courtesy of this firm, who flew him back to Croydon in a " D.H.9 " when he had completed his day's work for them.

An Important Early-Morning Conference

DURING the week, Major-General Sir W. S. Brancker held another of his early-morning meetings at the air-station. Brigadier-General Festing accompanied him, and the meeting was attended by representatives of the various British air-transport companies and pilots. General Brancker asked for suggestions as to the requirements of the firms in the way of new machines—such as what performance they required, and what load they wished the machines to carry.

It is evident that he intends to ask designers to submit designs for machines for next year's work that will embody the experience so far gained in air transport. In addition, the form in which weather reports should be transmitted to pilots while in flight was discussed; also new regulations with regard to the tests pilots should undergo in order to obtain their licences. I understand that it was proposed that pilots should make a stipulated number of landings, with machines empty, and also with full load, and that an examination in engines should also be part of their tests. Everybody at the air-station is impressed by General Brancker's keenness, and by his evident desire to do all in his power to further commercial aviation, and, at the same time, to safeguard passengers.

The British Success at Brussels

I HEAR that as a result of the competition for commercial aeroplanes held at Brussels on Sunday, June 25, and won by the Handley Page " W.8.b.," this firm have obtained an order from the Belgian Government for six of these machines. Up to the present, however, I have been unable to obtain definite confirmation of this.

The " S.E.5's " which the Aircraft Disposal Co. sent to these competitions have been flown back to Croydon during the week. Mr. Courtney, while flying one of these machines, experienced engine trouble while still five miles out over the Channel, and had the utmost difficulty in reaching the English coast. He succeeded, however, in arriving over the Dover aerodrome, only to discover that it was covered with sheep and hurdles; so he was compelled to land on the cliffs, pulling up within 20 yds. of the edge.

During bad weather in the Channel, Mr. Robertson, flying the Daimler Airways " D.H.34 " attempted to get across from the English side, when, suddenly, the masts of a ship loomed up out of the clouds. He found that he was actually below the top of the masts, which were in the clouds, and wisely decided to turn back, alighting safely at Lympne.

* * * *

AEROPLANE *v.* INSECTS : We referred recently to some experiments carried out at Ohio in which an aeroplane flew over a plantation of Catulpa trees, spraying them with arsenate of lead, with a view to destroying a plague of caterpillars. Above will be seen a Curtiss biplane, piloted by Lieut. Macready, discharging its " poison gas," which successfully accounted for practically every caterpillar.

IN PARLIAMENT

Air Power

Mr. Lambert, on June 26, asked the Prime Minister whether, as our Air Force is dangerously deficient as a protection against invasion, and the fighting services are costing this year £167,000,000 as against £86,000,000 pre-War, he will appoint a Commission to ascertain how most efficiently the public money can be spent for defence, having regard to modern aircraft developments?

The Prime Minister: No, Sir. The matters referred to are already under the consideration of the Committee of Imperial Defence.

Mr. Lambert: Has any definite action been taken to avoid a great waste of the taxpayers' money?

The Prime Minister: The matter is being carefully considered by the experts who advise the Government, and they are also considering the machinery for the purpose.

Mr. Lambert: In view of the fact that the Committee of Defence is a very hard-worked body, will the right hon. gentleman consider the advisability of appointing a separate Commission?

The Prime Minister: I think it must be the Committee of Imperial Defence; a separate Committee of that body.

Indian Mails

Lieut.-Commander Kenworthy, on June 27, asked the Postmaster-General how long the mails take to reach India from this country; if he is aware of the great importance to merchants in Great Britain and India of a quick mail service; what steps are being taken to expedite the Indian mail service; and whether the possibilities of quick overland or aerial transport have been considered, and with what result?

Mr. Pease: The Indian mail is due at Bombay in 14½ days after leaving London. Occasionally it arrives rather later, as the Peninsular and Oriental Steam Navigation Company have not yet been able to replace fully their war losses and to provide a fleet of uniform speed for the service. I am aware of the great importance to commercial interests of a quick mail service to India, and advantage is taken of every opportunity of improving the service. I do not see any prospect of any material acceleration in overland transit. The possibilities of air transport in connection with the Imperial mail services generally are being explored by the Civil Aviation Advisory Board.

Lieut.-Commander Kenworthy: Is the right hon. gentleman's Department in constant consultation with the Middle East Department with a view to utilising aircraft, which now fly continuously in that area, with a view to quickening up the mails?

Mr. Pease: This question is being considered by the Civil Aviation Advisory Board at present.

Lieut.-Commander Kenworthy: Is the Post Office represented on that?

Mr. Pease: Yes.

Royal Air Force (Naval Wing)

Viscount Curzon asked the Secretary of State for Air whether he can make any statement or give any figures to show the work actually carried out by the Naval Wing of the Royal Air Force during the past 12 months?

Capt. Guest: Beyond stating that I am satisfied with the progress that has been made in the development of aircraft co-operation with the Navy during the past 12 months, I do not consider that it would be in the public interest to make any detailed statement of the work performed or to give any figures of the flights carried out.

Viscount Curzon: Is the right hon. gentleman aware that during the discussion on the Air Force Estimates he failed to give any item of information relating to the work of the Naval Air Service, and a wide impression exists that the power provided by the Air Ministry is not adequate for the work which that service has to do?

Capt. Guest: The wide impression is largely created by my noble friend, Next year I will do my best to make up for it.

Minister of Air

Mr. L. Malone asked the Prime Minister whether, in view of the fact that it is increasingly possible to substitute air forces for naval or military forces and thereby effect considerable economies, he will reconsider his decision and place the Air Minister on a footing in the Cabinet where air propositions will not be overruled by naval and military arguments put forward without a proper consideration of the air side of the question?

Mr. Lloyd George: I have nothing to add to my answer of June 22. I do not accept the allegation in the last part of the hon. member's question.

Foreign Passenger Aircraft and a Second Pilot

Sir H. Brittain asked the Secretary of State for Air whether, seeing that at least 60 foreign-owned aeroplanes, carrying but a single pilot, are expected to continue trading between their respective countries and Great Britain, he can give instructions to advise the British travelling public as to which concerns are taking the precaution of carrying an additional pilot on each of their 'planes?

Capt. Guest: The desirability of passenger aircraft being provided with a second pilot is appreciated, but it is not a compulsory condition for international navigation under the Air Navigation Convention of 1919, and I think that the British public must use their own judgment in selecting the air line by which they travel. I may add that nearly all the French aeroplanes flying on the London-Paris service have accommodation for a second pilot although not fitted for dual control (The Dutch machines flying on the England-Holland route have accommodation for one pilot only.)

Night Flying

Sir H. Brittain asked the Secretary of State for Air whether he is able to inform the House as to the results achieved in the recent experiments in night flying carried out between this country and France?

Capt. Guest: The flight of the British aeroplane from London to Paris by night was quite successful. It established the fact that the lighting arrangements, both in this country and in France, are satisfactory, except that wind indicating lights have not yet been established on the emergency landing-places; steps are being taken to remedy this defect so far as the British portion of the route is concerned. It is understood that the French flight from Paris to London and back was equally successful.

Capital Ships and Air Attack Experiments

Lieut.-Commander Kenworthy, on June 28, asked the Parliamentary Secretary to the Admiralty whether it is proposed to carry out experiments with the various methods of attack from the air against any of the capital ships due to be scrapped under the terms of the Washington agreement?

Commander Eyres-Monsell: The answer is in the affirmative.

Lieut.-Commander Kenworthy: Can we be informed of some details? How many ships are going to be experimented upon, and when will it take place?

Commander Eyres-Monsell: The experiments are being carried out on H.M.S. "Superb." These will be preceded by those on the monitor "Gordon," which does not come under the provisions of the Washington Treaty.

R.A.F. Aeroplanes

Mr. Alfred T. Davies, on June 29, asked the Secretary of State for Air whether his attention has been directed to the fact that at the recent display of the Royal Air Force at Hendon the aeroplanes used were each, approximately, four years old; whether similar machines are being used in Iraq, Somaliland, and India on active service; whether any squadrons of the Royal Air Force are equipped with up-to-date aeroplanes; what number of new and improved aeroplanes have been supplied to squadrons of the Royal Air Force this year; and what is the cost of such supply?

Captain Guest: In answer to the first question, it is true that the aeroplanes used at Hendon, with the exception of the experimental machines, were not less than four years old, but they were all thoroughly sound and serviceable, many of them recently re-conditioned, and all capable of satisfactory performance. As regards the second and third questions, the same general remark applies, but some of the squadrons abroad have been partly re-armed with new aeroplanes, and the four squadrons working with the Navy are being completely re-armed. The answer to the fourth and fifth questions is, that 10 aeroplanes of new type have been issued to squadrons since 1st April, 1922, and that the approximate cost was £106,000.

Rear-Admiral Sueter asked the Secretary of State for Air if he can give the date of construction of the majority of machines now in use for air work in Iraq; whether these machines are satisfactory and their carrying capacity adequate when the proper load of petrol is carried for the desert journey; and at what date will more modern machines, such as those being now used on the London-Paris route, be sent out to replace the older types?

Captain Guest: With the exception of the Vickers type, all the aeroplanes used on the cross-desert route are either of 1918 or 1919 build; the Vickers, of 1921 build, with a few of 1919 and 1920. These aeroplanes are all serviceable, and it would be expensive and quite unnecessary to replace them at present. In the interests of economy, it is urgently necessary to use up existing serviceable war stocks of aeroplanes before ordering new ones. The aeroplanes are not specially built for the cross-desert route, and it is neither necessary nor practicable to build a new type of aeroplane for every kind of work which the Air Force has to do. The civil aeroplanes used on the London-Paris route are of a variety of types, and would not be suitable for the Royal Air Force work without extensive modifications. I can assure my hon. and gallant friend that the question of the re-equipment of the Royal Air Force with new types of aeroplanes is fully recognised as one of the greatest importance, and is being given constant careful consideration by my expert advisers.

Captain Viscount Curzon: Is it not a fact that many firms engaged in the manufacture of aircraft and aircraft engines are being compelled to go out of business altogether through lack of orders?

Captain Guest: I regret to say there is a good deal of truth in the noble lord's supplementary.

The Burney Airship Scheme

Mr. L'Estrange Malone asked the Secretary of State for Air if his Department has approved the Burney airship scheme; and, if any reservations were made, what were those reservations?

Captain Guest: The Burney airship scheme has been referred to the Committee of Imperial Defence for consideration, and I do not think that it would be proper for me to make any further statement on the matter at the present time.

Mr. Malone asked the Prime Minister whether the Burney airship scheme has yet been considered by the Committee of Imperial Defence; and when a decision may be expected?

Mr. Lloyd George: The Burney airship scheme is being considered by the Committee of Imperial Defence, and it is hoped that a decision will be taken at an early date.

Civil Aviation

Rear-Admiral Sueter asked the Secretary of State for Air, in view of the allegations now being made that civil aviation in this country has almost entirely disappeared, and that the aircraft industry is lacking in orders to keep it in a normal healthy condition, whether he will state what steps he proposes to take to remedy this state of affairs?

Captain Guest: It would be impracticable to deal adequately with the state of civil aviation in this country by way of question and answer, and I can only repeat the suggestion made in my reply on June 19, that, if the House desires, an opportunity to discuss the question can be taken on the Civil Aviation Vote, which is still on the Paper.

Captain Wedgwood Benn: Will the right hon. gentleman speak to the Leader of the House, with a view to getting an additional Supply day for this important purpose?

Captain Guest: I suggest to the hon. and gallânt gentleman the usual channels.

Captain W. Benn: I am asking whether the right hon. gentleman will support those who wish for an additional day. He is aware that the 20 days are fully occupied with controversial and political topics.

Lieut.-Col. Sir F. Hall: Is it not advisable, seeing that a Committee is now sitting on civil aviation, that the matter should be left in abeyance until their first report comes forward, and is it not a fact that that report is expected very shortly?

Aerial Defence

Lieut.-Commander Kenworthy asked the Prime Minister whether he will give the names of the persons forming the Committee to consider the problem of aerial defence; how long the Committee has been in being; how many sittings have been held; who is the chairman, and what means are taken to consult the War Office, Admiralty and Air Ministry, and to keep them informed of the conclusions arrived at?

The Prime Minister: It is not considered desirable to give the information asked for as to the composition and proceedings of committees conducting secret enquiries. The Admiralty, War Office and Air Ministry are represented on the Committee, and its conclusions will be communicated to the Departments concerned in due course.

Lieut.-Commander Kenworthy: Can my right hon. friend answer the second part of the question as to how long this Committee has been in being? Is he aware that there is a great deal of public anxiety that money is being wasted on obsolete weapons of war and not on the air service?

The Prime Minister: I know there is a feeling of anxiety, and quite reasonably so. I also know that this matter is being pressed forward by the various Departments concerned, but there is some preparation required before they can investigate the matter.

Lieut.-Commander Kenworthy: How long has the Committee been functioning?

THE ROYAL AIR FORCE

London Gazette, June 20, 1922

Medical Service

The following are granted short service commns. in ranks stated, with effect from, and with seny. of, the dates indicated :—

Flight Lieuts.—A. J. Brown, D.S.O.; June 1. P. Rutherford, O.B.E.; June 8.

Flying Offr. (*Hon. Flight Lieut.*).—H. W. Street, M.B.; June 6.

H. C. Perkins is granted a tempy. commn. as a Flight Lieut., with effect from, and with seny. of, June 6.

Memoranda

The following are granted tempy. commn in ranks stated for service with No. 1 Works Co.; June 1 :—Sqdn. Ldr. M. C. Rousseau, Flying Offr. (Hon. Flight Lieut.) G. M. Cox, Pilot Offr. W. J. Root.

London Gazette, June 27, 1922.

General Duties Branch

The following are granted short service commns. as Pilot Officers on probation with effect from, and with seny. of, June 10 :—R. Collins, B. R. C. Coope, C. Denison, F. W. M. Doner, R. Fisher, M. C. W. C. Flint, M.C., D. M. Morphy, L. G. Pinnell, G. F. Reeves, A. C. W. Richards, A. Thompson, M. B. F. Watson.

The following Lieuts., Army, relinquish their tempy. commns. on return to Army duty :—Flying Officer W. R. Oulton, A.F.C. (Cheshire Regt.); June 15. Flying Officer A. Dix-Lewis (Middlesex Regt.); June 16.

Stores Branch

Flight Lieut. P. J. Wiseman is transferred to Stores Branch for Accountant duties from General Duties Branch; May 5. Flight Lieut. C. A. Shaw, D.S.O., is placed on retired list on account of ill-health contracted in the Service, and is granted rank of Major; June 28.

Medical Service

Flying Officer R. Boog-Watson, M.B., D.P.H., to be Flight Lieut.; June 7. Capt. H. E. Hayes, Army Dental Surgeon, is granted a tempy. commn. on attachment to R.A.F.; June 16. (He will continue to receive emoluments from Army funds.)

Nursing Service

The following ladies are confirmed in their appts. as Staff Nurses :—Misses M. S. F. Stewart; Dec. 3, 1921. J. McLeod; Dec. 6, 1921.

Memorandum

Lieut. R. F. Berrill, R.F.A., relinquishes his temp. commn. on return to Army duty; July 16, 1918 (substituted for *Gazette* July 30, 1918).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

Air Commodore L. E. O. Charlton, C.B., C.M.G., D.S.O., from British Embassy, Washington, to R.A.F. Depôt (Inland Area) (Supernumerary). 1.5.22.

Group Captain J. G. Hearson, C.B., D.S.O., from British Delegation (Air Section) Paris, to R.A.F. Depôt (Inland Area) (Supernumerary). 1.6.22.

Wing Commander R. J. F. Barton, O.B.E., from No. 28 Squadron (India), to R.A.F. Depôt (Inland Area) (Supernumerary). 10.5.22.

Squadron Leaders E. Huntley, M.B., B.S., to No. 1 School of Technical Training (Boys) (Halton), on appointment to Temporary Commission. 22.5.22. W. Sowrey, A.F.C., from No. 84 Squadron (Iraq) to R.A.F. Depôt (Inland Area) (Supernumerary). 14.4.22. F. A. Baldwin, from Iraq Group Headquarters (Iraq Group) to Aircraft Park Iraq (Iraq Group). 14.3.22. J. W. Cruikshank, O.B.E., from No. 4 Flying Training School (Middle East), to Headquarters, R.A.F. Iraq (Supernumerary), to command Armoured Car Company (on formation). 16.5.22. R. Leckie, D.S.O., D.S.C., D.F.C., from Canadian Air Board to No. 1 School of Technical Training (Boys) (Halton), on ceasing to be seconded to the Canadian Air Board. To join 8.6.22. 27.5.22. W. Tyrrell, D.S.O., M.C., M.B., from R.A.F. Depôt (Inland Area), to Research Laboratory and Medical Officers' School of Instruction (Inland Area) (Supernumerary). 1.6.22. R. A. G. Elliott, B.M., B.A., from R.A.F. Depôt (Inland Area), to Central Medical Board (Inland Area) (Supernumerary). 1.6.22.

Flight Lieutenants R. C. L. Holme, M.C., from No. 70 Squadron (Iraq Group), to No. 1 Squadron (Iraq Group). 25.3.22. L. J. Maclean, M.C., from Central Air Communication Section (Iraq) to Headquarters, R.A.F. (Iraq). 1.4.22. H. Leadham, from Aircraft Park, Iraq (Middle East Area), to Iraq Group Headquarters (Middle East Area). 22.12.21. G. M. Moore, M.C., from Central Air Communication Section (Iraq), to Headquarters R.A.F. (Iraq). 1.4.22. A. W. Clemson, O.B.E., D.S.C., from R.A.F. Depôt (Inland Area), to Headquarters, R.F.A. (Iraq). 2.6.22. H. W. Evens, from Seaplane Training School (Coastal Area), to Headquarters, R.A.F. Iraq (Supernumerary). 2.6.22. B. C. Tooke, from Seaplane Training School (Coastal Area), to Headquarters, R.A.F. (Iraq) (Supernumerary). 2.6.22. W. C. Day, M.C., from No. 100 Squadron (Inland Area), to No. 4 Flying Training School (Middle East). 2.6.22. H. A. Tweedie, O.B.E., A.F.C., from British Delegation (Air Section) Paris, to R.A.F. Depôt (Inland Area) (Supernumerary). To join 17.6.22. 1.6.22. A. H. S. Baker, O.B.E., from Headquarters, R.A.F. (Middle East), to R.A.F. Depôt (Inland Area). 15.5.22. J. W. Harper, M.D., from No. 1 School of Technical Training (Boys) (Halton), to R.A.F. Depôt (Inland Area) (Supernumerary). 6.6.22. J. F. Gallagher, from R.A.F. Hospital, Cranwell (Cranwell), to No. 1 School of Technical Training (Boys) (Halton). 6.6.22. W. D. Miller, M.B., from Research Laboratory and Medical Officers' School of Instruction (Inland Area), to R.A.F. Depôt (Inland Area) (Supernumerary). 7.6.22. A. J. Brown, D.S.O., to Research Laboratory and Medical Officers' School of Instruction Inland Area). On appointment to Short Service Commission. 1.6.22. H. W. Woollett, D.S.O., M.C., from No. 8 Squadron (Iraq), to Stores Depôt, Iraq. 1.4.22. Hon. Squadron Leader G. D. Kerr, from Inspector of Recruiting (London) Coastal Area), to R.A.F. Depôt (Inland Area) (Supernumerary). 23.5.22. F. G. Stammers, O.B.E., from School of Technical Training (Men) (Inland Area), to No. 2 Flying Training School (Inland Area). 12.6.22. J. A. Barron, from Canadian Air Board, to Armament and Gunnery School (Inland Area) (Supernumerary). 1.6.22. W. B. Everton, from School of Technical Training (Men) (Inland Area), to No. 2 Flying Training School (Inland Area). 12.6.22. H. E. Flavelle, from No. 1 School of Technical Training (Boys) (Halton), to R.A.F. Base, Leuchars (Coastal Area). 12.6.22. T. Fawdry, M.B.E., from Headquarters (Middle East), to R.A.F. Depôt (Inland Area) (Supernumerary). 14.5.22. E. P. Punch from R.A.F. Base, Gosport (Coastal Area), to Aeroplane Experimental Establishment (Coastal Area). 25.5.22. Hon. Squadron Leader A. E. F. Huntsman, from R.A.F. Depôt (Inland Area), to Inspector of Recruiting (Coastal Area). 29.5.22. J. Cahalane, M.B., from Aeroplane Experimental Establishment to R.A.F. Base, Gosport (Coastal Area). 31.5.22. Hon. Squadron Leader F. W. Squair, T.D., M.B., to Inspector of Recruiting (Coastal Area). 29.5.22. W. E. Hodgins, M.B., from Army (R.A.M.C.), to Research Laboratory and Medical Officers' School of Instruction (Inland Area). On appointment to Temporary Commission in R.A.F. 24.5.22.

Investigation of Aircraft Accidents

REGULATIONS for the investigation of accidents under Section 12 of the Air Navigation Act, 1920, have been made by the Secretary of State for Air, and have been placed on sale by H.M. Stationery Office. These Regulations will come into operation on July 12.

Since May, 1919, arrangements made by the Air Ministry with aircraft companies and the owners of aircraft have enabled this Department without statutory powers to conduct enquiries into accidents with the good will of the parties concerned. It was felt, however, that the conduct of such enquiries should ultimately be placed on a statutory basis in the same way as enquiries into accidents in other industries, notably those of shipping and railways, and accordingly power was taken in the Air Navigation Act, 1920, enabling the Secretary of State for Air to issue regulations for the investigation of accidents by air.

The regulations now issued are based upon three years' experience of the voluntary system which has hitherto existed, and their main features are as follows :—

(1) Compulsory notification of accidents.

(2) Statutory powers for preliminary investigation of accidents by an Inspector of Accidents appointed by the Secretary of State.

(3) Statutory powers to order, if deemed necessary, a formal investigation by a person specially appointed by the Secretary of State.

(4) Statutory authority for the publication of the whole or part of the report of an investigation.

Commercial Aviation in America

IN an excerpt—issued by the Aeronautical Chamber of Commerce of America—from the 1922 Aircraft Year-Book which is published by the above body, some interesting facts are given as regards civil aviation in America. Of these, the following data showing the comparative figures for the years 1920 and 1921 are, perhaps, worthy of note :—

Comparative Commercial Aircraft Operations, 1920–1921.

	1920.	1921.
Estimated number of aircraft in operation	1,000	1,200
Estimated total mileage	6,000,000	6,250,000–6,500,000
Operating companies reporting ..	88	125
Equipment of these companies ..	365–425	500–600
Mileage flown by these companies ..	3,136,550	*2,907,245
Number of passengers carried ..	115,163	122,512
Pounds of freight carried	41,390	123,227
Number of flights by operating companies	Unknown	130,736
Average duration of flights	Unknown	21 mins.
Average charge for short flights ..	$12.50	$9.00
Average charge per mile for inter-city flights	0.65	0.55
Average charge per pound for freight	Unknown	0.33
States in which operations were carried on	32	34
Air terminal facilities	128	146

(*Decrease explained by less free and more paid flights.)

A New Junkers Three-seater

A NEW Junkers monoplane has just been completed which appears to promise well. Although fitted with a Siemens engine of 60 h.p. only, it carries pilot and two passengers. It is rumoured that when the machine has been thoroughly tested it will be built in quantities in either Sweden or Holland, although we see no reason why it should not be built in Germany, the present restrictions not prohibiting manufacture of machines complying with certain regulations.

PERSONALS

To be Married

The marriage arranged between HENRY MICHAEL MOODY, M.C., R.A.F., son of the Rev. Henry Moody, vicar of Welshampton and Rural Dean of Ellesmere, and Mrs. Moody, and AUSTIN ROBINA (BOBBIE), youngest daughter of Mr. and Mrs. C. A. HORN, of Adelaide, South Australia, and Beaumont, Jersey, will take place at St. Aubin's, Jersey, early in August.

The engagement is announced between Mr. B. de H. PEREIRA, B.A., LL.B., late R.A.F., of 131, St. James's Court, S.W. 1, only son of Mr. H. J. C. Pereira, K.C., and BARBARA, elder daughter of Mr. and Mrs. C. G. SYRETT, of Oakdene, Sydenham.

Killed

RONALD ST. CLAIR MCCLINTOCK, M.C., Flight-Lieutenant R.A.F., of Tresco, Birchington-on-Sea, who was killed on June 22 in a flying accident at Northolt, was the youngest son of Mr. and Mrs. Arthur McClintock, of Rathvinden, Leighlin Bridge.

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All the World's Aircraft

JANE'S *All the World's Aircraft* for 1922 (12th edition), which is now obtainable, is, as in previous volumes, full of interesting and very useful information regarding aircraft and all appertaining thereto. Considering the almost hopeless nature of the task confronting one when trying to collect from various sources complete particulars of the world's aircraft, we are bound to admit that the information given in the book is remarkably complete and up to date.

Several changes in the arrangement of the 1922 volume have been made, and whereas previous issues appeared towards the end of the year, this time it makes its appearance much earlier. It is divided into four parts :—(A) The Progress of Aviation in the various Countries during the past Year; (B) The World's Aeroplanes; (C) The World's Engines; and (D) The World's Airships. In each section the countries are arranged alphabetically.

As before, it is edited and compiled by C. G. Grey, and is published by Sampson Low, Marston and Co., at £2 2s.

◆ ◆ ◆ ◆

PUBLICATIONS RECEIVED

Advisory Committee for Aeronautics, Reports and Memoranda, No. 246. *Experiments on Model Airships.* By J. R. Pannell, N. R. Campbell and G. N. Pell. June–October, 1916. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 6s. 6d. net; by post, 6s. 8½d.

Aeronautical Research Committee: Internal Combustion Sub-Committee Reports :—

No. 14. *An Investigation of Certain Spark Gaps for Magnetos for the Air Board.* By C. C. Paterson, M.I.E.E., and N. R. Campbell, Sc.D. August, 1917. Price 6*d.* net. By post 6½*d.*

No. 19. *The Relationship Between Air Temperature and the Power of a Petrol Engine.* By A. H. Gibson, D.Sc. November, 1917. Price 4*d.* net. By post 6½*d.*

No. 21. *On the Synchronism of the Spark of a Magneto as Affected by the Method of Coupling.* By G. E. Bairsto, D.Sc. November, 1917. Price 6*d.* net. By post 6½*d.*

Report No. 130. *Oxygen Instruments.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 144. *The Decay of a Simple Eddy.* By H. Bateman. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Abhandlungen aus dem Aerodynamischen Institut an der Technischen Hochschule Aachen, 1921 *and* 1922. Aerodynamischen Laboratorium Technische, Hochschule, Aachen, Germany.

Aeronautical Research Committee, Reports and Memoranda No. 681. *A Consideration of Airscrew Theory.* By A. Fage, A.R.C.Sc., and R. G. Howard, B.Sc. March, 1921. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 3s. net; by post 3s. 2½d.

Aeronautical Research Committee, Reports and Memoranda No. 761. (*Ae.* 22.) *Experimental Determination of Tailplane Characteristics.* By H. Glauert and I. L. Peatfield. July, 1921. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 9*d.* net; by post 10*d.*

Report on Benz Aero Engines (*Bz* 3*bo* (195 *h.p.*) *and Bz* 3*bv* (210 *h.p.*)). *Air Ministry Publication* 868. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 6s. net. By post 6s. 2½*d.*

Report on the Economic Situation of Denmark, to March, 1922. By R. M. Turner, O.B.E., Department of Overseas Trade. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 1s. 6*d.* net; by post, 1s. 7½*d.*

THE LONDON AERO-MODELS ASSOCIATION
(The Society of Model Aeronautical Engineers.)

ON Thursday, June 29, Mr. R. Reynolds read a very interesting paper on "The Handley Page Slotted Wing" before the members at Headquarters, 20, Great Windmill Street, Piccadilly, W. 1, Dr. A. P. Thurston presiding. It was followed by an excellent discussion by the members. A very hearty vote of thanks was passed to Mr. Reynolds and also to Dr. Thurston. The paper will be printed and circulated amongst the members in due course.

It is hoped that a good muster of members will attend on Thursday, the 6th inst., when suggestions for future competitions will be discussed.

The Committee hope that as many members as possible will enter the Competition for the FLIGHT Challenge Cup. If unable to enter for the Cup, members are asked to bring a model along for demonstration purposes.

General Rule No. 3 and Competition Rule No. 3 are specially drawn to the notice of members concerned. Competition Secretary, Mr. C. A. Rippon, 52, Fairbridge Road, Holloway, N. 19. Hon. Secretary, Mr. A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6, to whom application for membership should be addressed.

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Aircraft in the Naval Review

DURING the Naval Review in Torbay one of the exercises will be the bombing of the German cruiser Nürnberg by aircraft. It is understood that these experiments will take place today (July 6), but it appears doubtful if the results will be published.

◆ ◆ ◆ ◆

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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(*Continued from* p. xvi.)

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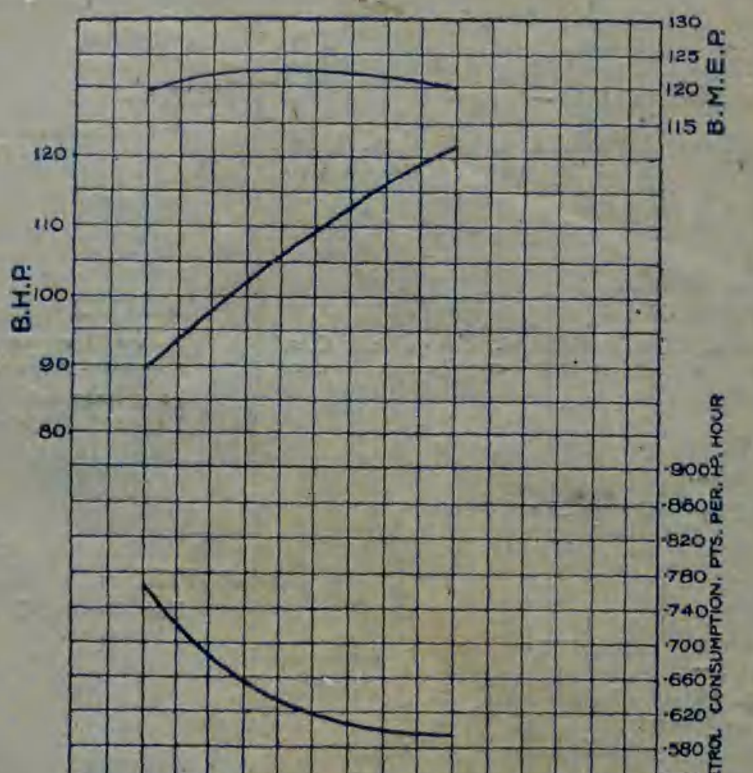

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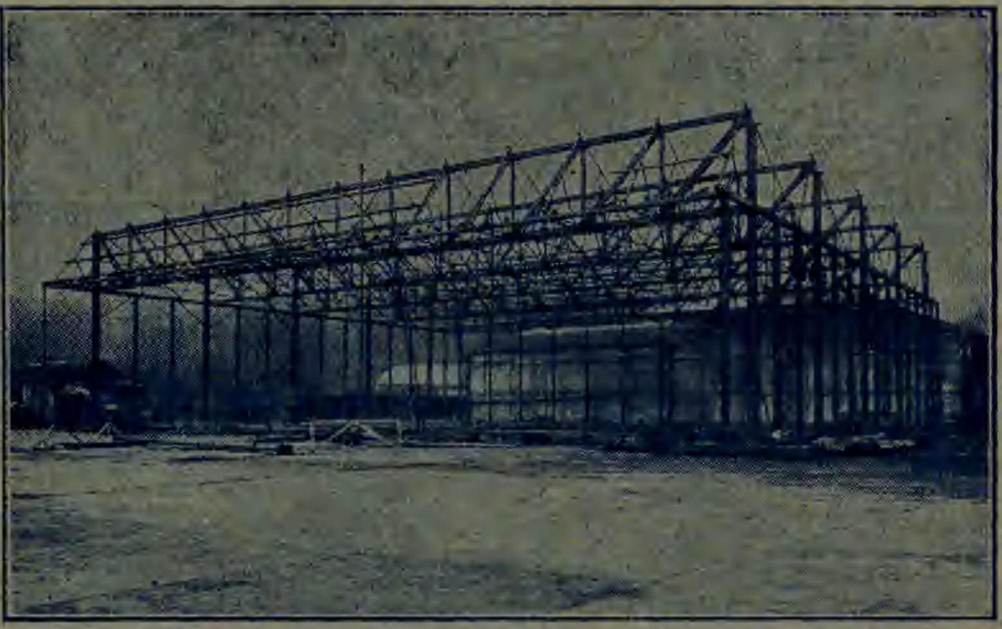

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Aug. 6–20	**French Gliding Competition**
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 7	**Aerial Derby Starting at Waddon**
Aug. 12	**Schneider Cup Seaplane Race, at Naples**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsch (300 kil.)**
Dec. 15– Jan. 2	**Paris Aero Exhibition**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**
Mar. 15 ...	**Entries close for Dutch Height Indicator Competition**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy (1s. 1d. post free).

EDITORIAL COMMENT.

Common-Sense about the Air

THE disinclination to face large issues calmly and on their merits that has been noticeable in England since the War is once again affecting the attitude of the country towards its comparative defencelessness in the air. There is, doubtless, general assent to the principle that the development of aircraft, civil and military, lighter and heavier than air, is of vital importance to our strategic safety as to our commercial prosperity. But this assent does not connote readiness to support, and still less to insist upon, the adoption of measures calculated to safeguard the interests admittedly involved. Rather is there a tendency, which was reflected on Friday in the House of Commons, to treat as mere "scares" attempts to prove how dangerously our air power has lapsed. Pious suggestions that nations should agree to suppress aerial locomotion altogether are put forward, despite their visionary character. Aviation is a fact that cannot be gainsaid. Its development in all countries is not merely a possibility, but a certainty. No nation can afford to handicap itself by deliberately or carelessly neglecting to exploit the quickest means of transport. Still less can any Power, great or small, run the risk of leaving itself at the mercy of the most deadly weapon of offence that the ingenuity of man has yet devised. Against the menace of this weapon there are but two means of protection. One is the possession of an adequate supply of efficient aircraft and efficient pilots; and the other is the strengthening of political safeguards, by the pursuit of sound policies, supported by international sanctions against wanton aerial offence.

The people of this country have not yet realised as fully as they ought the elementary fact that, strategically, Great Britain is no longer an island. Our southern shores, and even London, are technically open to bombardment by artillery from foreign territory. Slight though this danger may seem, it is increased a hundred-fold by the menace of foreign aerial bombardment. Hence the need for a consistent foreign policy that shall decrease, even if it cannot entirely remove, the danger of attack. Hence, equally, the need for an adequate force of military aircraft supported by ample reserves of civil aircraft from which supplementary strength could, in an emergency, be drawn. At present this country is not only technically unprepared to meet an emergency, but it is mentally unprepared. Otherwise it would be unnecessary to repeat such self-evident propositions as those we have advanced. The supremacy in the air which this country enjoyed at the end of the War has vanished. The British aircraft industry is moribund, the designers of aircraft and of aircraft engines are being driven to close their works. Even Capt. Guest and the Air Ministry " do not regard the situation without a feeling of alarm." Yet nothing, or next to nothing, is being done to improve the situation or to build up an adequate military and civil nucleus for national air defence. This is no party or sectional question. The facts are not controvertible. The danger is national, and it must be met on a national basis. There is no true economy in the neglect of elementary provision for safety. The time has come when all parties and Departments of State and individuals of influence and authority should combine to find a path of safety and to lay down fixed lines of policy for the air. The condition of Europe is not such as to contain any pledge of prolonged tranquillity, and no nation can indefinitely rely upon its own defencelessness as a protection against mischance or ill-will. If provision be made, and if, side by side with the making of such provision, there be developed a sound and far-sighted policy of peace, the influence of this country in the affairs of Europe and of the world may gradually rise again from its present low estate. But a beginning has to be made, and that quickly.

Some who have read the above may think that, appearing in FLIGHT, it is a biassed view of the position, but as it is word for word a leader from *The Times*, which appeared on July 10, that suggestion disappears. We reproduce it as we consider it is a masterly and very moderate summary of the present position in regard to the air.

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Human Nature and Air Armament

With unfailing regularity the ideal of limiting air armaments as well as armies, navies, etc., is trotted out as an imperative necessity for the future welfare of civilisation. We agree that the ideal is ideal, *but*—here comes the crux of the whole thing—it is human nature you have to alter first if these enthusiasts are really to have their way. So long as humans are as they are, war must and will crop up from decade to decade, and it is only a question of when any particular section of this " civilised "—save the mark—world considers itself strong enough to attempt to break out through the boundary fence, for a new war to start.

In the case of battleships, the building of these *can* be restricted because you cannot construct these little items in a back yard. It is, however, a very different tale when you come to aircraft. Nothing in the world can really prevent thousands of aeroplanes from being built secretly at various points and ultimately assembled when the critical moment arrives for a blow to be struck. Even the finances involved are of such a relatively small amount that they are easily camouflaged under other headings.

Such being the undoubted position, it would indeed be a grave matter for any nation to sit still under the false security of the other nation respecting its bond—or scrap of paper—agreeing not to create an air fleet. It would be a poor retaliation, when the enemy really got down to business, to chide him with " Oh, I say, you said you wouldn't build any of these beastly things, and now you've gone and done it! Oh, I say——"

No, it may be very Christian-like and desirable that restrictions in aircraft armament should be inaugurated, but it will not work, and the sooner these pious suggestions are completely negatived the better. That the Empire, if it is to exist, *must* be prepared with an unconquerable air fleet is as certain as the coming of death and quarter-day. Therefore let the advocates for air supremacy continue their campaign for guiding public opinion into the right channels, so that when the time comes for a possibly aggressive nation to attack us, we may rest assured with the certain knowledge that we shall be over his capital before he has time to strike. Waiting on the ground within the shores of our little island for the coming of the aggressor's air fleet would be but poor comfort to our populace.

As to the absurdity of the argument that, after all, by the time the next war breaks out any aircraft built now would be obsolete, and that therefore it would be better to wait ten years or so before bothering—do these same ostriches imagine that we can afford to mark time until the next scrap starts before we begin to gain experience and to ponder on the best types to build? We have successfully, more or less, muddled through our other wars, but in the next one, with the menace from the air added, that is a little too much, even for the stolid Briton, to subscribe to.

When the next crash does come it will be swift and annihilating. It will not be a case of digging in whilst our forces are called together, trained and entrained: it will be a deadly assault on the peoples themselves in their sacred castles, their homes.

◆ ◆ ◆

The Air Navigation Order, 1922

The Order in Council just issued, and which came into force on July 11, follows, generally speaking, the lines of the Air Navigation Regulations of 1919. On certain points alterations have been made, chiefly to give effect to the provisions of the International Convention for Air Navigation, the commission of which is sitting in Paris at the moment. The new Order does not appear to call for much comment except in the matter of fees for licences. A minimum of £65 for an airworthiness certificate for a type aircraft appears to be unduly high. We appreciate that a good deal of work may be involved in going through the calculations, etc., for a new design, but surely it would be policy not to hamper development by imposing such heavy fees. We would suggest that these fees, or at any rate that for machines of less than 200 h.p., should be materially reduced, otherwise development of small sporting machines will be seriously handicapped. Could not the Civil Aviation Department do its share by making a considerable reduction on the fee? It is a magnificent department, but, frankly, it cannot at the moment have such a great deal of work to do, and the " stress-merchant " section might be kept from getting bored if discouragement were prevented by not, at any rate, imposing unnecessarily heavy fees on builders of small machines.

THE UDET SPORTING SINGLE-SEATER

The Production of a Newcomer to the German Aircraft Industry

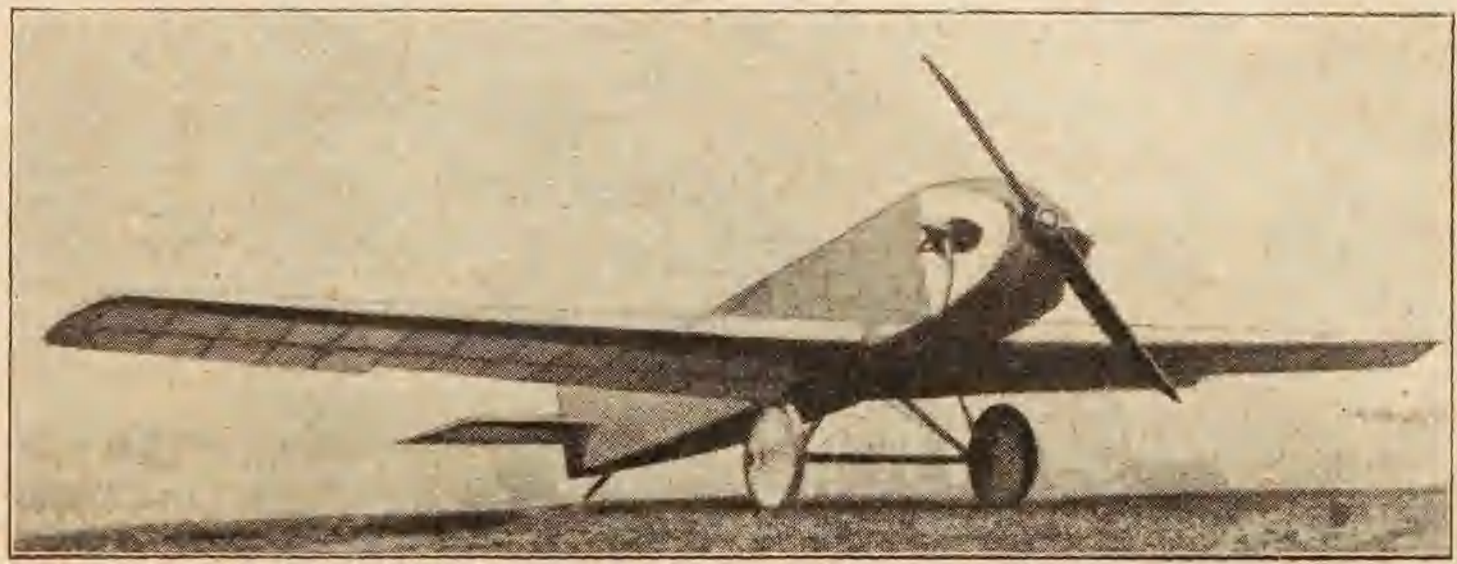
WHEN it was announced that, subject to certain limitations in engine power, Germany would become free to construct aircraft again, we expressed the opinion that probably the regulations would result in a considerable increase in the aerodynamical efficiency of German machines, and that quite a crop of new small machines would be produced. We have recently described several such, and this week we are in a position to give particulars of yet another small single-seater, this time produced by a firm which has but recently been formed. The firm, which has its headquarters in Munich, is known as the Udet Aircraft Works, and was founded by Capt. D. Udet, who was a well-known German air-fighter during the War. Incidentally, the new Udet sporting monoplane is, as far as we are aware, the first post-War machine to be designed and built in Bavaria.

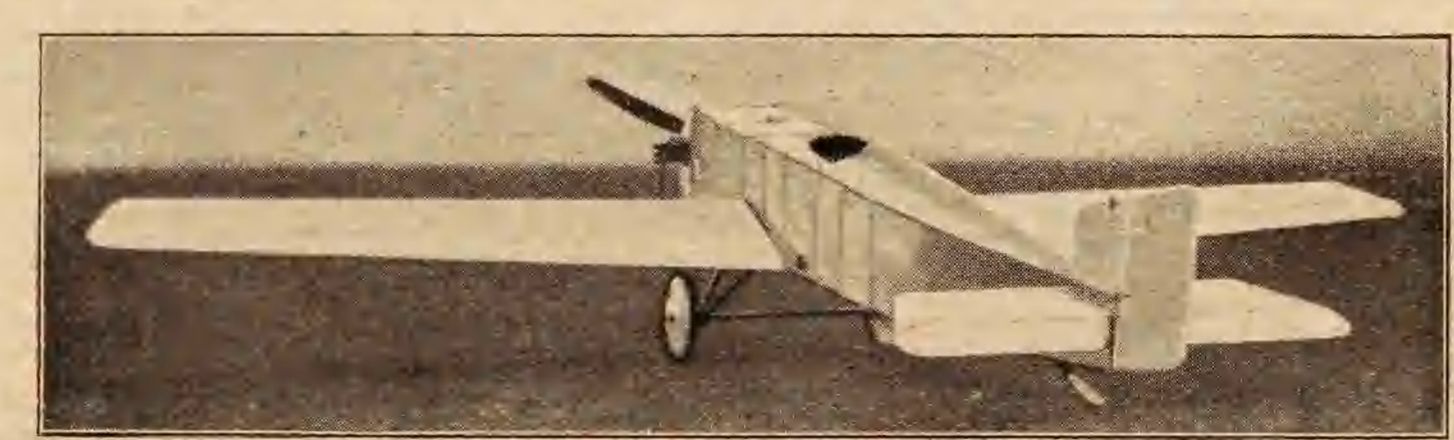
The Udet monoplane was designed by Capt. Udet's technical assistants, Hans Herrmann and A. R. Weyl, and is, as will be seen from the accompanying illustrations, of the cantilever type, with the wing placed low as in the Junkers machines. The machine is characterised by having wings of the, for a cantilever type, unusually high aspect ratio of about 9 to 1. Usually, a much lower ratio is employed for wings of this type in order to keep down the stresses. There is little doubt, however, that the higher aspect ratio results in a considerable improvement in efficiency, as well as in making the machine a good deal nicer to handle, and from the fact that the weight empty of the whole machine is only 440 lbs., the wings cannot be excessively heavy.

In the construction of the Udet monoplane wood has been largely employed, especially in the form of three-ply, with the exception of the engine mounting, controls and undercarriage. The wing is built up in one piece, of three-ply ribs, on two box spars having spruce flanges and three-ply sides. One of our photographs gives an idea of the general construction. The area of the wing is only 86 sq. ft., and as the weight of the machine, fully loaded, is 640 lbs., the wing loading is 7.44 lbs. per sq. ft. We have no information relating to the wing section used, nor to the landing speed of the machine, but it is stated that, owing to the good shape of the wing, the machine would easily carry a passenger with the same small engine. With regard to the structural strength of the wing, we are informed that the factor of safety is everywhere larger than 7; in the case of the front spar it is even stated to be over 10. The designers have worked to such high factors of safety that, even in the hands of comparatively inexperienced private owners, it would be difficult, not to say impossible, so to manœuvre the machine as to cause breakage in the air. *Ailerons* of large aspect ratio, although of small area, are hinged to the rear spar.

When in place on the machine, the wing spars rest in a recess in the bottom of the *fuselage*, the lower *longerons* of which are suitably strengthened to receive them, and are held in place by eight large bolts. It appears that to remove the wing from the machine it is necessary to remove the undercarriage, but as there is no bracing between the rear legs, and the struts are anchored by easily detachable ball-and-socket joints, the operation should not occupy many minutes. When removed, the wing is placed on special trestles above the *fuselage*, and the machine can, it is stated, be towed by placing the tail skid on the carrier of an ordinary motor-cycle. In fact, the machine was recently thus transported through the streets of Munich, much to the amusement of the passers-by.

The *fuselage*, which is of rectangular section with a slightly curved deck, is covered with three-ply, so that no wire bracing is employed. An exception is the front portion, which carries the 30 h.p. Haacke engine. This part of the *fuselage* is built up of steel tubes, and is so arranged that the whole engine can be moved a few inches in a fore-and-aft direction for purposes of trimming. As the weight of the engine is only about 140 lbs., however, it is hardly to be expected that a movement of a couple of inches can have any noticeable effect on the trim of the machine. The pilot's seat, it will be seen, is placed relatively far aft, in view of the light engine, and as a matter of fact we understand that in the next machine it will be moved farther forward. For the two-seater in contemplation, the present location will


THE UDET SPORTING SINGLE-SEATER: Three-quarter front view.

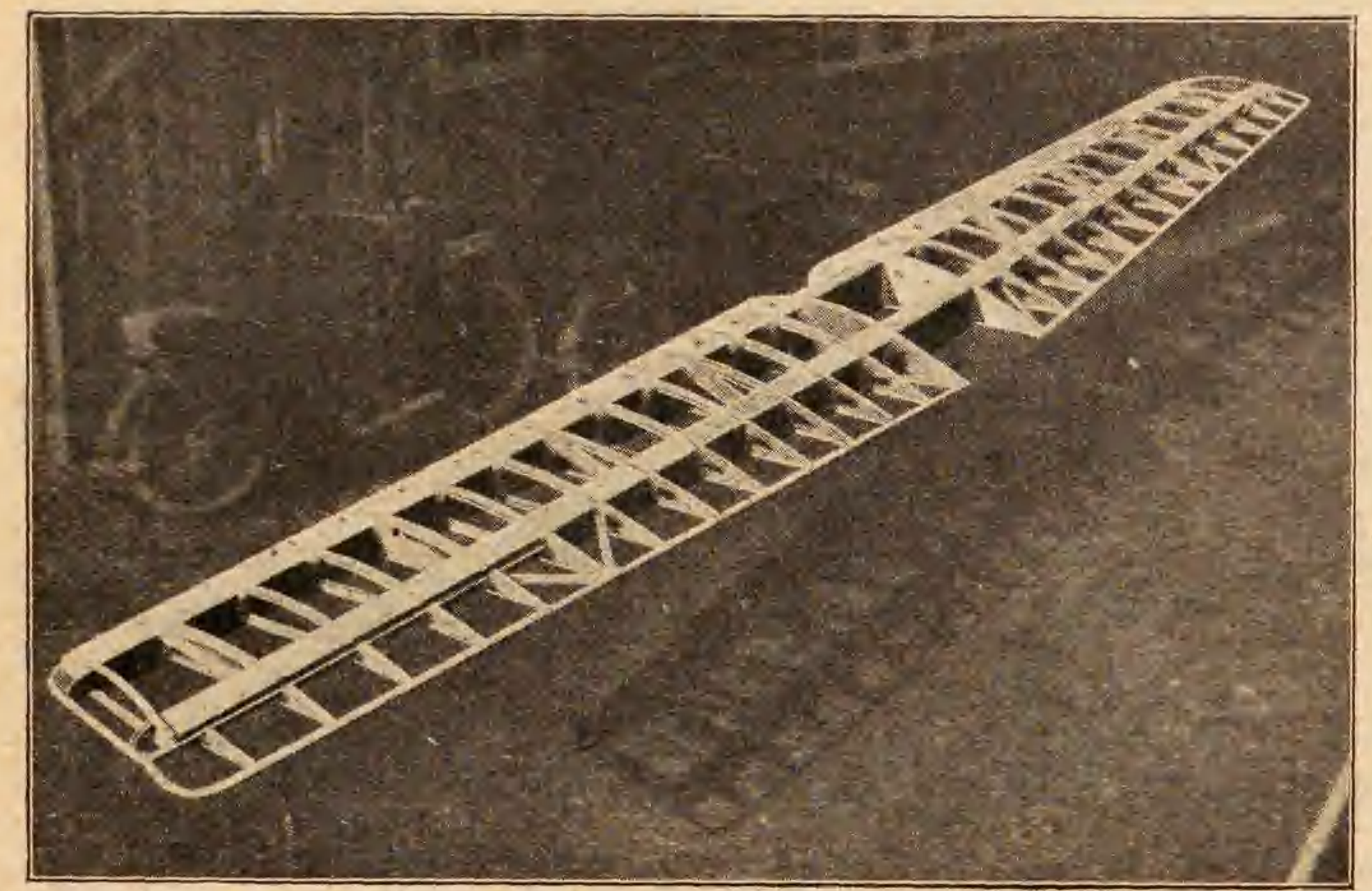

THE UDET SPORTING SINGLE-SEATER: Three-quarter rear view.

be retained. The controls are of the usual type, and do not call for any comment.

The petrol tank is carried in the upper portion of the *fuselage*, behind the fireproof bulkhead, and it is claimed that sufficient head can be maintained for direct gravity petrol feed. Normally, sufficient fuel is carried for 2½ hours' flight at full throttle, but if it is desired to make longer flights extra tanks can easily be fitted.

The undercarriage is of usual V-type, with struts of streamline steel tube, attached to the *fuselage* by ball-and-socket joints and having cross bracing in the front bay only. The wheel track is only 4 ft. 10 ins. A peculiarity of the design is the position of the undercarriage. From the side elevation it will be seen that the wheels are unusually far back, and one would imagine that the machine might have a tendency to stand on its nose. Probably, when the pilot's seat is shifted forward, the undercarriage will be moved forward also.

Beyond stating that they are of the cantilever type, the tail surfaces call for no comment, except to point out that the tail plane appears to be negatively cambered, as in some of the Pfalz machines of the War period.



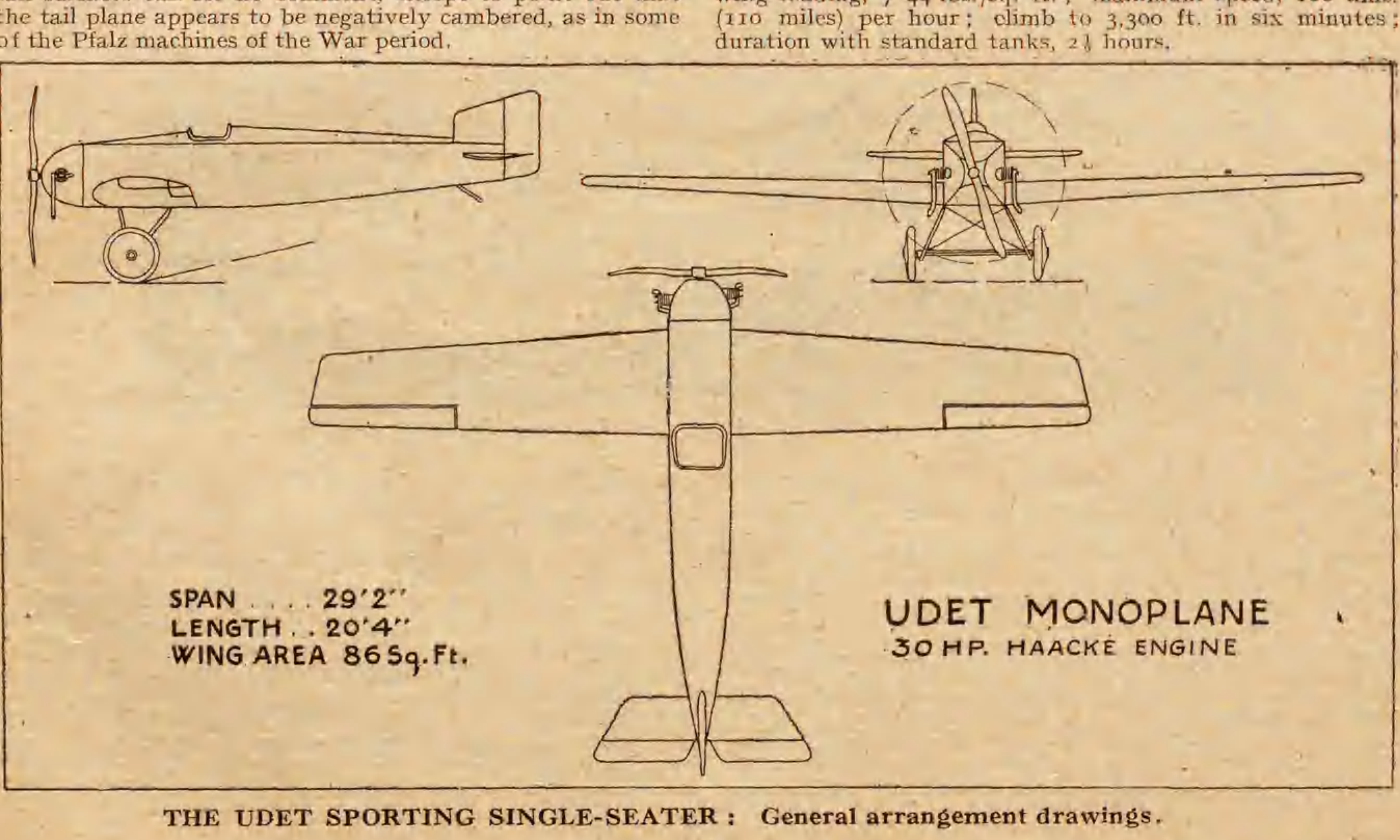
The Udet Sporting Single-seater : View of the wing in skeleton.

During recent test flights, the Udet monoplane, piloted by Capt. Udet, is stated to have behaved very well, although certain modifications are still necessary before putting it into production. When these have been effected the machine should appeal to many on account of its low running cost.

It might be mentioned here that for many months now there has been in existence in this country a small monoplane on very similar lines to those of the Udet. This is a Bristol machine, with the *fuselage* of the Bristol "Babe," fitted with cantilever wings placed low on the body. This machine has one of the 60 le Rhone engines, but has not yet, we believe, been flown.

The main features of the Udet monoplane may be gathered from the following brief specification :—

Engine, 30–40 h.p. Haacke (2-cylinder opposed air-cooled); length, o.a., 20 ft. 4 ins. ; span, 29 ft. 2 ins. ; maximum chord, 4 ft. ; minimum chord, 2 ft. 7 ins. ; wing area, 86 sq. ft. ; height, 5 ft. 7 ins. ; weight of machine empty, 440 lbs. ; weight fully loaded, 640 lbs. ; power loading, 16 lbs./h.p. ; wing loading, 7·44 lbs./sq. ft. ; maximum speed, 180 kms. (110 miles) per hour ; climb to 3,300 ft. in six minutes ; duration with standard tanks, 2½ hours.



THE UDET SPORTING SINGLE-SEATER : General arrangement drawings.

A BERLIN-VIENNA-ROME AIRSHIP PROPOSAL

AN important proposal has been placed by Commander F. L. M. Boothby, R.N. (retired), before the Air Ministry for running an experimental airship service between (*a*) London and Berlin, and subsequently (*b*) to Vienna, Rome, Constantinople and Russia. The details given by Commander Boothby are much on the conservative side, and the proposition bears with it such far reaching results that it is to be hoped the Government will give it the most favourable consideration, having regard to the very small, comparatively, financial risk which would be run, relatively to the possible advantages to be obtained imperially through its exploitation.

Here are the particulars of the proposals of Commander Boothby, and, incidentally, we may say that the German Government have offered to supply an airship of the Parseval type by way of an item in the reparation proposals for the destroyed Zeppelins.

1. A preliminary airship service to Berlin will be inaugurated, calling at Amsterdam, if the traffic warrants it, to obtain full data as to cost of running, etc.

2. An extension of the service to Vienna and Rome, the extra capital that the experience on the preliminary service shows to be necessary being obtained by the formation of a public company.

3. An extension of the service to Constantinople and Russia.

It is proposed to utilise airships of about 31 tons displacement, with a useful lift of 18 tons, which will be disposed as follows:—Crew, 2 tons; passengers, 8 tons; mails, parcels, 2 tons; fuel, 3 tons; ballast, 3 tons.

The maximum horse-power will be 1,300.

An option to obtain the sole right of building Parseval airships in the British Empire has been obtained by me.

The directors and designers of both companies have been interviewed, and the question of obtaining the maximum degree of safety in commercial airships has been discussed. It is generally agreed that the following modifications to standard design can be made with advantage, and British insurance companies are prepared to quote lower rates if they are adopted.

1. The fuel can be removed from the keel and carried on the side of the ship in flexible tanks, which cannot overflow, and any fuel leaking will drop clear of all cars.

2. Use a fuel of a paraffin nature.

3. Place a layer of inert gas between the cars and the hydrogen.

4. Abolish all electric leads outside the cars, each car generating its own electricity supply.

It is also proposed to utilise hydrogen as fuel, and the necessary patents for the purpose can be obtained. This will considerably increase the efficiency of the airships, but full allowance is not made for this, pending actual tests of the system in commercial service.

A British firm of engine makers expect to be able to supply an engine that can be swivelled through 90 degrees. This, in conjunction with a reversible propeller will allow the ship to be driven up and down as well as ahead and astern, so providing the equivalent of 6,000 pounds of ballast, always available while the fuel lasts. This should considerably facilitate the handling of the ship in thick weather. It is hoped by the methods above indicated to make the airship a reasonably safe method of travel.

Subsidy.

The continental airship service could be inaugurated if the Air Ministry were prepared to guarantee the same subsidy and facilities as are now granted to aeroplanes running on the London-Paris route for a number of years, making due allowance for the increased distance to be flown.

As in the case of aeroplanes, the Air Ministry would assist in the provision of the fleet.

A syndicate with a capital of £80,000 will be formed, who will erect mooring-masts near London and Berlin, and provide the running expenses of two airships for one year.

The Air Ministry will arrange for the supply of one 31-ton Parseval airship and one 31-ton Zeppelin airship of the Bodensee type instead of the 75-ton Zeppelin due for reparations. It has been ascertained that the German firms are quite willing to build these ships. British engines can be fitted if desired.

These two airships would then be run by the syndicate on the London-Berlin route, to ascertain which type is the more suitable for this work, and the actual cost of running, profits, etc. After a year's experience a company would be formed to extend the service to Vienna and Rome, the necessary airships of the selected type being built in England.

The Air Ministry to place Kingsnorth Airship Station at the disposal of the company for constructional and repair work at a rent equivalent to 5 per cent. on the capital value of the station. The company would undertake to man the airship with men who would be available for service in case of war, and to hold all its ships at the disposal of the Government for war purposes. In return, the company would have the exclusive right of carrying mails by air to the countries served by it.

The appendix gives an estimate of the cost of the preliminary service, and also of the maximum profits which might possibly be made and of those that might be reasonably expected. No estimate is given as to the capital which would eventually be required, as this would depend on the result of the first year's working.

Appendix

Capital Expenditure.	£
Two mooring masts at £15,000	30,000
Motor transport	5,000
Hire of Kingsnorth	7,500
Offices, etc.	5,000
Working capital	32,500
Total	80,000

Standing Charges.	£
Insurance of ships at 10 per cent.	10,000
Depreciation of ships at £20,000	20,000
Depreciation of masts at 10 per cent.	3,000
Total	£33,000

Running Costs.	£
Four crews at £10,000	40,000
Petrol at 2*s*. per gallon, running 20 hours per day, 300 days at 1,000 h.p., using 4 lbs. per h.p.	34,285
Gas at 4*s*. per 1,000 cubic ft. to balance petrol plus 50 per cent.	10,286
Bases	25,000
Repairs, spares, etc.	20,000
Agents' fees and advertisements, etc.	10,000
Total	£139,571
Standing charges ..	£33,000
Total running costs ..	£172,571

Revenue.

Assuming London to Berlin to be 2·5 times the distance of London-Paris, the subsidies payable would be as follows:—

Each passenger	£7 10*s*. 0*d*.
Parcels	7½*d*. per lb., or £70 per ton.

25 per cent. of gross takings.

The single fare is estimated at £10.

Possible profits, assuming a full load and 300 flying days.

	£
100 passengers per day for 30 days at £10 ..	300,000
Four tons of goods at 2*s*. per lb.	268,800
Subsidy on passengers	225,000
Subsidy on goods	84,000
25 per cent. gross takings	142,200
Total	£1,020,000
Running expenses ..	£172,571
Profit	£847,429

Probable profits assuming 25 per cent. full load and 250 flying days.

	£
Passengers 25 per day at £10	62,500
One ton of goods at 2*s*. per lb. for 250 days ..	56,000
Subsidy on passengers	46,875
Subsidy on goods	17,500
25 per cent. gross takings	29,625
Total	£212,500
Running costs ..	£172,571
Profit	£39,929

It is realised that there must be a limit to the amount of subsidy it is possible to earn. The estimate for possible profits is principally given to show that the airship service can run without assistance once a reasonably full load can be secured. Several years' running will probably be necessary to secure this, it being first necessary to prove that travel by airship is both safe and comfortable.

A NEW CALTHROP PARACHUTE DEVELOPMENT

It would seem that the "slot" is destined to play an important part in the development of aeronautics. It was only just recently that Mr. Handley Page stirred us up with his slotted aerofoil, and now Mr. Calthrop comes forward with some more slots and accompanying improvements, but this time applied to the parachute. By this we do not mean that Mr. Calthrop has been applying the H.P. theory to his parachute, but that, as it happens, his new theory relating to parachutes embraces what is equivalent to a slot inserted in the parachute body.

At present this new development has not got much beyond the theoretical stage, but a preliminary test with an actual parachute was, with the assistance of the Royal Aero Club, carried out at Croydon on May 6 last with, we understand, encouraging results. It is hoped, however, that extensive practical tests will be made at an early date, and we are informed the Air Ministry has been approached with this object in view. For the time being, therefore, we do not propose to do more than just briefly outline the theory of this parachute as explained to us by Mr. Calthorp.

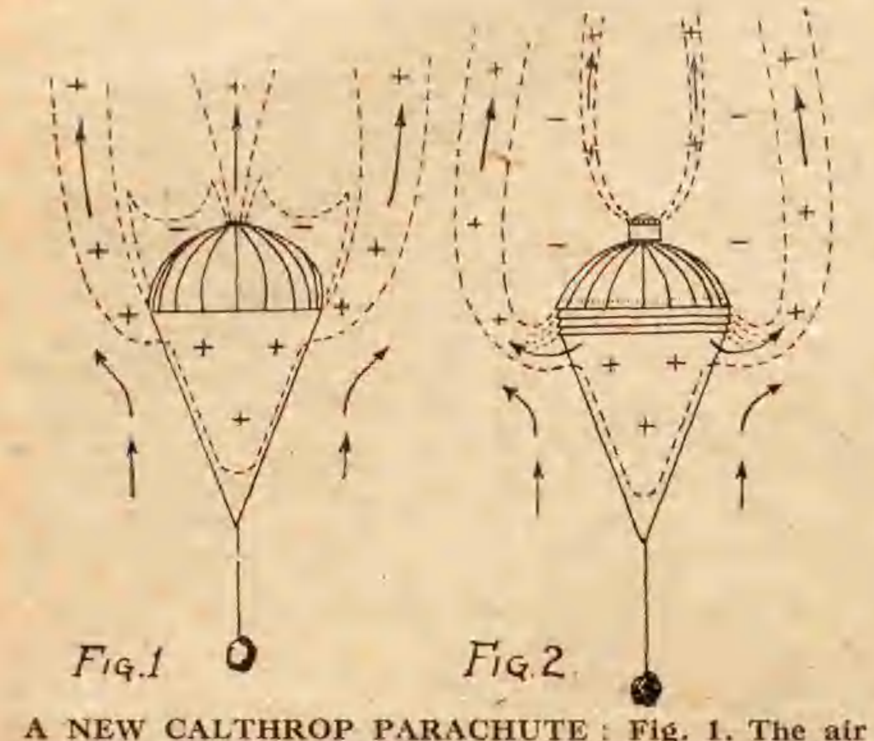


Fig. 1 Fig. 2

A NEW CALTHROP PARACHUTE : Fig. 1. The air forces about an ordinary type parachute. Fig. 2. The same, but with the new type of parachute.

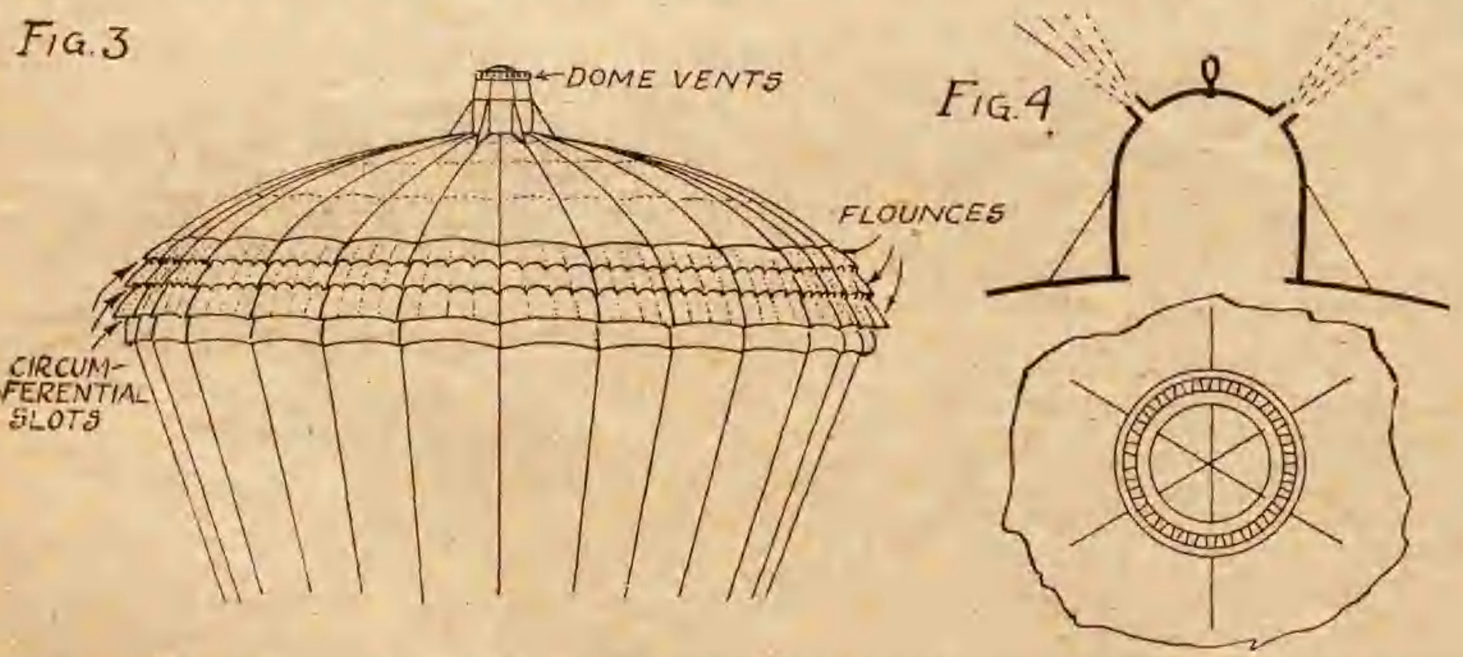


Fig. 3 Fig. 4

A New Calthrop Parachute: Fig. 3. Diagrammatic sketch of the new type parachute, with three flounces. Fig. 4. Detail of the dome-shaped air vent at apex of parachute.

At the outset we must acquaint our readers with the theory of the air forces in and about an ordinary parachute body during its descent, and to do this we think we cannot do better than quote from Mr. Calthrop's patent specification relating to his improved parachute. The behaviour of these air forces is shown in Fig. 1, which shows that during the descent of a parachute under load an inverted cone of compressed air continually accumulates under the parachute body, and that this air escapes partially through the vent in the apex of the parachute body and partially centrifugally under the periphery of the body. This escape of compressed air results in the formation of a suction area, or a partial vacuum, immediately above the body of the parachute. The high pressure of air escaping through the vent in the apex of the parachute body, it may be mentioned, constitutes what may be termed a universal rudder preventing side-slip and generally stabilising the parachute.

The heavier the load on the parachute the more rapidly it descends with a corresponding increase in the diametral contraction of the parachute body by virtue of the pull of the load on the rigging. It is obvious that the more rapid the descent the greater will be the pressure of air within the body, but it has been found that contrary to what might be expected from the law of falling bodies, a parachute descends at a lower speed than is calculable in accordance with the area of the contracted diameter of the parachute. This may be explained by the fact that the compressed air escaping centrifugally and horizontally under the periphery of the parachute affords a tangible resistance to the uprising air current, virtually producing an extension, cantilever-wise, of the actual diameter of the parachute, and thus increasing the effective area of its resistance.

It may be assumed that the leading edge of the periphery of a parachute body forms an aerofoil set at a considerable angle of incidence to the path of the rising air currents, but with this peculiarity: The vertically rising air currents are diverted from their path shortly before reaching the leading edge, and to such an extent that the now highly compressed air flows past the leading edge horizontally at approximately right angles to it. Thus it will be seen that two conditions desirable in a parachute are, firstly, to extend and intensify the effects of the diversion of the vertically rising current of air projected outwards beneath the periphery of the parachute, and secondly, to utilise to its maximum of efficiency the effect of the highly compressed air escaping at the apex. It was with these objects mainly in view that this new Calthrop parachute was evolved.

In this parachute a series of circumferential apertures, or slots, are introduced in the body of the parachute, near the periphery. Over these slots, on the outside, are flounces so arranged—by means of separating webs—that they form a series of pockets, which deflect the air escaping through them at the desired downward angle. This latter depends upon the depth and position of the pockets. It should be mentioned that more or less than the three circumferential slots shown in Fig. 3—which is a diagram of the new parachute—may be used, and the higher their position the greater will be the pressure of the air ejected, but their effective resistance to the rising air current increases the nearer they are to the periphery of the parachute body.

The introduction of these apertures, therefore, serves to produce the increased cantilever effect, previously referred to, of the compressed air escaping horizontally beneath the periphery of the parachute in resistance to the rising current of air, as indicated in Fig. 2.

It is also claimed that this results, in addition, in an extension of the area of partial vacuum on the upper surface of the parachute body, thus increasing the total lift.

In place of the usual circular vent hole in the apex of the parachute body, it will be seen from Figs. 3 and 4 that a cylindrical, dome-topped member is fitted. This is constructed of some suitable flexible material, and provided with external and internal stays, which together with the stiffness produced by the air pressure within, provide the necessary rigidity. In the upper portion of this member is an annular opening or vent, formed by two flanges, one on the domed top and one on the cylinder, separated by a zig-zag strip of stiff webbing. The area of this opening is less than that of the opening communicating with the interior of the parachute body, so that the cylindrical member is kept rigidly extended with the highly compressed air within. From the annular opening air escapes from the parachute in a highly compressed condition and in the form of a hollow cone of large superficial area. Thus greatly increased resistance surface against side-slip and a greater leverage to counteract oscillation of the parachute are produced.

Besides enabling a parachute of a given diameter to carry a greater load (or alternately, the same load to be carried by a parachute of smaller diameter), the new Calthrop parachute has the additional advantage of considerably adding to the already quick positive opening characteristic of the well-known "Guardian Angel." A further important advantage is that, upon the parachutist landing, the "slots" permit the earlier escape of a portion of the compressed air within the parachute body during the period when the parachute exerts little or no pull (whilst it is falling from the vertical to the horizontal position). This prolongs the period of slack, giving the parachutist more time in which to effect his release.

We understand that two test parachutes of this type have already been built, each 28 ft. diam., one with three 8-in. annular flounces, and the other with three of 10 ins. It has been found possible to construct these flounces so that they not only cause the minimum of obstruction to the compressed air passing through them, but they do not in any way weaken the connection between the periphery and main portion of the body of the parachute. This is achieved by means of a special method of tape and webbing reinforcement.

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NOTICES TO AIRMEN

"Air Navigation Order, 1922": Revised List of Prohibited Areas

1. An Order in Council has been issued for the purpose of bringing the regulations governing air navigation in the British Isles into line with the provisions of the International Air Convention, which became operative on July 11, 1922.

This Order, entitled "The Air Navigation Order, 1922, which came into force on July 11, 1922, will have the effect of revoking, as from that date, the Air Navigation Regulations, 1919, and all Orders made by the Secretary of State amending these Regulations.

A revised edition of the Air Navigation Directions is in course of preparation, and will be published shortly.

2. Attention is specially drawn to the fact that in connection with the above-mentioned change the list of prohibited areas given in Schedule VI. of the Air Navigation Regulations, 1919, will be cancelled and substituted by the following list, as from 11th July, 1922:—

Orkney Islands.—An area enclosed by straight lines joining the following points: Tor Ness, Rora Head, Inga Ness, Mull Head, Old Head.

Firth of Forth.—An area enclosed by straight lines between the following places: Hill House (one mile south of Dunfermline), Blackness Pier, Dalmeny Church, Inchmickery, Hall-Craig Point.

Osea Island.—Three statute miles in all directions from the centre of Osea Island.

Sheerness.—Three statute miles from Garrison Point from 30° (true) to 190° (true), half a statute mile from Garrison Point from 190° (true) through west to 30° (true).

Chatham.—Three statute miles in all directions from Hoo Church.

Portsmouth.—Two statute miles from Dockyard Clock Tower from 180° (true) through west and north to 130° (true); one statute mile from Dockyard Clock Tower from 130° (true) to 180° (true).

Poole Harbour.—Three statute miles in all directions from Lytchett Minster Church.

Portland.—Two statute miles in all directions from Portland Castle.

Devonport.—Two statute miles in all directions from a point half a mile north of Stoke Church.

Pembroke.—Two statute miles in all directions from Wear Point.

Cork Harbour.—Two statute miles in all directions from Spike Island Fort.

3. Aircraft are forbidden to land in any of the above prohibited areas and to fly over any such area at a lower altitude than 6,000 ft.

4. Copies of the Air Navigation Order, 1922, can be obtained from H.M. Stationery Office, Imperial House, Kingsway, W.C. 2; 28, Abingdon Street, London, S.W. 1; 37, Peter Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 23, Forth Street, Edinburgh; E. Ponsonby, Ltd., 116, Grafton Street, Dublin; or through any bookseller. Price 1½*d*.

5. *Cancellation.*—Notice to Airmen No. 8 of 1920 is cancelled.

(*No.* 67 *of* 1922.)

Commercial Aircraft: Carrying of Passengers in Seat next to Pilot

It is notified that passengers in commercial aircraft may not be carried in the seat beside the pilot. This prohibition does not apply to employés of the owner of the aircraft or to Air Ministry officials.

(No. 70 of 1922.)

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JULY 2 AND JULY 8, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	38	137	17	26	36	3 3	D.H. 34 G-EBBS (2h. 8m.)	B. (3), D.H. 9 (1), D.H. 18 (2), D.H. 34 (2), G. (9), H.P. (1), H.P. W.8B (3), Sp. (2).
Paris–Croydon	38	115	10	26	33	2 43	D.H. 34 G-EBBR (1h. 53m.)	B. (5), D.H. 18 (2), D.H. 34 (2), G. (8), H.P. W.8B (3), Sp. (2).
Croydon–Brussels ...	6	9	3	6	6	2 33	Westland G-EARE (2h. 8m.)	D.H. 18 (1), D.H. 34 (1), W. (1).
Brussels–Croydon ...	6	8	—	4	5	3 2	Westland G-EARE (2h. 16m.)	D.H. 18 (1), D.H. 34 (1), W. (1).
Croydon–Rotterdam–Amsterdam.	9	7	9	8	9	2 26§	Fokker H-NABS (1h. 59m.)	F. (5).
Amsterdam–Rotterdam–Croydon.	9	10	9	9	9	3 28§	Fokker H-NABS (2h. 27m.)	F. (7).
Totals for week ...	106	286	48	79	98			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys. § Rotterdam.

Incidental Flying.—Capt. Stocken and Mr. Hayns returned to Croydon from Brussels on 3rd, and later tested an Avro and Bristol Fighter for the Aircraft Disposal Co. The De Havilland Co.'s D.H. 9 made six return trips between Lympne and Ostend during the week.

THE CASE FOR THE SLOTTED WING*

By R. REYNOLDS

In future design, more attention should be given to the speed range of the machine, either by having a lower landing speed or by having the same landing speed with a higher top speed. Amongst the many proposals that have been made for an increase of this ratio, the slotted plane device is by far the most promising, but its application needs great care, and in the succeeding article a comparison is made of the results which can be obtained by its successful application with the adverse effects which will be present if great care is not exercised in the design. For this purpose the section known as RAF/6 (*see* Fig. 3) has been chosen as a basis. Below is the calculated performance of a machine fitted with this section. With slot closed practically all the advantages of the basic section are obtained. Results are taken from those published in a paper read before the Royal Aeronautical Society by Mr. Handley Page, Fellow, on the Slotted Wing, in their journal of June 21, 1921. The calculations are based on :—

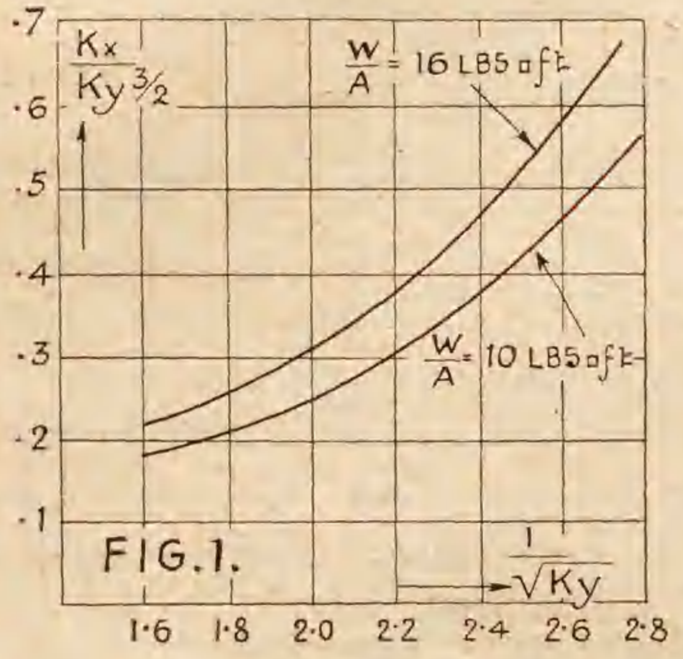


FIG. 1.

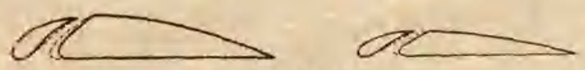


FIG. 2.

$$\text{(1) V/m.p.h.} = \frac{60}{88}\sqrt{\frac{W}{A}\,\frac{g}{\rho}}\;\frac{1}{\sqrt{Ky}}$$

$$\text{(2) H.P.} = \frac{W}{550}\sqrt{\frac{W}{A}\,\frac{g}{\rho}}\;\frac{Kx}{Ky^{\frac{3}{2}}}$$

V — Velocity in miles per hour.
W — Weight in lbs.
A — Area in sq. ft.
g — 32·2.
ρ — density of the air in lbs. per cubic ft.

where
$$\frac{1}{\sqrt{Ky}} = \frac{V}{\frac{60}{88}\sqrt{\frac{W}{A}\,\frac{g}{\rho}}}$$

and
$$\frac{Kx}{Ky^{\frac{3}{2}}} = \frac{\text{H.P.}}{\frac{W}{550}\sqrt{\frac{W}{A}\,\frac{g}{\rho}}}$$

so that by plotting the usual K*y* and K*x* curves in the form $\frac{1}{\sqrt{Ky}}$ and $\frac{Kx}{Ky^{\frac{3}{2}}}$ it is equivalent to plotting horse-power required against the corresponding velocity. $\frac{60}{88}\sqrt{\frac{W}{A}\,\frac{g}{\rho}}$ is a constant which, when multiplied by $\frac{1}{\sqrt{Ky}}$, gives velocity in miles per hour, and $\frac{W}{550}\sqrt{\frac{W}{A}\,\frac{g}{\rho}}$ when multiplied by $\frac{Kx}{Ky^{\frac{3}{2}}}$ gives horse-power required.

Data for an aeroplane from which the calculations are made are as follows :—

Weight	4,000 lbs.
Area	400 sq. ft.
Loading	10 lbs./sq. ft.
Horse-power	320
Wt./h.p.	12·5 lbs.

K*y* is given for top speed and landing speed, slot open and closed.

Ky	$\frac{1}{\sqrt{Ky}}$	$\frac{Kx}{Ky^{\frac{3}{2}}}$	$\frac{60}{88}\sqrt{\frac{W}{A}\,\frac{g}{\rho}}$	$\frac{W}{550}\sqrt{\frac{W}{A}\,\frac{g}{\rho}}$
0·133	2·74	0·538	44·3	472
0·580	1·31 (max K*y* unslotted)			
0·943	1·03 (max K*y* slotted)			

Allowing 75 per cent. of the available horse-power,

$$\therefore \frac{Kx}{Ky^{\frac{3}{2}}} = \frac{320 \times 0{\cdot}75}{472} = 0{\cdot}51$$

From the curve for 10 lbs. of loading, when $\frac{Kx}{Ky^{\frac{3}{2}}} = 0{\cdot}51$,

$\frac{1}{\sqrt{Ky}} = 2{\cdot}68$ (*see* Fig. 1).

2·68 × 44·3 = 119 m.p.h. *top speed.*

Landing speed will be :—

1·31 × 44·3 = 58 m.p.h. *unslotted*
and 1·03 × 44·3 = 46 m.p.h. *slotted.*

To still retain the same landing speed as the basic section, 58 m.p.h., and increase the top speed, the loading is increased and the area diminished.

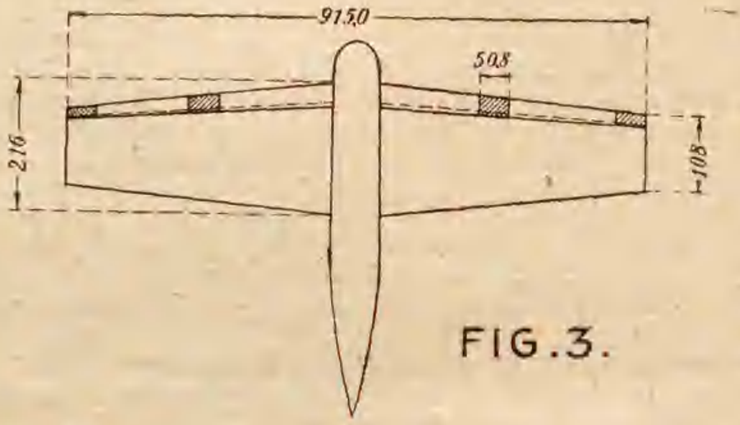
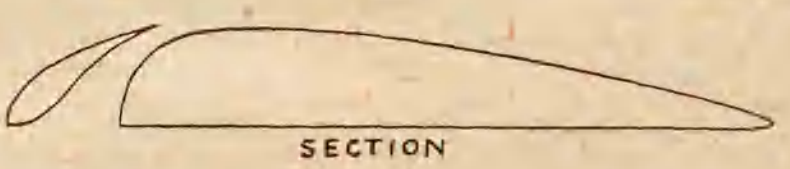


FIG. 3.



SECTION

From the equation $V = \frac{60}{88}\sqrt{\frac{W}{A}\,\frac{g}{\rho}}\;\frac{1}{\sqrt{Ky}}$

$$\frac{W}{A} = \left(\frac{88}{60}\,V\,\frac{\sqrt{Ky}}{\sqrt{g/\rho}}\right)^2$$

where K*y* maximum for the slotted wing is 0·943.

The new loading becomes 16·1 lbs. with an area of $\frac{4{,}000}{16{\cdot}1}$ lbs. = 248 sq. ft.

$$\frac{60}{88}\sqrt{\frac{W}{A}\,\frac{g}{\rho}} = 56{\cdot}3$$

and
$$\frac{W}{550}\sqrt{\frac{W}{A}\,\frac{g}{\rho}} = 600$$

$$\therefore \frac{Kx}{Ky^{\frac{3}{2}}} = \frac{320 \times 0{\cdot}75}{600} = 0{\cdot}4$$

From the curve for 16·1 lbs. loading, when $\frac{Kx}{Ky^{\frac{3}{2}}} = 0{\cdot}4$

$\frac{1}{\sqrt{Ky}} = 2{\cdot}24$ (*see* Fig. 1).

∴ New top speed will be 2·24 × 56·3 = 126 m.p.h.
and landing speed 1·03 × 56·3 = 58 m.p.h.

For top speed the slot must be properly closed, otherwise a diminution in $\frac{Ky}{Kx}$ results.

To obtain these results it is necessary to know conditions essential for high maximum K*y* :—

(*a*) Aerofoils near enough for mutual interaction.

(*b*) Slot of proper dimensions to allow perfect flow of air.

(*a*) The auxiliary aerofoil should have the same top surface as the nose of the basic section. The under-side should be deeply cambered. The position in front of the main aerofoil should be such as to give the auxiliary aerofoil a negative incidence to the main air flow.

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* This article by Mr. Reynolds of the Handley Page experimental staff appeared some time ago in the German journal ***Zeitschrift für Flugtechnik und Motorluftschiffahrt.*** In the English version we have retained the usual English units.

(*b*) To obtain proper slot formation the nose of the main aerofoil should be of small radius and come in at right angles to the base line.

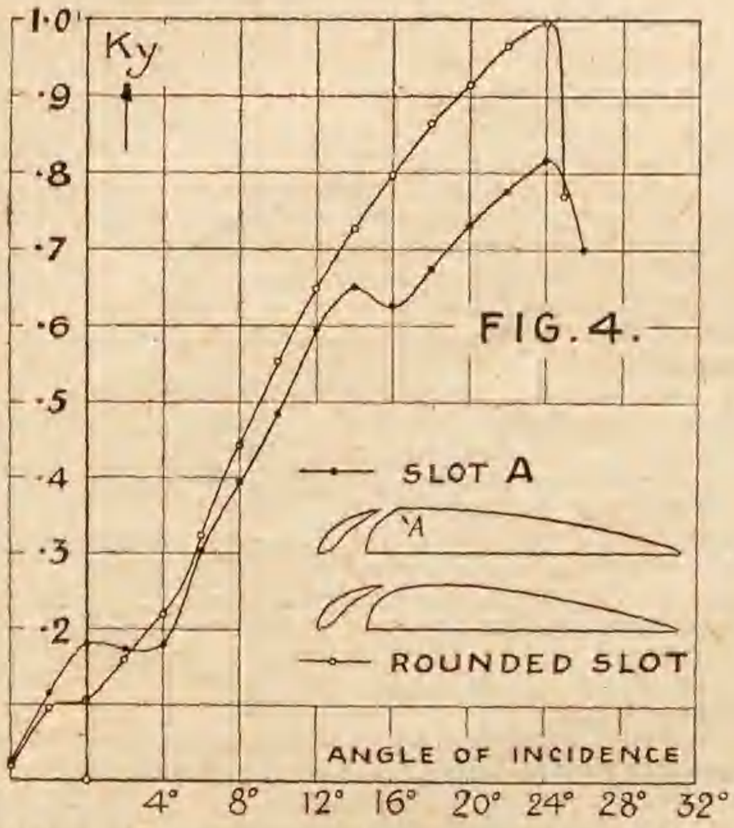

FIG. 4.

The auxiliary aerofoil having a deep under-camber and the nose of the main aerofoil being sharply rounded, will give a gradually converging slot, the ratio between the entry and exit being, roughly, 4 to 1.

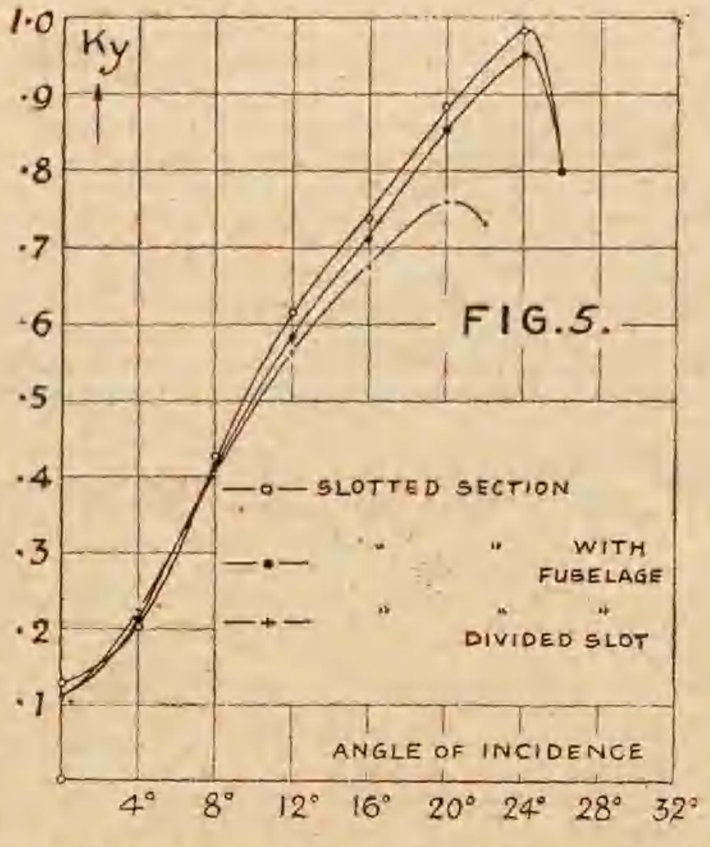

FIG. 5.

Results very different in character have, however, been obtained by W. Von Klemperer and published in the *Zeitschrift für Flugtechnik und Motorluftschiffahrt.*

It will be seen on reference to his diagrams (Fig. 2) that a comparison with the essential qualities required for a slot will show that many of the essential features have been neglected, with the result that the slotted plane is, as designed by him, very inefficient.

Herr Klemperer in his tests split the slots by having outriggers for support of the auxiliary plane of such dimensions as to interrupt the flow through the slots. This will cause burbling. It will be seen that where the outriggers occur the plane is a low-lift section and at the slots a high-lift one. This causes an uneven flow over the whole surface, with the results mentioned.

Tests shown will illustrate this slot interruption (*see* Figs. 3 and 5). His slot section should have been wider in the centre than at the tip with a taper plane. The gap or point of exit for the air should decrease in the same ratio.

By having the nose of the main aerofoil cutting into the top surface at a sharp angle, it will cause eddying behind this point, and consequently a reduction in maximum Ky. This is clearly illustrated in Fig. 4.

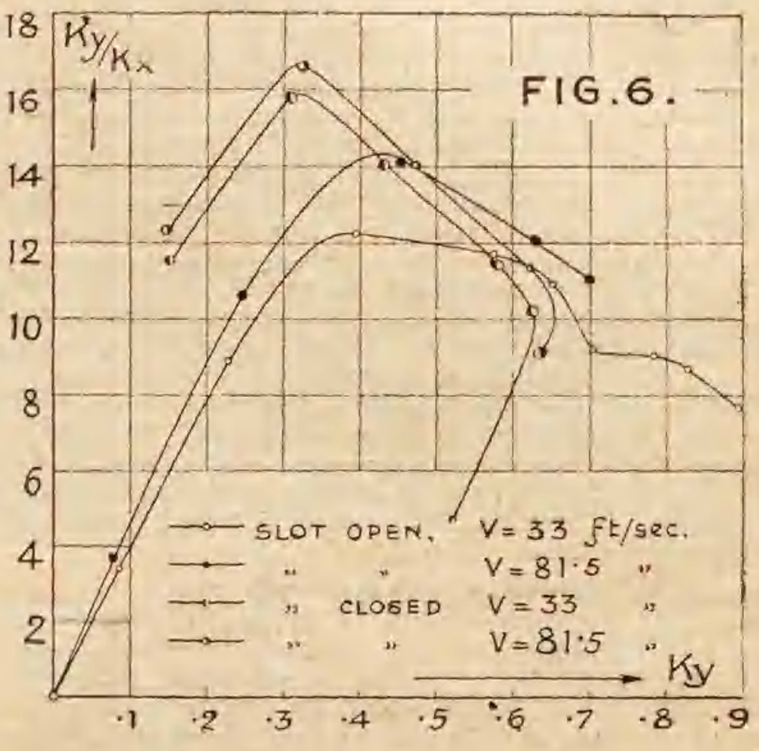

FIG. 6.

Leaving the unslotted portion in the centre of the plane is not the same as having a body in position; this again causes burbling at a most critical point of the aerofoil. It will be seen that the body Ky is practically negligible compared with the unslotted portion. These tests are shown in Figs. 3 and 5, and will show no big difference in Ky with and without *fuselage.*

Although the maximum $\frac{Ky}{Kx}$ is diminished by the slot at lower angles, at bigger values of Ky it is better than with slot closed. Owing to V.L. effect this is more difficult to compare, but at higher air speeds the maximum $\frac{Ky}{Kx}$ shows a better improvement with slot open than slot closed. Fig. 6 will show this.

Taking into consideration the slight increase in weight for slot attachment, the advantage of reducing the landing speed 20 per cent. or increasing top speed and still retaining the same landing speed are great, inasmuch as they greatly reduce the running costs, both in insurance and actual flying time.

The writer's thanks are due to Messrs. Handley Page, Ltd., for permission to publish the details of the tests given above, which were carried out in their Research Department.

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The Burney Airship Scheme

The Air Ministry announces that the statement which has appeared in the Press to the effect that the Admiralty and Air Ministry are in disagreement as to the Burney Airship Scheme is wholly incorrect. The Air Ministry has expressed itself favourably to the technical aspects of the scheme, subject to certain reservations, and the Admiralty have stated the great interest which they take in the development of airships which would be available for use in naval operations. So far from conflicting, the view of both departments is that the preservation of airships would be of considerable value to both of them for aerial and naval purposes. But the main problem arises in connection with the cost of retaining and developing airships which, even under the Burney scheme, involves a very large expenditure of public money, and this problem is one which can only be decided by the Government as a whole.

The French Gliding Competition

There can now be little doubt that the French Gliding Competition to be held at Clermont-Ferrand from August 6 to 20 will be a great success, at any rate from the point of view of entries. No less than 40 machines have been entered, and probably a few more will be booked before the closing date, July 15.

LONDON TERMINAL AERODROME

Monday evening, July 10, 1922.

Business is now showing signs of becoming brisker. The number of passengers travelling by air is increasing slowly, and had it not been for unfavourable weather this week's returns would have shown a substantial advance.

The Daimler Airway are steadily making headway, and their passenger lists are increasing in a very encouraging manner; while Handley Page Transport are, of course, still obtaining high average loads. Their passenger car arrives at the aerodrome regularly with a full load, and on Sunday last it was necessary to send two "W.8b's," in order to accommodate the number of people who, despite the wind, wished to travel to Paris by Handley Page.

The Royal Meteorological Society held their annual summer meeting at the air-station on Wednesday last. There was quite a large gathering, and, despite the fact that they had been unable to provide themselves with good weather, the Fellows showed a keen interest in every feature of the aerodrome, meteorological and otherwise. Mr. G. R. Hay, the meteorologist in charge at the air-station, read a paper on meteorology in commercial aviation, after which it was arranged that the visitors should divide into three parties, one of which was to have tea, while the others toured the aerodrome, and went up in the Surrey Flying Services' Avro for joy-rides. Owing to the weather—it was pouring with rain—it was decided that the aerodrome inspection and the joy-riding should be washed out, and this was suggested after Mr. Hay had read his paper. To the amazement of the organisers, however, practically the entire assembly voted in favour of the joy-rides, despite the rain, and Mr. Muir and Mr. Yuell between them took so me 68 of the visitors, both men and women, up into the pouring rain. Perhaps they wished to see for themselves "where the rain was coming from," with a view to extending their knowledge of weather phenomena.

The Irish Free State Air Force

A pilot of the Irish Free State Army—Lieut. MacSwiney, left, on Wednesday morning, for Dublin, piloting a Bristol fighter, which the Aircraft Disposal Co. have erected for the Irish Free State. I understand that there is also an Avro erected for the same destination, and there are rumours of 16 other Bristol fighters being ordered by the Irish Free State. These machines have a new international registration mark—concentric circles of green, white, and orange, the green on the outside and the orange in the centre.

The gale that blew up on Wednesday night disorganised the entire traffic on the airways, and various machines which were *en route* when it began were forced to land and abandon their journeys for the day, although some managed to complete their flights before the worst of the weather arrived. Two "Goliaths," one belonging to the Messageries Aériennes, and the other to the Grands Express, alighted at Penshurst, and, as there is no shed large enough to accommodate them there, they had to be picketed out through the gale. At 3.30 a.m., on Thursday morning, the automatic wind-gauge on the aerodrome registered a terrific gust of 65 m.p.h., and it was, undoubtedly, this squall that caused the majority of the damage done during the night. The large sign on the roof of the H. P. offices was blown down and smashed to pieces, although there was one section of it still in its place undamaged.

Fine Flying in the Gale

On Thursday morning, the gale had not blown itself out. In fact, the wind-gauge was still registering gusts as high as 50 m.p.h. But, in spite of this, Mr. Robbins arrived on a "D.H.18" from an overnight forced-landing in Kent, while Mr. Geysendorfer, on one of the Fokker monoplanes, left for Amsterdam shortly after 8 a.m. He made a sensational take-off, one wing being thrown up by a gust just as he had left the ground, and a lull in the wind dropping him to within a few feet of the ground a few seconds later. Apparently, however, he was quite comfortable about it all, and landed at Rotterdam less than two hours afterwards. Another K.L.M. monoplane, which left Rotterdam shortly after 2 o'clcok, was 6 hrs. 40 mins. before it arrived at Croydon, landing at Lympne on the way for more petrol. These two machines were the only ones that completed their journeys from terminus to terminus during the day—a very creditable performance.

Mr. Robertson, flying the Daimler "D.H.34 G-EBBS," left Paris as late as 7 p.m., on Wednesday evening, with four passengers, three of whom were women, and, after trying to get across the Channel no fewer than six times, had to descend at St. Inglevert owing to approaching darkness. He left again on Thursday morning, and, crossing the Channel at 3,000 ft., arrived at Croydon in 1 hr. 18 mins. The official report from Lympne put the wind at 3,000 ft. at 58 m.p.h., and Mr. Robertson said that the gusts amounted to at least 70 m.p.h.

Amongst the passengers who have travelled from the air-station by air this week, was Colonel Robert Loraine, who flew to Paris by the Instone Line. He met several old friends on the aerodrome, and was, I understand, returning from Paris by Handley Page. Another passenger who is famous in his own sphere was Mr. H. F. V. Edwards, the running champion, who was, on Saturday, running in a race at the Croydon sports, held just across Plough Lane from the aerodrome. After competing there, he crossed the road and embarked in the Instone Air Liner for Paris, where he was, I understand, to run in a race on Sunday.

Experiments in Sound-Ranging

Extensions are being made to the control tower. The top has been taken off, and a new portion is to be built above it. This is, I am told, to accommodate a sound-ranging device which is to be used for experiments in locating the position of an aeroplane in the clouds, or in mist, which renders it invisible from the aerodrome. The idea was mooted and talked about last year, and is now to be put to practical tests, with a view to improving the system of guiding machines into the aerodrome in thick weather.

The De Havilland Aircraft Co. are now running a daily early-morning service from Lympne to Ostend. Lympne has been chosen in order to get over the difficulty of the early morning mists, which hang over the hills just outside Croydon, and often prevent machines from starting. Newspapers are the primary load for this service, but on the return journey passengers will be carried at a fare of £3. This idea was first mooted as far back as 1920, but, owing to the fact that it meant diverting machines from the ordinary services, and keeping them more or less idle at Lympne for the greater part of the day, or, alternatively, flying them backwards and forwards between Lympne and Croydon empty, nothing came of it. I understand that the De Havilland Co. are stationing mechanics at Lympne.

The Daimler Airway have now received one of their damaged "D.H.34's" back from Stag Lane, and this will make things easier for the hard-working "G-EBBS," although this machine shows no sign of being a bit the worse for the past strenuous six weeks. The new engine repair-shops, and the engine-testing plant for this firm, are now practically completed, and are to be officially opened in the course of the next few days. On Sunday, the Handley Page air-line carried as many as 39 passengers.

The "D.H.18 G-EARO," one of the airway veterans, which was handed back on Monday to the Air Ministry, by the Instone Air Line, has, it is calculated, flown a distance of 90,000 miles between London and Paris.

A movement has been set on foot to form a club for pilots and managers on the aerodrome, and a meeting was held recently in the pilots' room of Handley Page Transport—kindly lent by that firm for the occasion. Capt. Baker, the C.A.T.O., was in the chair, and Commander Perrin, of the Aero Club, was in attendance to give the benefit of his experience in such matters. It was decided to form a club, with the title of "The London Terminal Aerodrome Club." It was also agreed that negotiations should be opened with the Air Ministry for the renting of suitable premises. A Committee of seven was appointed, comprising Messrs. Baker, Perrin, Shaw, Foot, Leverton, Robertson and Powell.

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The Breguet "Leviathan" Flies

The all-metal Breguet "Leviathan," the fuselage of which was exhibited at the last Paris Aero Show and described and illustrated in our issue of November 24, 1921, has been flown. Piloted by M. Thierry, the machine first made a straight climb to 1,000 ft., and the pilot then made a complete circuit of the Villacoublay aerodrome. No sharp turns were attempted, as the machine is a large one, and it was thought wiser to proceed slowly with the tests. The "Leviathan," on which the late Lieut. Henry Roget was to have attempted a flight from Dakar to Pernambuco, is fitted with one of the Breguet-Bugatti quadruple engines, in which two groups of double vertical engines drive a common tractor screw *via* automatic clutches.

INTERNATIONAL COMMISSION FOR AIR NAVIGATION

THE International Commission for Air Navigation held its first meeting in Paris on July 11. This meeting was convened by the French Government, in accordance with the terms of the International Convention for the Regulation of Aerial Navigation, which came into force on July 11.

Fourteen States ratified the Convention on June 1, these being :—Belgium, Bolivia, British Empire (including Canada, Australia, New Zealand, South Africa and India), France, Greece, Japan, Portugal, Serb-Croate-Slovene State, and Siam, while the following States, which were not signatories to it originally, have adhered :—Persia, Peru, Liberia, and Nicaragua.

The Right Hon. the Lord Gorell, C.B.E., M.C., Under-Secretary of State for Air, attended the meeting as the British representative, and acted also as the representative of India, and the Dominions, with the possible exception of Canada, who has not yet notified her representative. He was accompanied by Major-General Sir W. Sefton Brancker, K.C.B., A.F.C., Colonel L. F. Blandy, D.S.O., Controller of Communications, and other officials of the Air Ministry.

Sir W. Sefton Brancker, after this first meeting, is the permanent representative of Great Britain, and also for the present of the Dominions, with the possible exception mentioned above.

The duties of the Commission are laid down in the Convention (Chapter VIII, Article 34) as follows :—

(*a*) To receive proposals from or to make proposals to any of the Contracting States for the modification or amendment of the provisions of the present Convention and to notify changes adopted.

(*b*) To carry out the duties imposed upon it by the present article and by Articles 9, 13, 14, 15, 16, 27, 28, 36 and 37 of the present Convention.

(*c*) To amend the provisions of the Annexes A–G.

(*d*) To collect and communicate to the contracting States information of every kind concerning International air navigation.

(*e*) To collect and communicate to the contracting States all information relating to wireless telegraphy, meteorology, and medical science which may be of interest to air navigation.

(*f*) To ensure the publication of maps for air navigation in accordance with the provisions of Annex F.

(*g*) To give its opinion on questions which the States may submit for examination.

The Commission, at this meeting, considered (*a*) various questions provided in the Convention ; (*b*) certain matters referred to it by the Aeronautical Commission of the Peace Conference and the Conference of Ambassadors ; and (*c*) questions referred by signatory States.

Before the Commission assembled, a meeting of the Anglo-Franco-Belgian Civil Aviation Conference took place in Paris.

THE AIR NAVIGATION ORDER, 1922

THE Air Navigation Order, 1922, which came into force on July 11, is in general similar to the existing regulations, which were issued on April 30, 1919 (and published in FLIGHT of May 8, 1919). The differences in detail are in the main those necessary to give effect to the provisions of the International Convention for Air Navigation. A few alterations not directly attributable to the Convention appear, however, to have been incorporated, among which mention may be made of the following : (*a*) From January 1, 1923, certificates of airworthiness will be required for *all* aircraft, and not merely for those employed in public transport : the daily maintenance certificate, however, is still only required in the case of aircraft falling in the latter category ; (*b*) After November 1, 1922, all British aircraft must be equipped with certain specified instruments (the nature of which has not yet been announced) ; (*c*) the fees for certificates and licences have been revised.

With regard to (*c*), the registration fee for an aircraft is fixed at one guinea, and for the renewal of the registration certificate at 5s. The charges for airworthiness certificates for *type* aircraft, are as follows : When the nominal horse-power does not exceed 200, the fee is £65 ; from 200 to 400 h.p., £90 ; from 400 to 600 h.p., £110 ; and above 600 h.p., £126. These fees are, of course, for machines of new type. The fee chargeable on the issue of airworthiness certificates for subsequent aircraft of the same type, or for the renewal of any airworthiness certificate, is £5 5s. In cases where machines resemble a type for which a certificate has already been issued, the Secretary of State for Air has power to reduce the fees if the resemblance is sufficient materially to reduce the work of testing and examination.

In the case of aerodromes, the fee for issue of a licence is as follows : Up to 25 miles, from the nearest R.A.F. aerodrome, £1 1*s.* ; from 25 to 50 miles, £2 2*s.* ; more than 50 miles, £3 3*s.* The fee for a renewal is in all cases, £1 1*s.*

For the issue of licences, etc., to personnel, the following fees are charged : For pilots, Navigators and Engineers, medical examination, £1 1*s.* ; for pilot's flying tests, £1 1*s.* ; for all technical examinations, 5*s.* ; and for all licences, 5*s.* The renewal fees are the same, except the medical examination, which is reduced to 10*s.* 6*d.*

As the new regulations are, in the main, similar to those published in full in our issue of May 8, 1919, we do not propose to publish the text of the Air Navigation Order of 1922. All interested should make a point of obtaining from H.M. Stationery Office, Kingsway, a copy of the Order. The title is : *Statutory Rules and Orders, No.* 663 *of* 1922, and the price is 11*d.* net.

ROYAL AERONAUTICAL SOCIETY NOTICES

Chairman.—At a Council Meeting held on June 28, Prof. Leonard Bairstow, C.B.E., F.R.S., Fellow, was elected Chairman of the Society for the year 1922-1923 in succession to Lt.-Col. M. O'Gorman, C.B., Fellow, whose period of office terminates on September 30 next.

Election of Members.—The following members were elected at a Council Meeting held on June 28 :—

Associate Fellow : J. E. Dumbleton, A.M.Inst.C.E.

Members : Brian L. Martin, B.Sc., Air Vice-Marshal Sir Geoffrey H. Salmond, K.C.M.G., C.B., D.S.O.

Library.—The following books have been received and placed in the Society's Library :—" Fuel for Motor Transport " (Second Memorandum), The Fuel Research Board ; " A Short Course in Elementary Meteorology," by W. H. Pick ; " Report of the International Allied Commission of Control " (Germany), Air Ministry ; " Proceedings of the Second Air Conference held on February 7 and 8, 1922 " ; " All the World's Aircraft, 1922 " ; " A Dictionary of Applied Physics," edited by Sir Richard Glazebrook ; " Rapports Premier Congres International, Paris, 1921 " ; " Aviation in Peace and War," by Sir Frederick Sykes ; " Application de la Resistance des Materiaux au calcul des Avions," by M. Boileve ; " The War in the Air," by Sir Walter Raleigh ; " 14,000 Miles Through the Air," Sir Ross Smith.

W. LOCKWOOD MARSH,
Secretary

Splendid Flight by French Aviators

ONE THOUSAND MILES non-stop in an ordinary two-seater aeroplane is a very good performance, especially when nearly 500 miles is over the sea. Yet this is the achievement of M. Pelletier d'Oisy and his engineer, Corpl. Bussard. The machine used was a Breguet 14 A 2, with 300 h.p. Renault engine, and it carried 1,150 litres (about 250 galls.) of petrol, which naturally made it somewhat heavy during the first part of the flight. Leaving Tunis at 6 a.m. on July 6, M. Pelletier d'Oisy headed out to sea and shaped a course for Sardinia. Having made a " landfall " here, he proceeded along the coast until Corsica was picked up. From Ajaccio a course was shaped for St. Raphael, and it might be mentioned that most of the flight across the Mediterranean was made at the low altitude of 800 metres (2,600 ft.). After leaving St.-Raphael M. Pelletier d'Oisy climbed to 3,000 metres (10,000 ft.), heading towards Lyon. Here low clouds were encountered, and the aviators had to resort to " contour-chasing " in order not to get lost in the clouds. The wind was terrific, and to make matters worse, rain and hail-storms were encountered. When about 150 km. from Paris the propeller was beginning to suffer severely from the hail-stones, and a landing was made. After waiting for about 10 minutes the weather moderated somewhat and the flight was resumed, the two gallant aviators landing at Le Bourget at 5.50 p.m., having covered the 1,000 miles in just under 12 hours, or at an average speed of 83 m.p.h. On this flight M. Pelletier carried official dispatches only, but the flight does give an excellent demonstration of what will be done in the future in the way of mail-carrying by aircraft.

IN PARLIAMENT

Aviation (Helicopter)

Lieut.-Commander Kenworthy on June 30 asked the Secretary of State for Air what progress has been made in the experiments on the helicoptic system of flight; and whether the reward for any successful invention on this system is still offered by the Department?

Captain Guest: The answer to the first question is that satisfactory progress is being made with the experiments; to the second, that it is still intended to offer a prize for a successful helicopter, but that it has been necessary to settle points of detail in connection with the conditions of the competition. I hope, however, that a formal announcement will be made before very long.

Aerial Defence

Viscount Curzon on July 3 asked the Prime Minister whether the Committee to inquire into certain matters relating to the relations between the Royal Air Force and the Royal Navy, presided over by the Minister of Education, have as yet held any meetings, and when a Report may be expected; and if the Report will be published?

The Prime Minister: No formal meeting of the Committee has yet been held, but some progress has been made by preliminary exchange of views. I am unable to say when the Committee will conclude its labours. A Report will be rendered to the Committee of Imperial Defence, of which this is a Sub-Committee. It is unusual to publish reports of Sub-Committees of the Committee of Imperial Defence.

Lieut.-Commander Kenworthy asked the Prime Minister how long the special Sub-Committee of the Committee of Imperial Defence, which was formed to consider the problem of air defence and development, has been in existence?

The Prime Minister: The Sub-Committee was appointed on October 31 last. It has already reported, and its Report is to be considered by the main Committee very shortly.

The Jupiter Engine

Sir Edmund Bartley-Denniss on July 4 asked the Secretary of State for Air whether he is prepared, in the interests of the Royal Air Force, to take any, and what, steps to prevent the disbandment of the staff and the disuse of the plant of the Bristol Aeroplane Company used in the manufacture of the air-cooled aeroplane engine known as the Jupiter?

Mr. Parker (for Capt. Guest): No type of aero engine can be ordered in quantity for the Royal Air Force until its suitability for service requirements and its superiority to any other engine of the same type have been clearly demonstrated. At the moment, therefore, my right hon. friend is not prepared to place production orders for the Jupiter engine. The Air Ministry is awaiting quotations from the Bristol Aeroplane Company for the manufacture of a few engines of a modified and developed experimental type. Those orders, if placed, should materially assist in the retention of a nucleus staff capable of further expansion if necessary.

R.A.F. Establishment and Equipment

Capt. Viscount Curzon on July 6 asked the Secretary of State for Air whether his attention has been drawn to the statement issued by the Rolls-Royce firm that unless more orders can be given to them for the construction of aircraft engines they will have to close down that branch of their business; whether he is aware that many other firms engaged in the manufacture of aircraft and air engines are in a similar position; whether the Air Ministry intend to do anything to prevent such a state of affairs; whether he has any information to show how long the aircraft industry as a whole can exist on the present basis in this country; and whether these matters are receiving, or will receive forthwith, the attention of the Committee of Imperial Defence?

Capt. Guest: My attention has been drawn to the statement mentioned by my noble friend, and I am sorry to say that there are a number of firms in the aircraft industry whose orders for aircraft are far below the production capacity of their works. Owing to the necessity for national economy, drastic reductions were effected this year in Air Estimates. Consequently, money is not at present available to permit of large orders for aircraft being placed by the Air Ministry. I cannot give any forecast of the kind asked for by the noble lord, but I appreciate the seriousness of the position in the industry, and I can assure him that it is engaging the anxious consideration of the Air Council. As regards the last part of the question, the national capacity to produce an adequate supply of aircraft and engines in war time is an important aspect of the problem of national air defence, which is already under consideration by the Committee of Imperial Defence.

Viscount Curzon: Does not the right hon. gentleman think that a most serious position may shortly arise if this and many other firms in the country are compelled to close down or go out of business altogether, and are the Air Ministry prepared to look upon this and do nothing whatever to help these firms?

Capt. Guest: I can assure my noble friend that we do not regard this situation except with a feeling of grave alarm, and we have made it our duty to represent this strongly to the Government.

Viscount Curzon asked what percentage of the total Vote for Air Services is expended upon the actual provision of machines, repairs and personnel, respectively; how many pilots and observers are on the active list and actually operating today; and what is the total strength of other officers and men on the establishment of the Royal-Air Force?

Capt. Guest In regard to the first question, I assume that my noble and gallant friend desires some information which is not contained in the Air Estimates, but I am not clear what precisely it is. The main provision for Air Force pay will be found under Vote 1 of the Air Estimates, and the cost of the maintenance of air personnel under Vote 2. The money expended upon the provision of aeroplanes and their equipment is shown under Votes 3 and 9. Provision for repairs is partly included under the latter votes, but repairs are also undertaken, to a large extent, by service personnel, and it would, therefore, be difficult to disentangle the cost of such repairs from the personnel votes. The answer to the second question is that, according to the latest returns available, there are 1,862 qualified pilots and 109 observers. As regards the last question, there are 958 non-flying officers. This figure is partly made up of ex-warrant officers and other specialist experts who came to the Royal Air Force during the War, and whom it has been necessary, for various reasons, to retain temporarily. This number, therefore, will in the future constantly decrease, and will be reduced by about 200 within the next few months. Thereafter it will decrease steadily until it shrinks to a total of 530, which constitutes the present establishment of the non-flying list. The number of other ranks is 25,887.

Cost of Squadrons

Mr. E. Harmsworth asked the Secretary of State for Air whether his attention has been drawn to a statement by Lord Weir that a French squadron costs but a quarter of what it costs to maintain a British squadron; what are the causes which bring it about; and what steps he proposes to take?

Capt. Guest: I have seen the statement referred to, but I do not know on what basis Lord Weir's estimate was framed. In any case, I think that deductions from published figures of air expenditure in the two countries must be subjected to so many qualifications as to render the comparison illusory. I may point out, for example, that French personnel are provided by compulsory service, and that British Air Estimates include expenditure of a kind which the French meet under Army and Navy Votes. The French Air Service is almost entirely concentrated at home, which enables a greater part of the training to be done with the unit than is the case with us. Further, owing to the French *mechanic* being conscripted, it is possible to give less training to skilled personnel than is necessary in the British Service, where we have to teach them their trade.

Air Power

Maj.-Gen. Seely asked the Prime Minister what definite steps His Majesty's Government propose to take in order to safeguard our air position and to secure the adequate and equal consideration of the needs of all three Services?

The Prime Minister: A Sub-Committee of the Committee of Imperial Defence has completed an enquiry into this question, and its report has been under examination by the full Committee. Before the Government takes its final decision, I should be glad if a deputation of four Members of the Parliamentary Air Committee could attend a meeting of the Committee of Imperial Defence and lay its views before that body.

Extradition by Aeroplane

Lieut.-Col. Pownall asked the *Home* Secretary whether he has considered the possibility where extradition from a country situated like Austria involves crossing one or more other States with the consequent extradition difficulties of arranging for the prisoner to be brought by aeroplane?

Mr. Shortt: I am afraid the difficulties involved by the plan proposed by the hon. and gallant member would be more formidable than those which may arise when an extradition prisoner is taken through the territory of a third State in the ordinary course. There is no need to anticipate any serious difficulty arising in the present case if the usual methods are followed.

Naval Aircraft Carriers

Viscount Curzon asked the Parliamentary Secretary to the Admiralty how many aircraft carriers are now in commission and in reserve; how many ships are fitted for carrying aircraft; and whether enough machines, pilots and observers are kept either on board or at their attached aerodromes to provide for the full establishment of aircraft laid down for these ships?

Mr. Amery: The ships in commission are *Argus* and *Pegasus*; the ships under construction or reconstruction are *Hermes*, *Eagle* and *Furious*; *Ark Royal* is in reserve. Seventeen battleships, four battle cruisers and seven light cruisers are fitted with flying platforms. As regards the number of machines, I would refer my noble and gallant friend to the reply given on April 12 to the hon. and gallant member for Hertford (Rear-Admiral Sueter). The number of pilots and observers is adequate for the aircraft actually allocated to the Navy.

Viscount Curzon: Is the answer to the second part of my question in the affirmative or in the negative?

Mr. Amery: I referred to an answer in which I said that the number we thought desirable had been reduced from considerations of economy.

Viscount Curzon: Are we to understand that the Navy has not got the number of machines that it really requires; and, further, are the Admiralty satisfied with the position? May I have an answer?

Mr. Speaker: It was contained in the last answer.

Viscount Curzon: On a point of order. I asked the right hon. gentleman whether the Admiralty are satisfied with the position. That was not contained in the answer.

Mr. Speaker: I think it was.

Inter-State Air Services and Australia

Mr. Alfred T. Davies asked the Secretary of State for War whether his attention has been directed to the statement of the Commonwealth Minister of Defence, that delay in the manufacture of aeroplanes in England is preventing the start of important inter-State air services in Australia in August and September next; and whether the Ministry has taken, or intends taking, any action to remove this delay?

Capt. Guest: I have been asked to reply. Although I have seen the reports in the Press of the statement referred to, I have received no other intimation that such a delay is taking place. Whatever may be the cause of the delay, there does not appear to be any justification for interference or action by the Air Ministry.

Helicoptics

Lieut.-Comdr. Kenworthy asked the Secretary of State for Air whether he can make any further statement with regard to the experiments on the helicoptic system of flight; and whether orders for new machines for the Royal Air Force are being held over pending the results of the experiments?

Capt. Guest: I am not in a position to add to the statement made in answer to the hon. and gallant member on June 30. No orders for new machines for the Royal Air Force are being held up pending the results of these experiments.

R.A.F. Pilots and Officers

Mr. Malone, on July 7, asked the Secretary of State for Air how many trained airship pilots and how many other officers and men trained in any particular branch of airship work are now available; and how are they employed?

Capt. Guest: The numbers are: Trained airship pilots, 56; other officers, trained in airship duties (engines, stores, wireless), 21; airmen, trained in airship duties, 135. A few of the officers were also aeroplane pilots, and are now serving as such; the remainder are employed on various Royal Air Force duties or are undergoing courses of instruction. Of the airmen, 83 were riggers, and these are now under training as riggers of aeroplanes or balloons; the remaining 52 were hydrogen workers, and are being trained for other Royal Air Force duties, chiefly as mechanical transport drivers.

THE ROYAL AIR FORCE

London Gazette, June 30, 1922

Promotions

The follg. officers are promoted to the ranks stated, with effect from June 30 :—

General Duties Branch

Air Comdr. to be Air Vice-Marshal.—O. Swann, C.B., C.B.E.

Group Capt. to be Air Comdr.—T. C. R. Higgins, C.M.G.

Wing Comndrs. to be Group Capts.—A. Fletcher, C.M.G., C.B.E., M.C. ; P. B. Joubert de la Ferte, C.M.G., D.S.O. ; R. P. Mills, M.C., A.F.C.

Sqdn. Ldrs. to be Wing Comndrs.—W. C. Hicks, A.F.C. ; J. T. Babington, D.S.O. ; E. M. Murray, D.S.O., M.C. ; V. O. Rees, O.B.E.

Flt Lts. to be Sqdn. Ldrs.—J. C. Russell, D.S.O. ; A. R. Arnold, D.S.C., D.F.C. ; C. J. Mackay, M.C., D.F.C. ; A. Gray, M.C. ; R. H. Kershaw ; R. Graham, D.S.O., D.S.C., D.F.C. and H. S. Powell, M.C. ; C. F. Gordon, O.B.E., M.C., D.F.C. ; E. B. Beauman ; A. S. C. Maclaren, O.B.E., M.C., A.F.C. H. J. Payn, H. N. Bottomley, A.F.C. ; L. C. Keeble ; T. F. Hazell, D.S.O. M.C., D.F.C. ; A. W. F. Glenny, M.C., D.F.C. ; F. E. P. Barrington, H. G. Smart, D.F.C. ; H. I. Hanmer, D.F.C.

Flying Offs. to be Flt. Lts.—S. F. Vincent, A.F.C. ; S. E. Adams ; C. B. Riddle ; H. V. Rowley ; D. R. W. Thompson ; L. G. Maxton ; W. F. Dickson, D.S.O. ; the Hon. J. H. B. Rodney, M.C. ; I. M. Matheson ; N. P. Dixon, A.F.C. ; A. L. Chick, A.F.C. ; E. R. C. Scholefield, D.C.M. ; D. H. de Burgh, A.F.C. ; A. J. G. Styran, M.C., A.F.C. ; W. L. Fenwick ; E. J. McLoughlin ; S. Smith, D.C.M. ; R. Ankers, D.C.M. ; E. Thornton ; G. H. Martingell ; R. P. M. Whitham, M.C. ; W. R. Curtis ; F. Leathley, M.C. ; W. K. Mercer ; A. C. Sanderson, D.F.C. ; M. Ballard ; J. A. W. Binnie ; R. Harrison, D.F.C. ; P. M. McSwiny ; E. G. Hilton, A.F.C. ; H. S. P. Walmsley, M.C. ; J. M. Mason, D.S.C., D.F.C. ; E. R. B. Playford ; H. L. Rough, D.F.C. ; A. L. Fiddament ; C. L. King, M.C., D.F.C. ; N. H. Jenkins, D.F.C., D.S.M. ; G. S. Oddie, D.F.C. ; G. Martyn ; D. V. Carnegie, A.F.C. ; H. G. Crowe, M.C. ; H. P. Lloyd, M.C., D.F.C. ; H. G. W. Lock, D.F.C. ; A. Bottoms ; S. E. Mailer, A.F.C. ; J. R. Cassidy ; A. P. Ledger ; O. G. Gregson ; J. Duminy ; R. F. Durrant, A.F.C.

Stores Branch

Flt. Lts. to be Sqdn. Ldrs.—W. J. B. Curtis, O.B.E. ; F. H. Songhurst, M.B.E. ; C. Mason ; W. F. Bryant ; P. Adams, O.B.E.

Flying Offs. to be Flt. Lts.—W. G. McD. Nicholl ; K. D. G. Collier ; J. L. Denman ; J. R. Nicholls ; J. K. McDonald ; T. A. G. Hawley ; F. N. Trinder.

Stores Branch, Accountants

Flt. Lts. to be Sqdn. Ldrs.—W. H. Holroyd ; H. J. Down ; C. G. Murray, O.B.E. ; P. J. Wiseman ; T. H. Evans.

Flying Offs. to be Flt. Lts.—R. Byrne, M.C. ; J. S. Griffiths.

Medical Service

Wing Comndr. to be Group Capt.—C. E. C. Stanford, D.S.O., M.B., B.Sc.

Sqdn. Ldrs. to be Wing Comndrs.—W. Tyrrell, D.S.O., M.C., M.B. ; B. A. Playne, D.S.O., M.B., B.A. ; H. A. Treadgold, M.D., B.A. ; D. Ranken, M.S., B.S., F.R.C.S.

Flt. Lts. to be Sqdn. Ldrs.—E. P. Punch ; J. H. Porter, M.C., M.B. ; R. W. Ryan, M.B. ; H. S. C. Starkey, O.B.E., M.D., M.A.

Flt. Lts. to be Hon. Sqdn. Ldrs.—H. B. Smith, M.B. ; E. Brown ; H. B. B. Greene.

Chaplains' Branch.

The Rev. H. McCalman, M.C., M.A., resigns his permanent commn. ; July 1.

Nursing Service

The following Staff Nurses are promoted to the rank of Sister (July 1) :—Misses N. G. Rees, E. L. Whittingham.

Memorandum

The commission granted to W. Cougle to retain the rank of Sec. Lt. is withdrawn on his joining the Army ; June 19.

London Gazette, July 4, 1922

General Duties Branch

H. W. R. Banting is granted a short service commn. as a Flying Offr., with effect from and seny. of June 22. Capt. A. J. Carlielle, R.A.S.C., is granted a temp. commn. as a Flying Offr. (Hon. Flt. Lt.) on seconding for four years' duty with the R.A.F. ; May 9. Pilot Offr. F. V. Gauntlett to be Flying Offr. ; May 29.

The following Pilot Offrs. on probation are confirmed in rank (May 28) :—E. C. Barlow, C. A. Goatcher, R. C. Harrison, H. K. Waterfield.

Flying Offr. M. S. Marsden resigns his short service commn., and is granted the rank of Maj. ; July 5. Flying Offr. A. G. Quinnell is placed on the Retd. List on account of ill-health ; July 5. Flying Offr. W. Cole is placed on the Retd. List on account of ill-health contracted on active service, and is granted the rank of Capt. ; July 5. Flt. Lt. P. J. Wiseman is granted a permanent commn. ; April 1, 1920 (since promoted and transferred to the Stores Branch for Accountant duties). (*Gazette*, April 20, 1920, appointing him to short service commn. is cancelled.)

Medical Service

The following are granted short service commns. in the ranks stated, with effect from and with seny. of June 21 :—

Flt. Lt.—J. C. Osburne, M.B.

Flying Offr.—V. S Ewing, M.B.

Flying Offr. T. A. G. Hudson, B.A., is granted a short service commn., retaining his present substantive rank and seny. ; July 4.

Memorandum

The permission granted to W. Sangster to retain his rank of Sec. Lt. is withdrawn on his joining the Army.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

Air Commodore E. A. D. Masterman, C.M.G., C.B.E., A.F.C., from Headquarters, Coastal Area, to Half-pay List, on ceasing to be attached to Air Ministry (D.O.I.). 10.6.22.

Wing Commanders.—A. V. J. Richardson, O.B.E., M.B., D.P.H., from Headquarters, R.A.F. Middle East, to R.A.F. Depôt (Inland Area). (Supernumerary.) 31.5.22. A. V. Bettington, C.M.G., from Half-Pay List, to Command No. 12 Wing Headquarters (Ireland). 1.6.22. J. T. Cull, D.S.O., from Air Ministry (D.T.O.) to Headquarters (Coastal Area). (Supernumerary.) 17.7.22. H. R. Nicholl, O.B.E., from No. 7 Group Headquarters (Inland Area) to Air Ministry (D.T.O.). 3.7.22.

Squadron Leaders.—R. P. Willock, to School of Technical Training (Men) (Inland Area). 1.6.22. A. S. Morris, O.B.E., from No. 1 Flying Training School (Inland Area) to Headquarters (Inland Area). 22.6.22. H. E. Rowley, from Coastal Area Aircraft Depôt (Coastal Area) to Headquarters, R.A.F. Cranwell. 15.6.22. C. S. Wynne-Eyton, D.S.O., from Headquarters, R.A.F., Ireland (Ireland), to command Irish Flight(Ireland). 1.5.22. W. W. Shorten F.R.C.S. (E.), from No. 1 School of Technical Training (Boys) (Halton) to R.A.F. Depôt (Inland Area). (Supernumerary.) 6.6.22. A. J. Miley, O.B.E., from Air Ministry (D.G.S.R.) to No. 4 Flying Training School (Middle East). 29.4.22. A. Corbett-Wilson, from No. 1 Flying Training School (Inland Area) to Aircraft Depôt, Egypt (Middle East). 29.4.22. W. J. Y. Guilfoyle, O.B.E., M.C., from No. 208 Squadron (Middle East) to command School of Photography (Inland Area). (Supernumerary.) 1.7.22. C. S. Wynne-Eyton, D.S.O., from Irish Flight (Ireland) to R.A.F. Depôt (Inland Area). (Supernumerary.) 25.6.22.

Flight Lieutenants.—A. D. Pryor, from No. 100 Squadron (Inland Area) to No. 207 Squadron (Inland Area). 21.6.22. P. G. N. Ommanney, from Air Ministry (D.O.I.) to R.A.F. Depôt (Inland Area). (Supernumerary.) 15.5.22. J. F. Roche, from Experimental Section, R.A.E. (Inland Area) to School of Army Co-operation (Inland Area). 3.7.22. D. Le Bas, from Central Flying School (Inland Area) to R.A.F. Depôt (Inland Area). 17.6.22. H. E. Hayes, to Headquarters, R.A.F., Cranwell, on appointment to temporary Commission. 16.6.22. A. H. Wann, from Half-Pay List to R.A.F. Depôt (Inland Area). (Supernumerary.) 16.6.22. W. E. Hodgins, M.B., from Research Laboratory and Medical Officers' School of Instruction (Inland Area) to R.A.F. Depôt (Inland Area). 19.6.22. P. T. Rutherford, O.B.E. (Medical), to Research Laboratory and Medical Officers' School of Instruction (Inland Area). On appointment to Short Service Commission. 8.6.22. T. L. P. Harries, M.B., from No. 1 Flying Training School (Inland Area) to Central Flying School (Inland Area). 15.6.22. F. G. Stammers, O.B.E., from School of Technical Training (Men) (Inland Area) to Headquarters (Inland Area). 18.6.22. A. C. Collier, from R.A.F. Depôt (Inland Area) to No. 39 Squadron (Inland Area). 26.6.22. W. Sutherland, M.B.E., from C. and M. Party, Donibristle (Coastal Area) to Marine and Armament Experimental Establishment (Coastal Area). 16.6.22. D. O. Boddie, M.B., from Stores Depôt, Egypt (Middle East) to R.A.F., Trans-Jordania Headquarters (Middle East). 20.5.22. J. T. T. Forbes from No. 14 Squadron (Middle East) to No. 4 Flying Training School (Middle East). 27.5.22. W. D. Miller, M.B., from R.A.F. Depôt (Inland Area) to Marine and Armament Experimental Establishment (Coastal Area). 15.6.22. W. H. Oakey, from Irish Stores and Repair Unit (Ireland) to Headquarters, R.A.F. (Ireland). 1.5.22. R. A. Young, from R.A.F. Depôt (Inland Area) to No. 12 Wing Headquarters (Ireland). 3.6.22. J. A. Glen, D.S.C., from Canadian Air Board to R.A.F. Depôt (Inland Area). (Supernumerary.) 27.5.22. H. C. Perkins (Medical), to Research Laboratory and Medical Officers' School of Instruction (Inland Area), on appointment to Temporary Commission). 6.6.22. R. H. Smyth, M.C. (Stores), from R.A.F. Depôt (Inland Area) to No. 1 Stores Depôt. 16.6.22. L. Game, to R.A.F. Cadet College (Cranwell), on appointment to Temporary Commission. 21.4.20. S. N. Cole, from Palestine Wing Headquarters (Middle East) to Headquarters, R.A.F., Iraq. (Supernumerary). 14.5.22. W. A. C. Morgan, M.C., from Instrument Design Establishment (Inland Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) 17.7.22. C. H. Tancred, M.B.E., from R.A.F. Depôt (Inland Area) to Inspector of Recruiting (Coastal Area). 13.7.22. N. R. Fuller, from R.A.F. Depôt (Inland Area) to No. 1 Flying Training School (Inland Area). 1.7.22. A. J. Brown, D.S.O., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Central Hospital (Coastal Area). 26.6.22. H. C. Perkins, from Research Laboratory and Medical Officers 'School of Instruction (Coastal Area) to R.A.F. Base, Gosport (Coastal Area). 26.6.22. J. C. Osborne, M.B., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area). On appointment to Short Service Commission. 21.6.22. J. W. Woodhouse, D.S.O., M.C., from Central Flying School (Inland Area) to No. 1 Flying Training School (Inland Area). 1.7.22. A. Lees, from Central Flying School (Inland Area) to No. 1 Flying Training School (Inland Area). 1.7.22. J. K. Summers, M.C., from Central Flying School (Inland Area), to No. 5 Flying Training School (Inland Area). 1.7.22. B. McEntegart, from Central Flying School (Inland Area) to No. 2 Flying Training School (Inland Area). 1.7.22. J. J. Williamson, A.F.C., from Central Flying School (Inland Area) to No. 100 Squadron (Inland Area). 1.7.22. J. F. Gordon, D.F.C., from No. 207 Squadron (Inland Area) to School of Technical Training (Men) (Inland Area). 1.7.22. H. E. P. Wigglesworth, D.S.C., from R.A.F. Depôt (Inland Area) to Irish Flight (Ireland). 26.6.22. P. T. Rutherford, O.B.E., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Hospital, Cranwell. 26.6.22. J. E. B. B. Maclean, D.S.C., from No. 267 Sqendron, (Mediterranean) to No. 4 Flying Training School (Middle East). (Supernumerary.) 10.6.22. W. H. De W. Waller, A.F.C., from No. 100 Squadron (Inland Area) to Palestine Wing Headquarters (Middle East). (Supernumerary.) 15.6.22. A. R. T. Pipon, D.S.C., from H.M.S. "Pegasus" (Mediterranean) to Headquarters, R.A.F. (Mediterranean). (Supernumerary.) 10.5.22. E. D. Davis, from No. 267 Squadron (Mediterranean) to H.M.S. "Pegasus" (Mediterranean). 7.6.22.

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Siddeley "Jaguar" Passes New Type-Tests

THE 14-cylinder Armstrong-Siddeley "Jaguar" radial air-cooled engine has recently passed the new Air Ministry type-tests, which include five non-stop runs of 10 hours each, the first half hour of each period being run at full throttle, and the remaining 9½ hours at 90 per cent. of full power. At the end of each period a five-minute run at full power was given. We had the opportunity of seeing the engine dismantled after the tests, and it appeared to be in perfect condition, no appreciable wear being noticeable anywhere. The fuel and oil consumption were very low, and the engine should be very useful when the R.A.F. comes to be equipped with new flying stock. The 14 cylinders give very even torque and smooth running generally.

TITANINE ACTIVITIES

DURING the period of lethargy through which the aircraft industry has been passing, it is interesting and pleasurable to be able to record that Messrs. Titanine, Ltd., have continued to actively engage themselves in experiments in connection with dopes and finishing materials.

This firm has always " stuck to its guns " on the question of the durability of " Titanine "—the well-known nitro dope manufactured by their special patented formulæ—as against the usual cellulose acetate dope, and from the commencement of the dope industry being an industry have emphasised the necessity of proper protective coverings. They have also urged the careful study of two important dope problems, *i.e.*, the elimination of ingredients injurious to the workers' health and the effective resistance of the coverings to danger from fire. It is gratifying to note that Air Ministry specifications now embody clauses providing for these points. Messrs. Titanine not being in business entirely for their health's sake, have been compelled to manufacture dopes on the actyl-cellulose basis, and have received a good share of what business has been done in this direction. They nevertheless recommend all their customers to employ the standard Titanine doping materials in preference to acetate whenever specifications, or the absence thereof, permit.

A very good testimony to the Company's materials is their success with their " Racing Scheme," the famous " Bamel " or " Mars I," the holder of the British speed record, being coated with the " Titanine Racing Scheme " prior to its greatly increased speed. Also, as regards durability, an Avro machine owned by the Berkshire Aviation Co. which had been touring Great Britain for over a year, had only been in a hangar on five occasions; the rest of the time the machine had been anchored in fields where the whole of the flying surface had been exposed to the elements. During the winter of 1920 nothing was thought of scraping one to three inches of snow off the wings before commencing the day's flying. The machine in question carried 5,854 passengers, and flew, roughly, 19,000 miles. This is surely conclusive testimony to the excellence of " Titanine," with which this machine was doped.

When the " Mars I " made a forced landing in France, Mr. Folland, the designer, wrote to Messrs. Titanine that:—

" Owing to careless handling, and due to the local help putting their feet through the wings, it necessitated repairs over an area of the wings to approximately 6 to 8 sq. ft. As we had no facilities for doping we had to make the best of a bad job. The new piece of fabric was doped on the wing in a shed where the temperature was below freezing-point. As we had to make a hurried repair, three coats of dope were applied in less than ten hours. The new portion, when dry, was as tight as the original dope. The temperature and the putting on of the coats of dope in so short a time did not appear to affect the excellent tightening of the dope; the result was perfectly good, and I think it speaks volumes for the quality of your dope."

It is also interesting to note that the " Avro Baby " seaplane that was taken out with the Rowlett Quest Expedition had its flying surfaces coated with Titanine dope and protective covering.

As to other activities, Messrs. Titanine's works are also now employed, we understand with considerable success, on other products not concerned with the aircraft trade. For instance, one of their latest departures is " Otello " paints, which have the novel feature of being oilless, leadless, very fast in drying, resist acid and electrolysis and may be applied even over bituminous paints without the latter penetrating. The last quality and that of being oilless must surely be unique. A paint on a somewhat similar basis is their " Lumilac " for wood and metal seaplane floats, hulls of flying boats, metal and ply-wood wings, etc. etc. This paint has the special and unique feature of being absolutely waterproof. Also, it adheres to bright aluminium surfaces—an unusual feature in paints.

We do not think that manufacturers or designers of aircraft quite realise that dope and fabric coverings play as important a part in the speed of aeroplanes as they do. The problem is somewhat analogous to the painting of ships' hulls, when by the use of certain paints or compositions it has been found that an extra knot or so can easily be obtained through giving the bottom a paint surface that reduces friction to a minimum. Messrs. Titanine have often expressed their readiness to assist designers or those interested, by research work on special dope coverings, to meet any particular requirement. We believe that they have a very efficient and highly trained technical staff well competent to carry this out.

THE LONDON AERO-MODELS ASSOCIATION

(The Society of Model Aeronautical Engineers.)

AT the Committee Meeting held at Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, on Thursday, the 6th inst., it was resolved that the title " The Society of Model Aeronautical Engineers " should be registered forthwith.

On Saturday, the 8th inst., members who had entered for the Flight Golf Competition assembled on Wimbledon Common, but, unfortunately, the weather conditions were so bad that it was necessary to postpone the competition to Saturday, July 22, at the same time and place. It was very gratifying to see so many enthusiastic members turn up under such conditions.

Meetings are held every Thursday at Headquarters, 20, Great Windmill Street, Piccadilly, W. 1, at 7.30 p.m.

Report from Research Committee re Propeller Testing Apparatus

The speed of the motor without propeller is found to be 2,700 r.p.m. A suggestion to gear the motor down in the ratio 2 to 1 is being carried out, and it is anticipated that a speed between 1,000 and 1,200 r.p.m. will be obtained with propellers from 8 to 12 ins. diameter. Further information on this point may be available next week.

W. E. Evans, Hon. Sec. (*pro tem.*), Research Committee.

Hon. Sec., A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6, to whom all enquiries and communications should be addressed.

◆ ◆ ◆ ◆

Royal Air Force Memorial Fund

A MEETING of the Executive Committee of the Fund was held on June 21.

Grants to the amount of £453 12*s.* 1*d.* were approved.

The matter of the War Memorial, now in course of erection on the Thames Embankment, was considered in detail. It was hoped that the monument would be ready for unveiling by November 11 (Armistice Day), but, owing to unlooked for delays, it is probable that the ceremony must be postponed till, at earliest, January next.

The names of Air Vice-Marshal Sir Geoffrey Salmond and Group Captain E. R. Ludlow-Hewitt, both of whom have been nominated as members of the Executive Committee of the Fund, were added to the War Memorial Sub-Committee, which will deal with the details of the unveiling of the War Memorial.

The name of Air Vice-Marshal Sir John Salmond, lately embarked for India and Mesopotamia, was added to the list of Vice-Presidents of the Fund.

With regard to the Vanbrugh Castle School, the Acting-Chairman of the Sub-Committee, Mr. W. S. Field, referred to the fact of the erection of an emergency staircase in compliance with L.C.C. rules as regards fire escapes, and mentioned that half the cost of this structural alteration was being most generously borne by the donor of the house, Mr. Alexander Duckham. Mr. Field himself is generously contributing £50, and one or two other donations have been earmarked for this purpose. A balance remaining, of £100, has been sanctioned by the Executive Committee from the General Fund.

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(*Continued from* p. xiv.)

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 6–20	**French Gliding Competition at Clermont-Ferrand**
Aug. 7	**Aerial Derby Starting at Waddon**
Aug. 12	**Schneider Cup Seaplane Race, at Naples**
Sept. 2–17....	**International Concours Aviatique, Rotterdam**
Sept. 9–10....	**1,000 Miles Race round Britain for the King's Trophy**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsch (300 kil.)**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy (1s. 1d. post free).

EDITORIAL COMMENT.

Committee of Imperial Defence and Airship Scheme

FROM the Prime Minister's statement in the House on July 17, it appears that the Committee of Imperial Defence has arrived at the decision that, in view of the need for economy, no money should be expended in developing an airship service, "either for commercial purposes or with the object of establishing Imperial communications." That seems to dispose of any doubt as to whether or not the Government is to take any part in getting the airship service to India going by guaranteeing a certain interest on the capital involved. So far so good. Now we know, at any rate, how we stand. We need expect nothing from the Government. It still remains to be seen whether the Admiralty, whose Parliamentary Secretary, Mr. Amery, is the chairman of the new Sub-Committee to look into the technical aspects of the Burney scheme, will decide to jog along without a couple of destroyers so as to be in a position to afford airships. Even if it is decided to come down in favour of airships—and that is, of course, by no means certain—it is to be expected that whatever is done with them will be mainly with naval ends in view. With that we are not inclined to quarrel. We have previously stated as our conviction that in the matter of airships we see little objection to the Admiralty taking control. The construction of the ships themselves, the training of the personnel, and the naval use of airships appear to follow so closely along naval lines that it seems fairly obvious that the natural procedure would be to give the Admiralty control, now that their lordships have, almost, decided that they do want airships, after all.

We should like to see the Burney scheme go through, because we believe that there is a very definite useful commercial future for airships. The main point, however, is that we want airships. We must have airships. And if we cannot have them any other way than as part and parcel of the Navy, then that method will have to satisfy. At any rate, designing and construction, not to mention the more important phase of the maintenance of an airship personnel, should be assured, and not, as the Secretary of State suggested, put on the shelf for the next ten years, to be resumed when, with little doubt, everybody else will have got well ahead of us in airship matters.

* * *

Aircraft v. Warships

As we anticipated, considerable secrecy is being, not unnaturally, maintained, both by the Air Ministry and the Admiralty, regarding the results, if any, of the attacking experiments with aircraft on warships, which took place in the Channel on July 7. While we fully realise that a certain amount of reserve is necessary in giving to the public and world at large detailed information that might be of value to a potential enemy, we do think that the broad results should be made known. After the American experiments last year a great deal was published regarding results of bombing tests, and though it is true that a confidential U.S. report upon the results still remains to be revealed, there really does not appear to be any valid reason for withholding from the public the main facts established by our tests.

From meagre results that have been reported, assuming them to be approximately correct, it appears that during the mock attack by aircraft on the Fleet a squadron of aircraft suddenly appeared, and the Fleet altered course so as to prepare for defence against it. The flight, however, instead of attacking, circled around the Fleet, leaving a dense smoke screen, which prevented the Fleet from seeing what was coming. Then the real attack came from, it is stated, a totally different quarter, and torpedo planes dodged through the smoke screens, dropped their torpedoes and got away. It is stated that many hits were thus recorded which would have had serious consequences had the torpedoes been loaded with explosives instead of oil. It is even asserted that the whole thing was over in 1½ minutes.

While we have no means of judging of the accuracy of this report, there does not appear to be anything in it which gives cause for doubting that, in fact, something very like that did, or at least could, occur. The establishment of a smoke screen by aircraft has long been within the bounds of practical politics, and the sudden attack by torpedo-planes, darting through the smoke screen and getting away again after having dropped their charges, does not sound at all unlikely to anyone with a knowledge of modern aircraft.

It may be objected that, even accepting the truth of this report, the Navy was handicapped by having no aircraft for defence. While that is a perfectly fair claim, it should not be forgotten that whereas this attack was—must have been—delivered by a mere handful of machines, in real warfare that handful would be squadron after squadron, arriving at carefully timed intervals and from all sides, and unless the Fleet was protected by huge numbers of aircraft serious losses would inevitably have been sustained. We are distinctly not among those who think that the time is ripe for scrapping the Navy and trusting entirely to the air, but we do think that no navy in the world can afford not to make the fullest use of aircraft co-operation. That ultimately the Navy will dwindle in size, and the R.A.F. grow, is not to be doubted. What the Navy has to do, if it wishes to retain its existence for another decade or so, is to gracefully postpone the evil day of its demise by making every possible use of co-operating aircraft. Personally we are of the opinion that one of the results of the experiments will be that the Navy will devote some of the money intended for other purposes to forcing forward a better equipment of aircraft, and in so doing it will probably make another fight for a separate Naval Air Service—a retrograde step which will require careful watching.

* * *

British Entry for the Schneider Cup

Since the memorable occasion when, in 1914, Howard Pixton won the race for the Schneider Cup at Monaco, Great Britain has not played a very glorious rôle in this classic contest. In 1919, as a result of Pixton's win on the Sopwith seaplane, the race was held at Bournemouth, but misty weather prevented all of the competitors, except Signor Janello, from completing the course. The memory of the controversy as to whether or not the Savoia pilot had correctly rounded the mark boats will still be fresh in mind, and it is sufficient to say that it was decided to let the Italian Aero Club organise the next race. Since then Great Britain has entered no competitor for the Schneider race, and the Italians having won it two years running, the Cup will become their property in perpetuity, should they succeed in winning again this year.

Realising this, it is gratifying to learn that, at any rate, one British competitor will represent this country for the Schneider race to be held at Naples on August 12. The machine chosen is a Supermarine flying boat with Napier "Lion" engine. So far as we understand, this Supermarine is an adaptation of the single-seater "Sea King," Mark II, which was fully illustrated and described in our issue of April 20, 1922. The "Sea King" then had a 300-h.p. Hispano-Suiza engine, but for the race a Napier "Lion" will be fitted. Also, in its original form, the "Sea King" had amphibian gear, which will not be required for the Schneider race.

As the original machine had a speed of about 125 m.p.h., the racer should be very much faster, what with the extra power and the absence of the amphibian gear. What that increase will be we cannot say, but, at any rate, the 150 m.p.h. mark should be reached without great difficulty.

We do not know whether any name has been chosen for the Supermarine Schneider racer, but we would suggest that a very fitting name would be "Sea Lion," Mark II. It will be remembered that the Supermarine entered for the Schneider race at Bournemouth and, flown by Hobbs, was called the "Sea Lion." As this machine is also fitted with that famous engine, and is flying in the Schneider race, the name might well be retained.

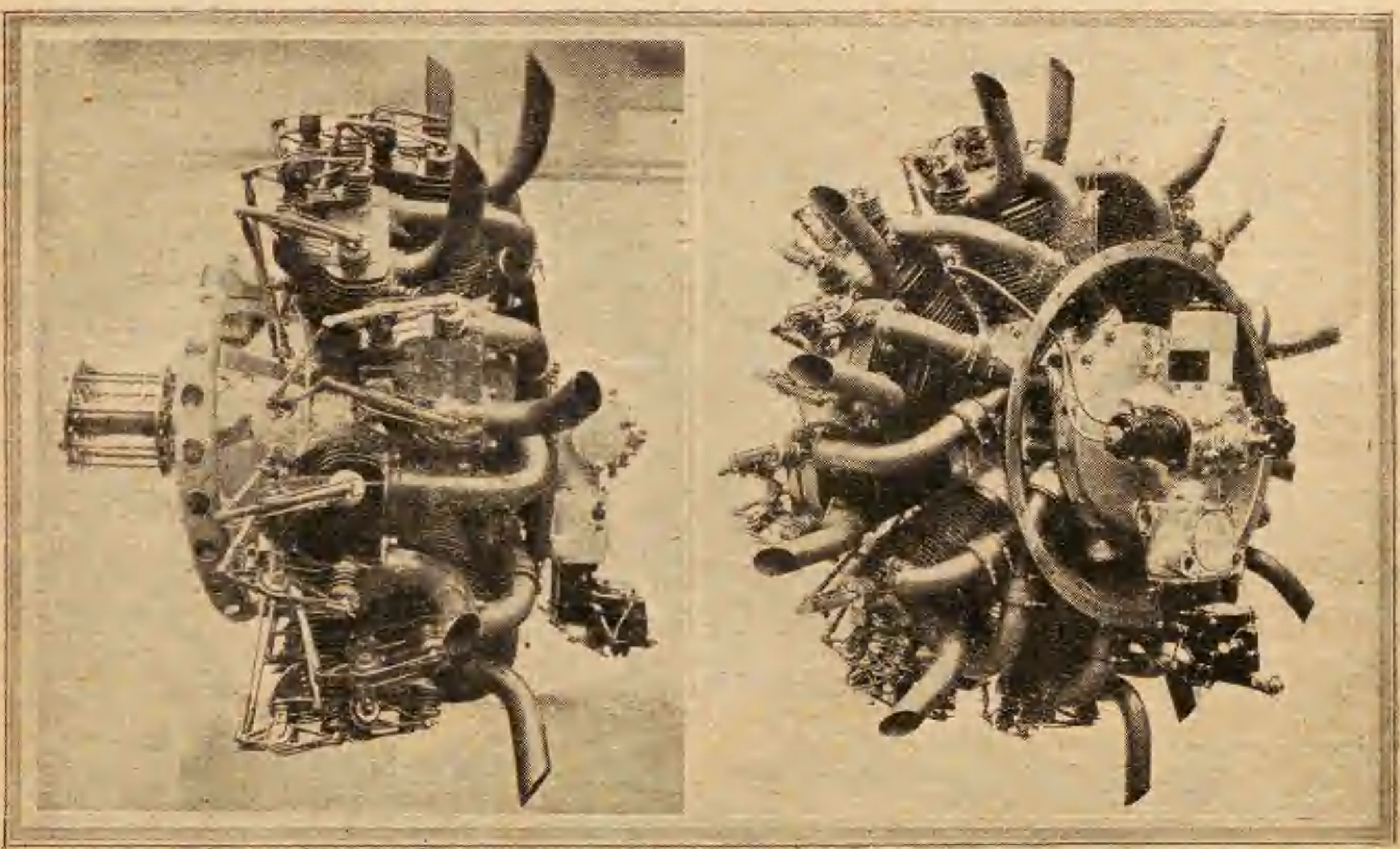
The pilot who will fly the machine in the race is Mr. H. C. Biard, who has had a very extensive experience of flying-boat work and has been test pilot for the Supermarine Aviation Works for some time. Thus the combination of Supermarine boat, of known and proved sea and air worthiness, Napier "Lion" of enviable reputation and pilot with long experience, should be one difficult to beat. We are prepared to find that faster machines may be entered by other nations, but we shall be surprised if any of them can combine speed with as good seaworthiness as the "Sea Lion." May our representative bring the Cup back to these shores.

THE ARMSTRONG-SIDDELEY "JAGUAR" RADIAL AERO ENGINE

An Interesting Air-Cooled Engine of 350 H.P.

As briefly announced in FLIGHT last week, the new Armstrong-Siddeley radial air-cooled, the "Jaguar," has recently passed its type tests with flying colours. This engine, which has been undergoing development for a considerable time, is chiefly remarkable for the following desirable features :—The great number of cylinders results in very even torque and smooth running ; the petrol and oil consumption is low, and finally the weight is but slightly in excess of 2 lbs. per horse-power. In addition, the short overall length results in a small longitudinal moment of inertia, which is of considerable importance in a machine which has to be manœuvred quickly, for instance during an air fight. The type-test recently passed by the "Jaguar" is the latest and somewhat severe Air Ministry test and includes five non-stop runs of 10 hours each. That the engine has successfully fulfilled the conditions is proof of its reliability, and it is not, therefore, without interest to examine the details of the design which have made the good results possible.

Fundamentally the Siddeley "Jaguar" is a radial air-cooled engine with its 14 cylinders disposed in two rows, those of the back row being placed in line with the spaces between the cylinders of the front row. From this arrangement it follows that the crankshaft is of the two-throw type with seven connecting rods meeting on each crank-pin. As will be seen from the illustration showing the connecting rod assembly, there is a master connecting rod and six auxiliary rods. The master rod is of H section, while the six auxiliary rods are tubes of circular section. All rods are made of high tensile steel, and are machined all over so as to ensure their weight, and consequently balance, being accurate. The webbed master ring is made in two dissimilar parts held together by four bolts, and the white-metal crank-pin bearing is cast direct into the master ring. The latter is controlled by the master rod, to which it is secured by two pins passing through the webs. The wrist-pins of the auxiliary rods work on similar tubular pins, which are floating in bronze bushes held in the webs of the master ring. The pins are held in position endwise by wire spring clips which, when pinched up, are inserted into the phosphor bronze bushes and allowed to expand there into annular grooves. In the photograph the free ends of these locking wire clips can be seen.



THE ARMSTRONG-SIDDELEY "JAGUAR": Side and three-quarter rear views.

The tubular gudgeon-pins are similar to the wrist-pins, except that they are of larger diameter, and are entirely floating, that is to say, they are free to turn in the piston bosses and also in the phosphor bronze bushes, which are in turn floating in the small-end of the connecting rods. The small-end bronze bushes are perforated with holes which ensure the lubrication of the working surfaces, the oil supply being maintained through large holes at the top of the small-end of the connecting rods.

Pistons

The pistons are made of a special aluminium alloy, combining the requisite strength of material with adequate heat-conducting properties. They are furnished with two gas rings of cast iron at the head, and with two scraper rings of the same material, one immediately below the gas rings, and the other in the skirt to prevent any excess of oil on the cylinder walls from finding its way into the combustion chamber. For the purpose of enhancing this effect two chamfered grooves are turned in the piston, immediately below each scraper ring, and the oil which collects in the grooves escapes into the inside of the piston through a series of small holes in the bottom of the groove.

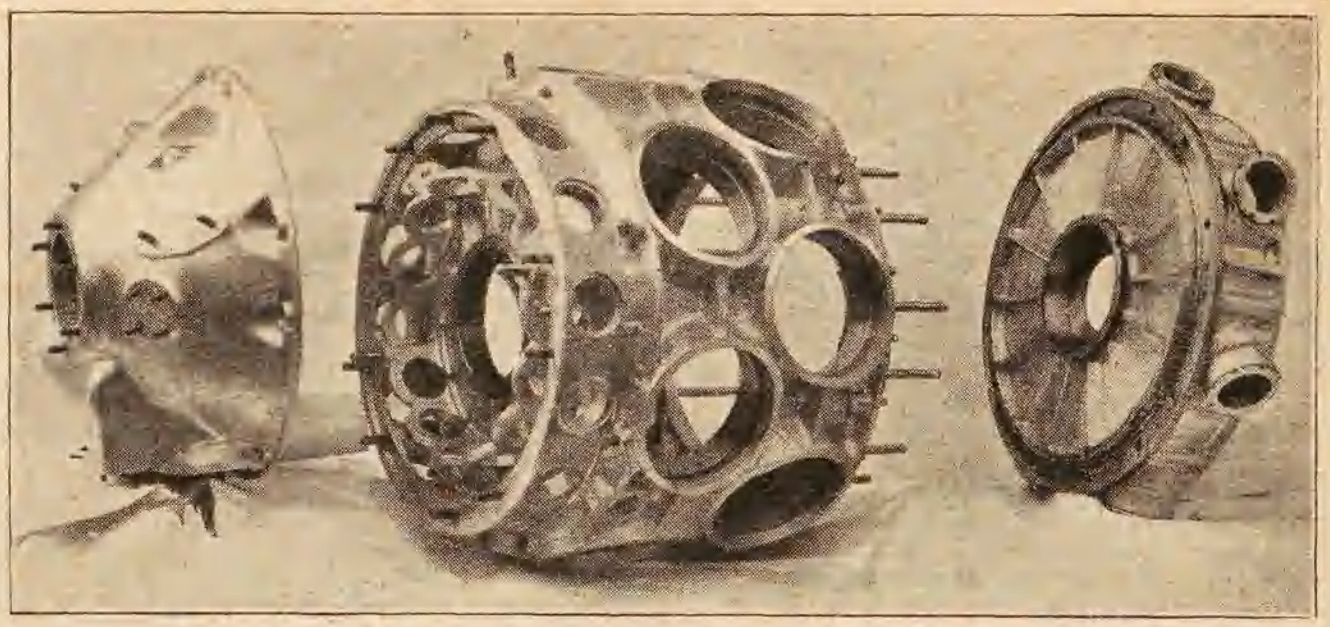
Crankshaft

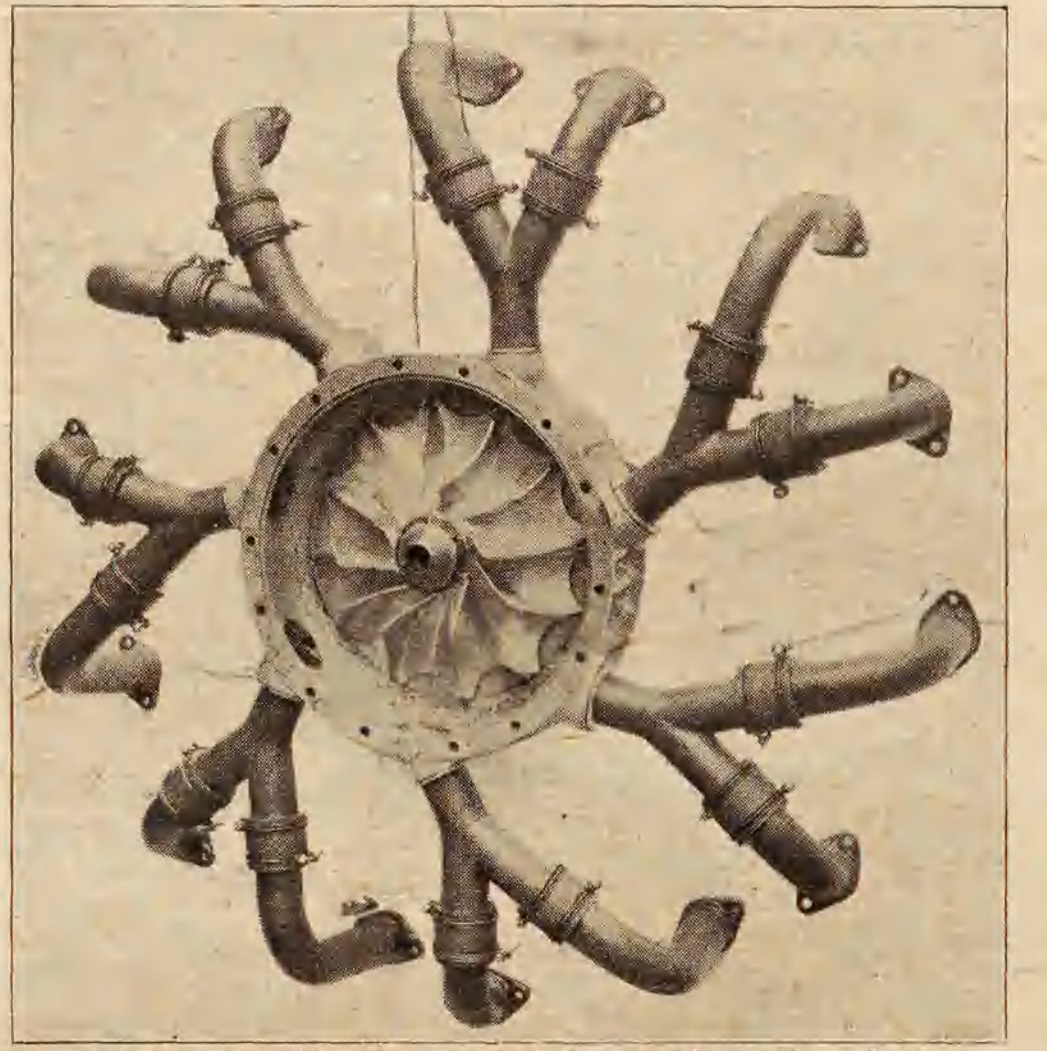
As already mentioned, the crankshaft, which is in one piece and very rigid, is of the two-throw type, with the pins at 180°. Bronze balance weights, shaped like a sector of a circle, serve to neutralise the couple set up by the two pins at 180°. The crankshaft is carried in three journal roller bearings, and is located by a double-acting ball thrust bearing at its front end. The rear end of the crankshaft carries the induction fan. The drives for the cams, ignition gear, and oil pumps are all taken off the front end of the crankshaft.

The Crank-case

The crank-case proper is of aluminium, and is in one piece, although what might be termed the engine "body" consists of three parts. The crank-case itself carries the cylinders, tappet guides, and bolts for securing the engine to its bearer plate. The front cover carries the crankshaft front journal and thrust bearings and the auxiliary drives for pumps, cams

The Armstrong - Siddeley "Jaguar": Crank case with front cover and rear cover and fan casing.





The "Jaguar": Fan casing, fan and induction pipes.

and ignition, while the back cover carries the crankshaft rear bearing and forms the induction fan casing. One of our photographs shows the three parts.

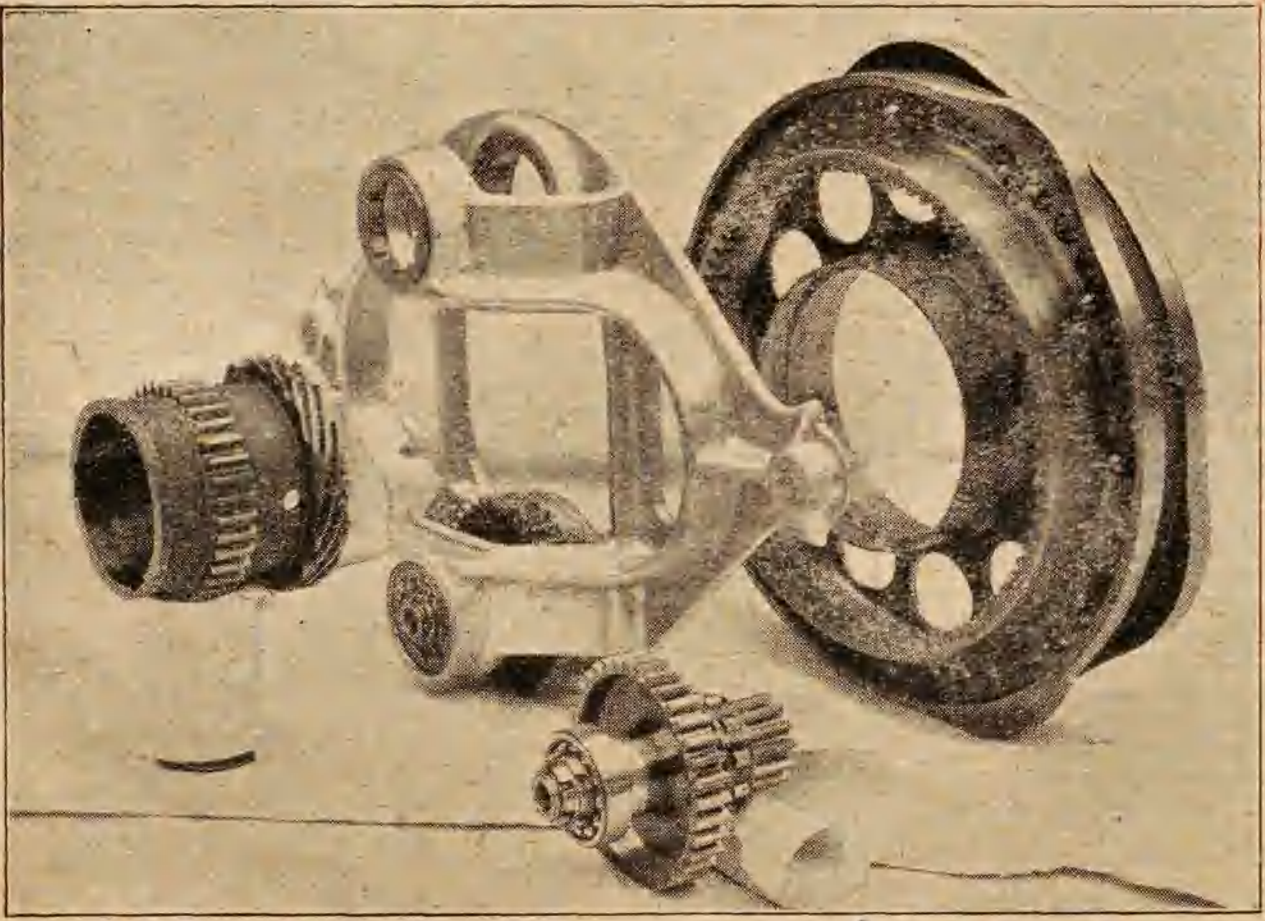
Cylinder Construction

The cylinders of the "Jaguar" are of composite construction, having heads of aluminium and barrels of steel. The aluminium head is a casting, and the fins are so arranged that they leave a space between the valve stem guides on top of the cylinder head. Internally the head shows a hemispherical shape, which should give a good shape of combustion chamber, and the valve seats are of a special bronze alloy. The cylinder barrel is turned and bored from a steel forging, and is shrunk-screwed into the aluminium head, being locked in position there by a lock nut, shaped as a cooling fin. The end of the cylinder barrel butts up against a shoulder in the aluminium head so as to form a gas-tight joint.

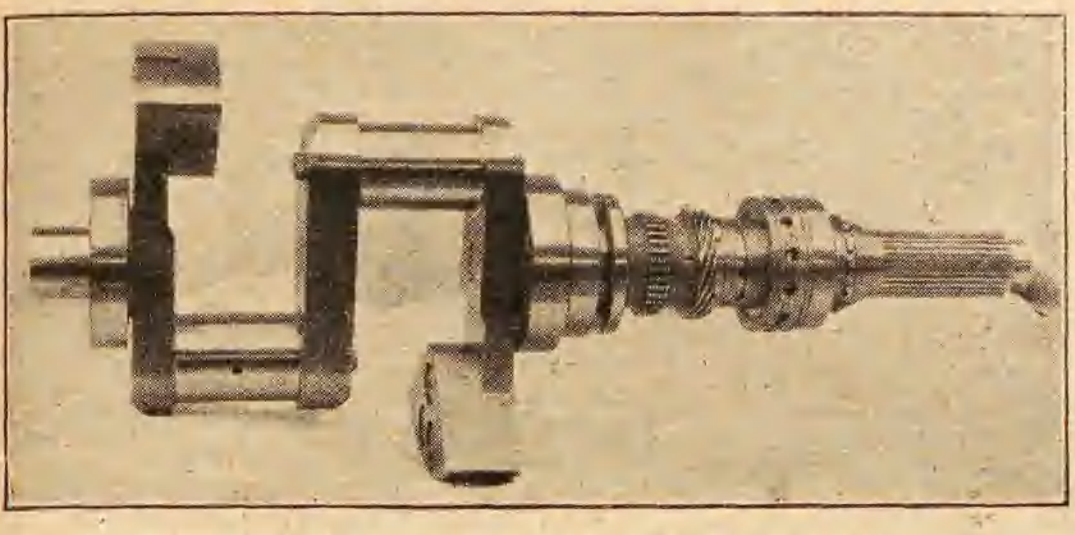
The cylinders are mounted on the crank-case by being screwed into a light steel adapter, and are secured by double-coned locking rings. The cylinder is screwed into the sleeve until the valve gear and ports are in line, and the locking ring is then tightened up.

Induction System

The explosive mixture is supplied by a dual carburettor mounted on the back cover, and delivering through the centre of an induction fan or blower mounted in a casing on the back of the engine.



The "Jaguar" Engine: Cam rings and epicyclic cam gear.



Crankshaft of Armstrong-Siddeley "Jaguar."

The air intake to the carburettor is under the control of the pilot, and may be taken either from the vicinity of the lower cylinder heads or from the slip stream outside the aeroplane fairing. Thus the incoming air may have its temperature regulated to suit atmospheric conditions. The carburettor is heated by an exhaust gas heater box, so that vaporisation of the fuel is started as soon as it leaves the carburettor.

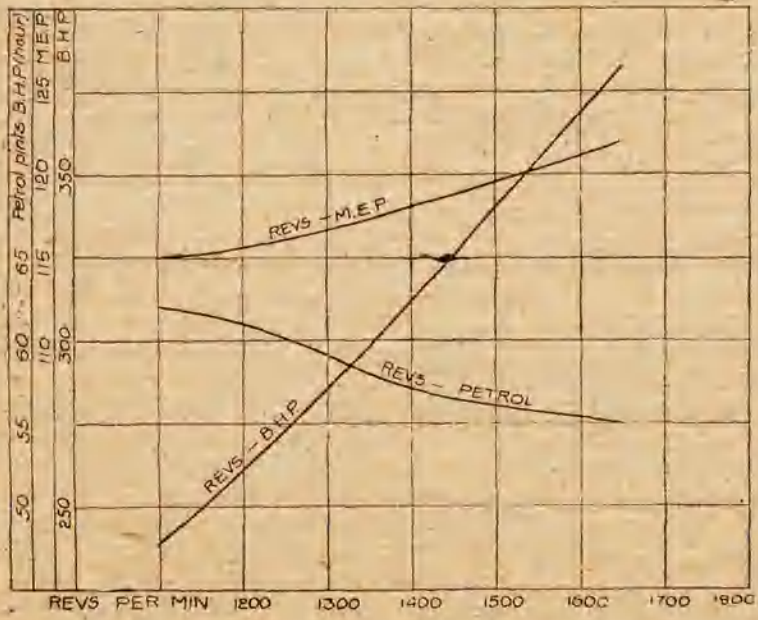
The fan or blower is of the centrifugal type, and is mounted on the rear of the crankshaft and driven at crankshaft speed. Thus the petrol and air are thoroughly mixed, while it is claimed that an even distribution is obtained. At high speeds it would appear that a certain amount of forced induction may be obtained.

The front of the fan chamber forms the rear wall of the crank-case, so that the fan chamber is heated by the oil in the engine body. The rear cover of the fan chamber is similarly heated by a jacket through which hot oil from the engine is passed on its way from the scavenge pump to the oil tank. Seven pipes convey the gas from the fan chamber to the cylinders, each pipe being forked so as to serve one front and one rear cylinder.

The Valve Gear

In these days of multi-valve cylinders it is somewhat surprising to find that the "Jaguar" has only two valves per cylinder. On the other hand, each valve is of fairly large diameter, and the valve gear is certainly simpler with only two valves. It might be mentioned incidentally that all valves with their springs and spring washers are similar and interchangeable. The valve spring collar is retained by a split steel cone, which is screwed (left-hand thread) on to the valve stem. The valve spring, by pressing the collar against the cone, pinches the latter into the screw threads on the valve stem and so locks it.

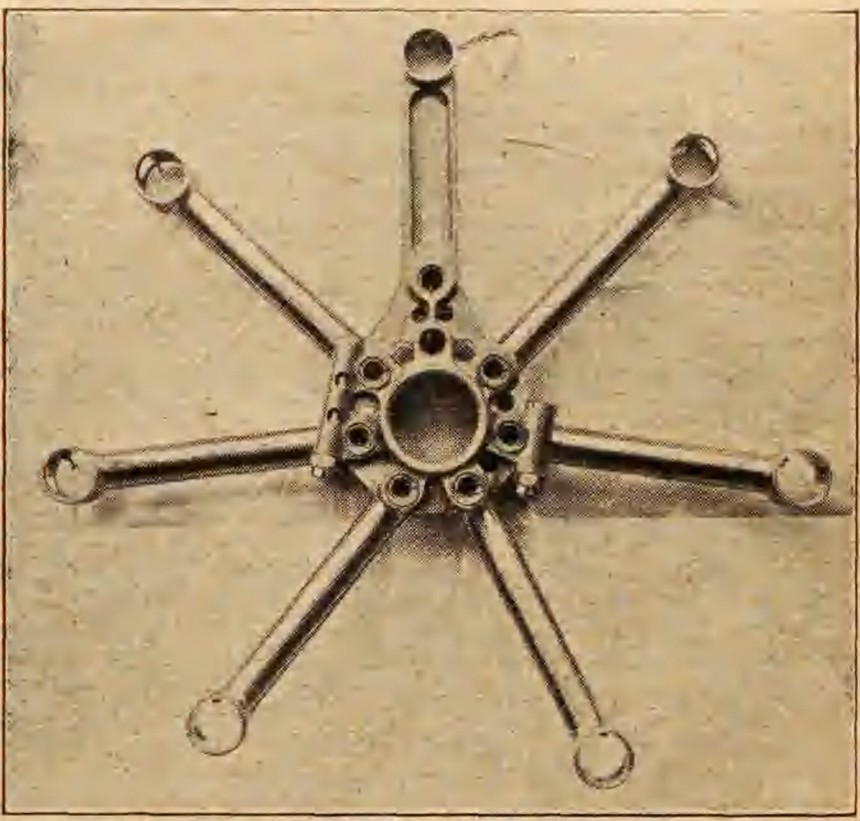
The valves are operated *via* push rods and rockers by two cam rings mounted on the front of the engine. One ring has three cams for the inlet valves and the other has three exhaust cams. The cam rings are driven from the front end of the crankshaft through epicyclic gearing, and rotate together at one-sixth engine speed, and in opposite direction to the crankshaft.



Running chart of the Armstrong-Siddeley "Jaguar."

Lubrication

The "Jaguar" is provided with a somewhat unusual, and very positive, lubrication system. Two pumps, "feed" and "scavenger," of the gear type are fitted, and as the scavenger pump is of about 30 per cent. greater capacity than the feed pump, the base is at all times positively drained. Oil is drawn from the tank and forced by the feed pump through a filter to the hollow crankshaft, at the rate of approximately 2½ gallons per minute. The filter gauze is carried on a movable lantern, which is held in position by a spring. This lantern is so arranged that, in case the gauze gets choked it moves back against its spring, and so allows unfiltered oil to reach the crankshaft. The whole filter may be readily dismantled for cleaning.

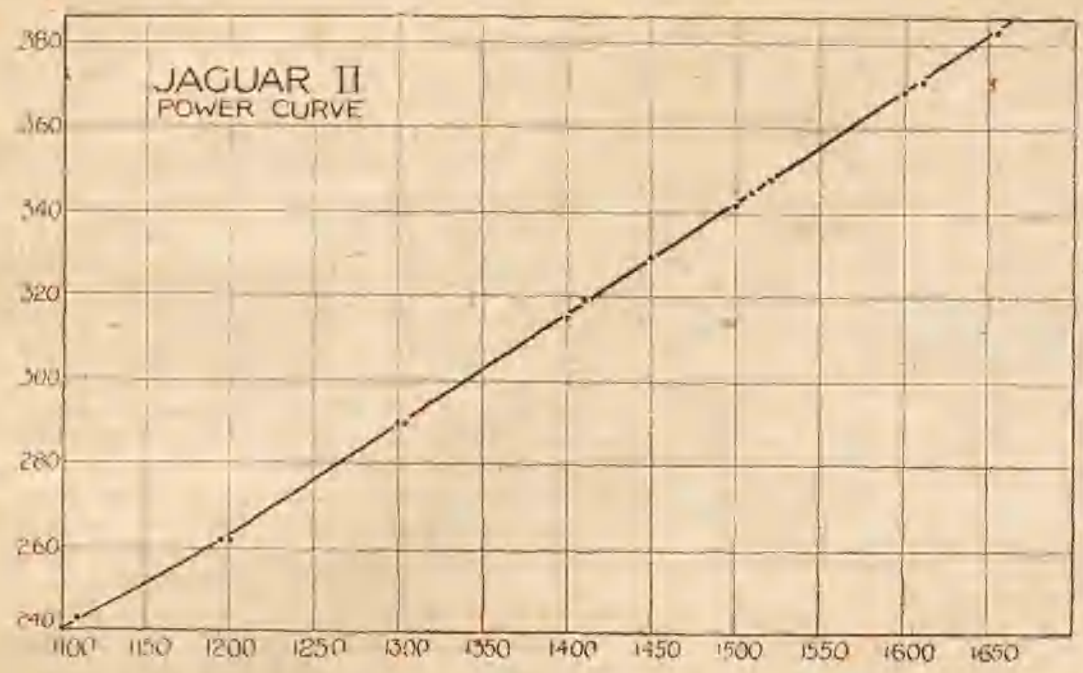


THE "JAGUAR": Connecting rod assembly.

The following table gives a brief summary of the test runs recently undertaken :—

Summary of Tests

Date.	Test.	Time Run. Hrs.	Time Run. Mins.	B.H.P.	B.H.P. Corr.	Fuel (pts. per B.H.P./hr.	Oil (pts. per B.H.P./hr.
17.6.22	Power Curve	0	40	—	—	—	—
,,	Endurance	9	55	234·6	—	—	0·0192
,,	,,	0	5	330·2	331·4	0·599	—
18.6.22	,,	9	55	294·1	—	—	0·218
,,	,,	0	5	329·7	330·3	0·605	—
19.6.22	,,	9	55	293·6	—	—	0·0239
,,	,,	0	5	326·0	326·0	0·599	—
20.6.22	,,	9	55	293·9	—	—	0·0204
,,	,,	0	5	—	330	0·593	—
,,	,,	9	0	292·8	—	0·591	0·0197
21.6.22	,,	0	55	—	—	—	0·0184
,,	,,	0	5	—	342·2	—	
,,	Slow run	0	30	737 r.p.m.	—	—	—
	Acceleration	0	3	—	—	—	—
21.6.22	High Speed	1	0	1,751 r.p.m.	267	0·626	—
	Acceleration	0	2	Five each under 4 seconds.			
21.6.22	High Power	1	0	1,648 r.p.m.	373·5	0·557	—
	Power Curve	0	40	—	—	—	—



Power curve of the Armstrong-Siddeley "Jaguar" aero engine.

The oil entering the crankshaft flows, through passages drilled in the webs, to the crank-pins, where it enters the bearing at the centre, and, after lubricating and cooling the bearing, leaves by holes drilled at each end of the pin, and returns, through similar passages, to the front cover, where it keeps the cams and cam gear thoroughly flooded. The end clearance between the crank-pin bearing and the webs is carefully set to regulate the amount of oil which is thrown off from the crank-pins to lubricate other internal working parts.

All the oil released inside the engine drains to a sump from which it is returned to the tank by the scavenge pump. The oil-pressure gauge is connected to the system on the engine side of the filter, so that the gauge shows the pressure of oil entering the crankshaft, and not the pressure which is being used to force oil through a partly clogged filter. An oil-pressure release valve is fitted to prevent strain on the gauzes and piping through the high oil pressures developed on starting with cold oil. This release valve is set to blow off at approximately 50 lbs./sq. in., and this setting should not, of course, be altered by the users.

Ignition

It is of interest to note that in the "Jaguar" magneto ignition has been done away with, the ignition being by battery and coils. A dynamo driven by the engine charges a small accumulator, and a switchboard complete with cut-out is supplied.

Mounting

A mounting plate of unusual design is employed, and forms a standard part of the "Jaguar" engine. This is a steel pressing shaped like a deep dish, and finishing in a flange in which are 16 holes on a 25-in. pitch circle. The front of this "dish" is bolted to the engine, and its rear flange, with the 16 holes, is carried aft clear of the engine, thus enabling a simple engine plate to be used on the aeroplane.

A few leading Particulars

Without going into a detailed specification the following main particulars of the "Jaguar" may be of interest. The bore and stroke are 5 in. and 5½ in. respectively, and the normal rated horse power at a normal speed of 1,500 r.p.m. is 320 h.p. The maximum rated b.h.p. is 360 at 1,650 r.p.m. The petrol consumption is about 0·53 pts. per b.h.p. per hour, and the oil consumption 0·03 pints/h.p./hour. The weight of the engine is 710 lbs., and the compression ratio 5 to 1. The "Jaguar," as will be seen from the photographs, is very compact, its overall length being but 46½ in. and its maximum diameter (over cylinder heads) 45 in.

* * *

Honours

H.M. THE KING has granted unrestricted permission for the wearing of the following decoration, conferred by His Majesty the King of the Belgians on the following officer for valuable services rendered in connection with the War:—

Croix de Guerre avec Palme.

Squadron-Leader R. L. G. Marix, D.S.O.

R.A.F. Club Cricket Week

ARRANGEMENTS for the Royal Air Force Club Cricket Week are now nearing completion. By arrangement with the Eastbourne Club, the Saffrons Ground at Eastbourne has been secured for the dates September 20-26 inclusive and the football fixtures arranged for that time have been postponed.

Two three-day matches will be played. The first (on September 20, 21, 22) will be North of England *v.* South of England; the second (September 23, 25, 26) will probably be an eleven of Past R.A.F. Officers and Men *v.* the Rest of England, or a similar fixture.

The following ex-R.A.F. officers and men have accepted invitations to play: P. G. H. Fender (Surrey), Hon. F. S. G. Calthorpe (Warwick), A. H. H. Gilligan (Sussex), A. Jeacocke (Surrey), S. L. Amor (Somerset), Hobbs (Surrey), Woolley, F. E. (Kent), Hardinge (Kent), Geary (Leicester), Parker (Gloucester) and Waddington (Yorks).

Others who have accepted invitations to play include Hon. L. H. Tennyson (Hants), A. E. R. Gilligan (Sussex), A. W. Carr (Notts), N. Haig (Middlesex), Tyldesley, E. (Lancs), Kilner, R. (Yorks), Parkin (Lancs), Gunn, G. (Notts).

Although the week is not included in the list of first-class cricket fixtures, very excellent cricket should be seen, and the matches will have an added interest owing to the fact that several of the players may be selected for the South African tour and this may be the last occasion upon which the public will be able to see them before their departure.

Tickets for the reserved covered stand, and other information, may be obtained from the Hon. Secretary, Capt. M. G. Kiddy, 24, Denison House, 296, Vauxhall Bridge Road, S.W. 1. (Telephone, Victoria 2112.)

Aero Golfing Society

A NEW golfing club has been formed under the above title, with Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., as President.

A Committee (*pro. tem.*) has been appointed, including A. J. A. Wallace Barr, P. Barry, Comdr. W. Briggs, R.N., Lieut.-Col. W. A. Bristow, C. R. Fairey, E. B. Parker, Capt. L. V. Pearkes.

Lieut.-Col. F. K. McClean, A.F.C., is Hon. Treasurer and Mr. Harold E. Perrin, Hon. Secretary.

The Headquarters are at the Royal Aero Club, 3, Clifford Street, London, W. 1.

Membership (limited to 100) is open to officers and ex-officers of the R.N.A.S., R.F.C. and R.A.F., and to gentlemen engaged in the Aircraft Industry; the annual subscription is 10s.

British Forces in Ireland

THE Postmaster-General states that, in order to avoid the risk of delay to letters, parcels, etc., for the British military and Royal Air Forces in Dublin and district, the address should consist of—(1) The name and rank of the addressee; (2) his unit; and (3) the words, "Army Post Office, Southern Ireland."

* * *

THE LONDON AERO-MODELS ASSOCIATION
(The Society of Model Aeronautical Engineers.)

The postponed competition for FLIGHT Challenge Cup will be held on Saturday next on Wimbledon Common at 5 p.m. Members to meet at the Windmill at 4.30 p.m. For rules see FLIGHT, June 22. A rising-off sheet will be provided on account of the bad state of ground. The thanks of the members are due to Mr. F. de P. Green, Mr. Houlberg and Mr. Rippon, for having kindly undertaken to prepare same. Thanks are also due to Mr. Green and Mr. Evans for providing the Society with a set of flags and tapes.

The Competition for Mr. Felix Kelly's Challenge Cup will be held on Saturday, September 2. See FLIGHT, June 29, for full particulars of same.

Transfers of the letters L.A.M.A. can now be obtained from Mr. Burchell.

The Committee are desirous of active members putting up new flying records.

The membership of the Society is now approaching 80. Can we reach the first hundred before the end of September?

Meetings are held at Headquarters, 20, Great Windmill Street, Piccadilly, W. 1, every Thursday evening, at 7.30. Anyone interested in model aeronautics will be welcomed.

A. E. Jones, Hon. Sec., 48, Narcissus Road, West Hampstead, N.W. 6.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

THE AERIAL DERBY, 1922

(Under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aéronautique Internationale)

at

Waddon Aerodrome, Croydon, on Monday, August 7, 1922.

Prizes

The following prizes will be presented by the Royal Aero Club:—

Fastest time (winner of the Aerial Derby), Trophy and £300; Handicap: 1st prize, Trophy and £150; 2nd prize, £75; 3rd prize, £50.

Regulations

Qualification of Competitors.—The Competition is open to persons of any nationality holding a licence issued by any Aero Club affiliated with the Fédération Aéronautique Internationale.

Organisation.—The Competition shall be conducted by the Royal Aero Club under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aéronautique Internationale.

Entries.—The entry fee is £10. Entries close on Wednesday, July 26, 1922, at 12 noon. Late entries will be received up to 12 noon on Monday, July 31, 1922. Late entry fee £15.

Course.—The Course is approximately 200 miles, and will consist of a double circuit of London, starting from Waddon Aerodrome, Croydon, with the following turning points: West Thurrock, Epping, Hertford, Brooklands Aerodrome, Weybridge.

Air Navigation Regulations.—Competitors must comply with the Air Navigation Regulations in force.

Members of the Club will be admitted free on presentation of their Membership Cards. Motor-cars, 6s.

COMMITTEE MEETING

A meeting of the Committee was held on Wednesday, July 12, 1922, when there were present: Lieut.-Col. F. K. McClean, A.F.C. in the Chair; Wing-Commander W. D. Beatty, C.B.E., R.A.F., Mr. Ernest C. Bucknall, Lieut.-Col. M. O'Gorman, C.B., Mr. T. O. M. Sopwith, and the Secretary.

F.A.I. Rome Conference.—The following delegates were appointed to represent the Club at the F.A.I. Conference to be held in Rome on October 4, 1922:—

Lieut.-Col. F. K. McClean, A.F.C., Lieut.-Col. M. O'Gorman, C.B., H. E. Perrin.

Racing Committee.—The recommendations of the Racing Committee regarding the Aerial Derby were received, and it was decided to hold the Race at Croydon on August Bank Holiday, Monday, August 7, 1922.

Schneider Cup.—The entry on behalf of Great Britain was reported as follows:—

Flying Boat, constructed by the Supermarine Aviation Works, Ltd., with 450 h.p. Napier engine. Pilot, Captain H. C. Biard.

It was unanimously decided to vote £100 towards the expenses of the British competitor.

Aviators' Certificates.—The following Aviators' Certificates were granted:—

7927 Norman Jeffries, May 19, 1922.
7928. Frederick Arthur James Champion, May 11, 1918.
7929. Leslie Norman Hollinghurst, March 20, 1917.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JULY 9 AND JULY 15, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h m.		
Croydon–Paris	52	161	26	36	50	2 31	D.H. 34 G-EBBQ (1h. 56m.)	B. (6), D.H. 9 (1), D.H. 18 (1), D.H. 34 (3), G. (8), H.P. W.8B (3), V. (1).
Paris–Croydon	52	154	10	32	48	2 54	D.H. 34 G-EBBQ (2h. 6m.)	B. (7), D.H. 9 (1), D.H. 18 (2), D.H. 34 (3), G. (8), H.P. W.8B (3), V. (1).
Croydon–Brussels ...	10	17	6	9	10	2 25	D.H. 34 G-EBBR (2h. 1m.)	D.H. 18 (1), D.H. 34 (1), W. (1).
Brussels–Croydon ...	10	20	—	4	9	2 30	Westland G-EARE (2h. 8m.)	D.H. 18 (1), D.H. 34 (1), W. (1).
Croydon–Rotterdam–Amsterdam.	11	14	11	10	11	2 33§	Fokker H-NABH (2h. 4m.)	F. (8).
Amsterdam–Rotterdam–Croydon.	11	7	11	11	11	2 57§	Fokker H-NABN (2h. 15m.)	F. (8).
Totals for week ...	146	373	64	102	139			

* Not including "private" flights. † Including certain journeys when stops were made *en route*. ‡ Including certain diverted journeys. § Rotterdam.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Sp. = Spad. V. = Vickers Vimy, Vulcan, etc. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

Incidental Flying.—During the week two of the De Havilland Co.'s D.H. 9's kept up a daily service between Lympne and Ostend, carrying goods and passengers.

THE HANDASYDE MONOPLANE, TYPE H.2

Rolls-Royce "Eagle" Engine

ONE of the most interesting machines which we have had the opportunity of seeing is now nearing completion at the Bleriot Works at Addlestone. The machine referred to is the new Handasyde monoplane, designed by Mr. G. H. Handasyde, of the Handasyde Aircraft Company, for Australia. Being at the moment without works for manufacturing aircraft, the Handasyde Aircraft Co. have made arrangements with Mr. Chereau for the construction of a batch of these machines at the Bleriot Works, and here we had the opportunity of inspecting the machines last week for the purpose of compiling the following notes, and obtaining the accompanying illustrations. It should be pointed out that, at the time of our visit, no drawings were available of the engine cowling and undercarriage. Although as regards general lay-out the accompanying scale drawings are accurate, the portion relating to these two items should be taken as representing the general idea only, and is not guaranteed to be exact as regards dimensions, as we were unable to obtain certain necessary information relating to wheel track, size of wheels, etc. For the rest, however, the scale drawings on p. 413 may be taken as being accurate.

General Design

To those who have followed the development of flying since its earliest days it will not come as a surprise that the new H.A.C. machine is a monoplane. From the very first Mr. Handasyde was a great believer in the monoplane, and it will be remembered that his early machines, round about 1911, 12 and 13, were of this type. During the War Mr. Handasyde turned his attention to biplanes, not because he had lost his faith in the mono., but as a result of the demands of the R.A.F. He proved that he was quite as capable of designing biplanes as monoplanes, and probably his F.4 is the most beautiful aeroplane that has ever been produced. It must be admitted that, purely as regards appearance, the new monoplane is not up to the F.4, but probably this was impossible of attainment in a monoplane type.

The new machine, which is of the cantilever type, is characterised, in the matter of construction, by being built almost entirely of wood. Metal is used very sparingly in the construction, and the manner in which the wood has been used is everywhere interesting and, in places, highly ingenious.

The Fuselage

The *fuselage* is built up of a framework of four main *longerons*, a certain number of stringers, and shaped formers or bulkheads. The covering is three-ply wood. Although the main frame work is of rectangular section, the cross-section of the complete body is rounded, the flat sides, top and bottom having been brought up to a rounded section by curving the formers and bending the three-ply covering over them. It is an old axiom that one can bend three-ply sheet over a single but not over a double curvature. In other words, although it can be bent over a cylinder, it cannot be bent over a barrel. In the Handasyde H.2, as the new machine is called, it would appear that an attempt has been made to bend the three-ply covering over a barrel. On closer examination, however, one discovers that the old saying has not been disproved, since here and there it has only been possible to persuade the ply-wood to bend by sawing little vee-shaped pieces out of the ends. By using smaller panels elsewhere, the desired curvature is obtained, or, more correctly speaking, the curvature consists of several relatively small straight faces.

The four main *longerons* are of ash, while the simple struts and stringers are of spruce. The shaped bulkheads or formers are built up into box sections from ash flanges and three-ply walls. A noticeable feature of the *fuselage*, which, incidentally, has also characterised Handasyde-designed biplanes, is that all tapers are straight, with the *longerons* butt-jointed and the joints reinforced by fish-plates of generous area. Thus in the H.2 the cabin portion of the *fuselage* is one piece, with the *longerons* running parallel. To this portion the rear part of the *fuselage* is joined and runs in a straight taper to the tail. Similarly, the part of the *fuselage* which is in front of the cabin is of straight taper, with joints well secured by large fish-plates.

The Monoplane Wing

Perhaps the most interesting feature of the machine is the manner in which the wing has been built up. Aerodynamically also the wing is interesting, on account of the sections employed, which taper from a deep bi-convex section at the root to a very thin section, with perfectly flat bottom camber, at the tip. So far as we were able to discover, there is no change in the angle of incidence along the span: in other words, there is neither "wash-out" nor "wash-in."

Constructionally, the wing is interesting; first, on account of the fact that it is built up on four main spars, and, secondly, because of the unusual wooden covering which takes the place of fabric. From the plan view of the general arrangement drawings, it will be seen that the wing, which is built in two halves, joined on the centre line, has a pronounced taper from root to tip. The front main spars are parallel, the others tapering so as to fall always at the same percentage of the chord from the leading edge. The use of more than two spars in a cantilever wing has previously been advocated in this Journal as being more economical, but up to the present no machine except the new Handasyde has been built in this country which incorporates this feature.

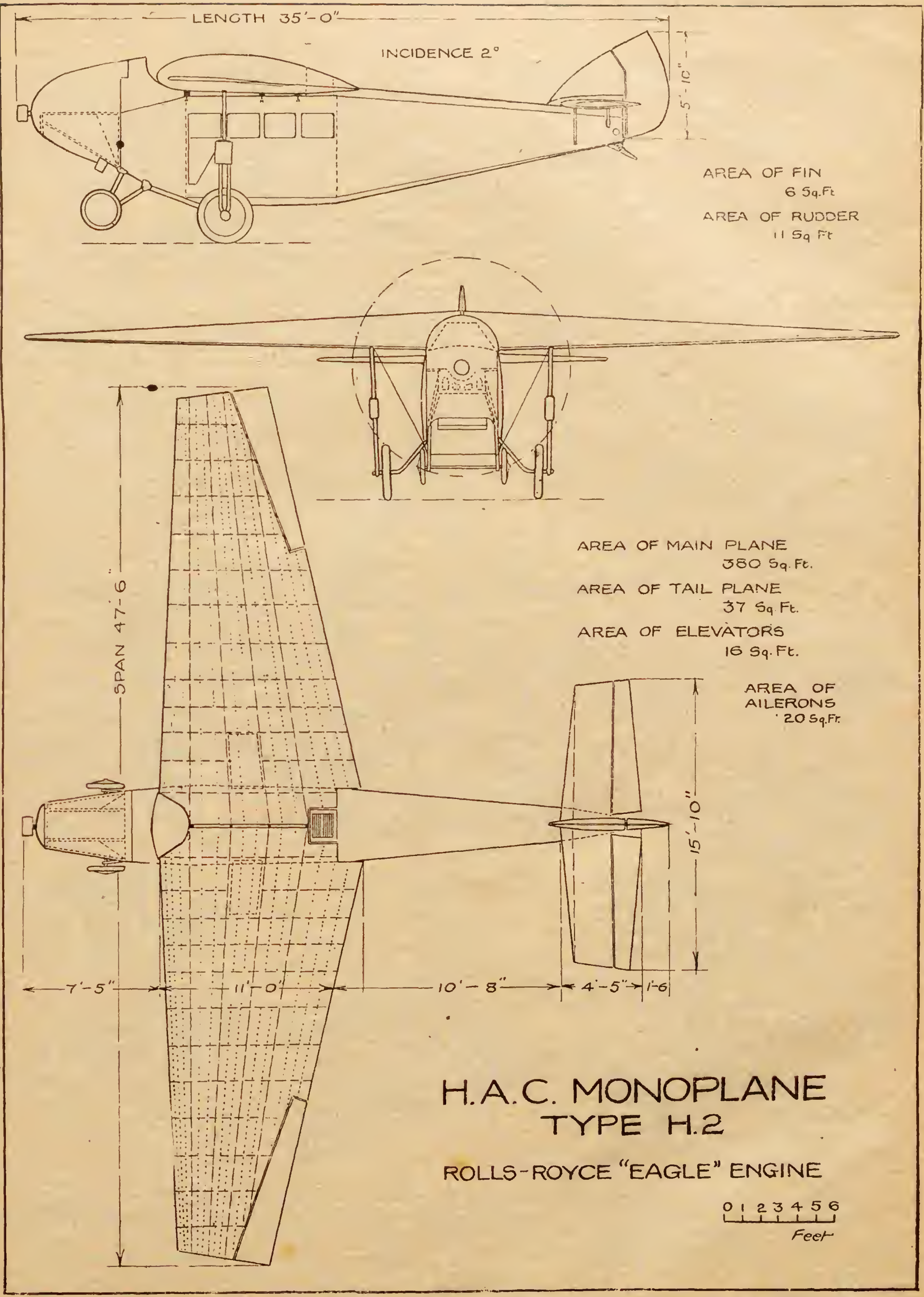
The construction, quite apart from the number of the spars, is interesting. Obviously with four spars each can be built much lighter and the usual forms, such as simple I sections or box sections may not necessarily be the best. The form which the spars of the H.2 take is a built-up I section, with a thin web of two-ply spruce and divided flanges of the same material. The web is built up of two thicknesses, each composed of thin strips about 4 inches wide crossing the other at right angles, each crossing the horizontal at 45 degrees. In order further to strengthen the web, its two sides are covered with fabric. The flanges, which are made up of two strips each, have their halves screwed and nailed through the web, which comes up to the level of the outer faces of the flanges.

Between the spars there are two sets of stringers, one set on the upper surface and one on the lower, and the ribs, which are of a construction somewhat similar to that of the spars, are notched to receive the stringers.

The ribs are built up of thin three-ply webs, stiffened with vertical and diagonal pieces of spruce, having two sets of flanges, one of which passes inside the stringers and the other forms the outer flanges. The sketches will serve to indicate the construction. All ribs project past the stringers and come up to the level of the wooden wing covering. Where local loads occur, such as, for instance, the petrol tanks, the attachment of the undercarriage struts, etc., double ribs are used, whose construction is also shown in the sketches. Both single and double ribs have the outer flanges running across the spars, and the shear stresses are taken by the inner flanges and three-ply webs resting against the inner faces of the spar flanges.

Interesting as is the construction of the spars and ribs, the wing covering is even more so. Although it appears possible that the wood covering takes a certain part in supporting the load, the manner of applying the strips of which it is composed is such that no allowance has been made for this in stressing the wing. The covering consists of spruce strips approximately ¼ inch thick and about 4 inches wide, laid parallel in a fore and aft direction. In order to lighten these strips, they have been spindled out, leaving narrow ridges the full depth of the thickness of the strips. It was noticed that where the strips are bent over a fairly steep curve, the spruce covering strips, or planking, as one might term them, had sagged between these ridges, much as does the fabric between ordinary wing ribs, but, of course, to a much smaller extent. There is no internal drag bracing, as the wing planking, running fore and aft, is capable of resisting drag stresses. The leading edge of the wing is formed by $\frac{1}{16}$ inch three-ply, packed up by strips on the front spar to come level with the thicker spruce covering. We have no figures relating to the weight of the wing, but Mr. Handasyde informs us that, although heavier per square foot than the ordinary thin wing with bracing, in view of the high lift coefficient of the thick section, the wing comes out quite light. Naturally the first wings have been very expensive to build, as jigs, etc., had to be erected, but it is thought that for production in quantities the construction will not be unduly expensive. The finished wing certainly looks a beautiful piece of work, and we think Mr. Chereau is to be congratulated upon the manner in which his works have carried out a difficult piece of construction.

The attachment of the wings to the *fuselage* is very neat and simple, and should prove very satisfactory. On the four formers in the cabin, near the top *longerons*, are metal fittings, roughly of T shape, with the one arm of the T projecting out through the *fuselage* covering. As there is



THE H.A.C. MONOPLANE, ROLLS-ROYCE "EAGLE" ENGINE: General arrangement drawings.

one of these plates on each side of the former, and bolted through it, two lugs project from each former. On the main wing spars are long straps, one on the front and one on the rear of each spar, projecting below the wing covering. These lugs are in line with, but slightly above, those on the *fuselage*, and the two are held together by a form of turnbuckle. In order to distribute the weight of the wing, when the machne is on the ground, over a larger area, the wing fittings have aluminium packing pieces, which engage with wooden brackets on top of the *fuselage*. The rearmost fitting on the *fuselage* has also an aluminium packing piece, stepped to locate the rear wing spar in a fore and aft direction. It might be mentioned that the wood brackets on the top of the *fuselage* are faced on top with leather, so as to allow of the wing fittings bedding right home in the leather.

Engine Mounting

The engine mounting is one of the simplest imaginable, the framework consisting of four *longerons* of ash about 2¼ inches square, bolted at the rear to the front end of the *longerons* with the usual large fish-plates, and terminating in front in two points, on a former of multi-ply wood. The engine bearers are simply two stout steel tubes resting in sockets in the bulkhead and in the front multi-ply former, and braced by a tube running to the lower corner on each side. It would be difficult to imagine a simpler mounting and one which allowed of easier access to the engine.

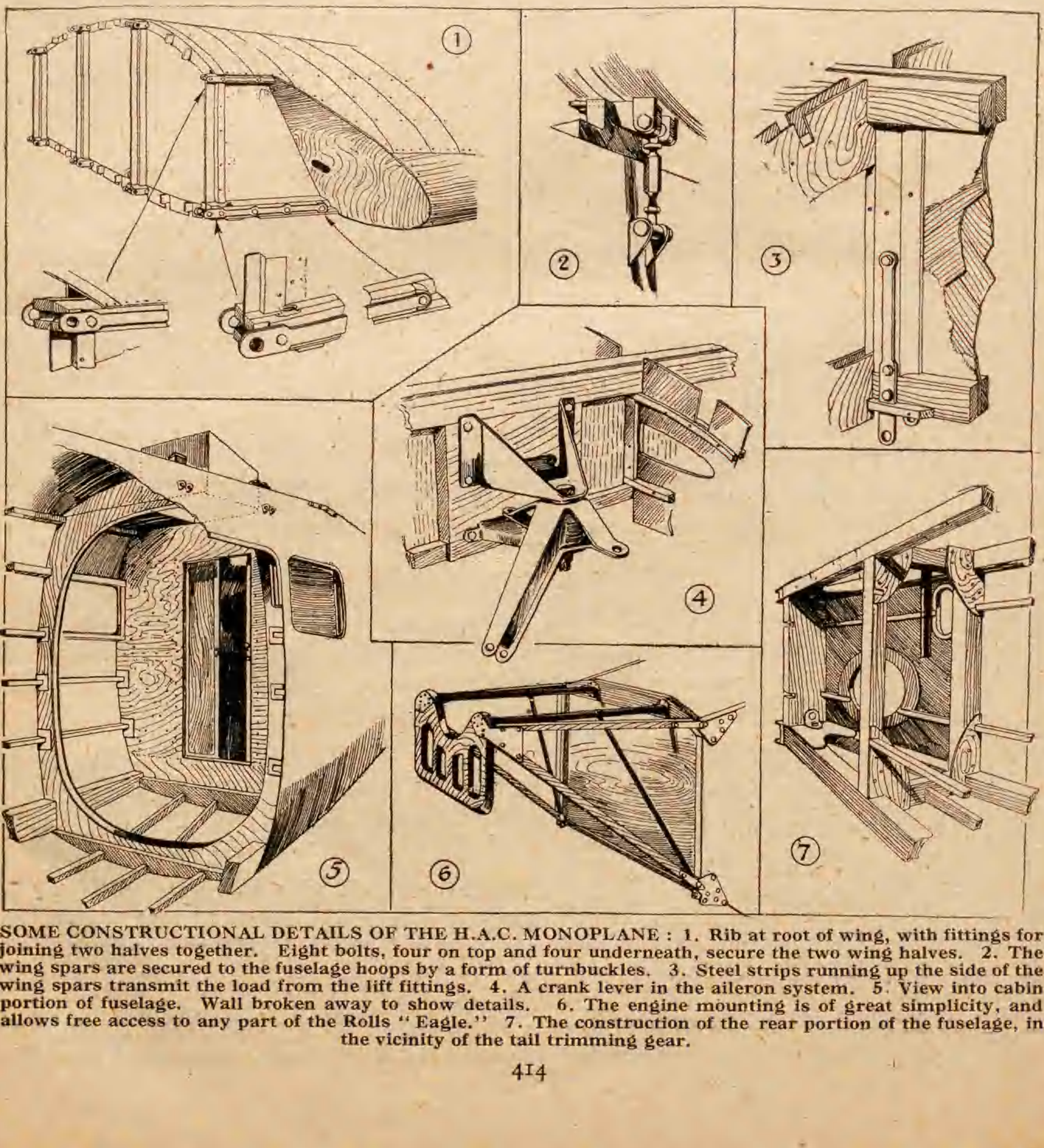
The radiator, which was not in place when we saw the machine, is to be mounted behind and below the engine, with a portion projecting below the lower cowl. Without a front radiator the nose of the engine housing can be nicely rounded off, somewhat as shown in the scale drawings.

Petrol System

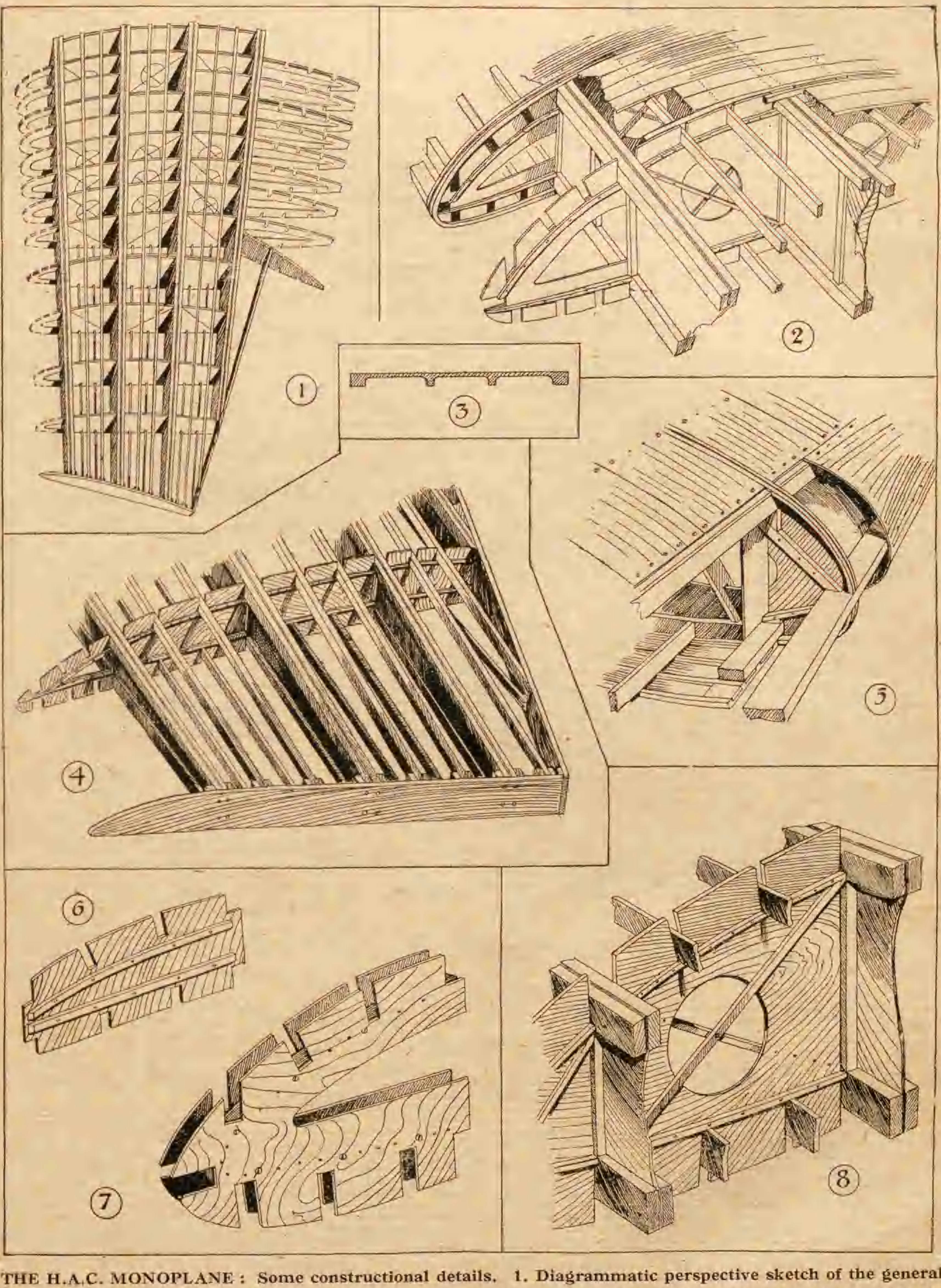
The petrol system of the H.A.C. H.2 is of the latest approved type, with the tanks in the wings, right outside the *fuselage*. Owing to the great depth of the wing section, it has been possible to place the tanks entirely inside the wings without unsightly projections. It appears doubtful, however, whether the " head " thus obtained will be sufficient for direct gravity feed, and probably a small service tank will have to be carried in the *fuselage*. A low-pressure petrol system should be sufficient, so that even if the ideal of direct gravity feed is not attained, there should be little possibility of trouble with the petrol supply.

The Undercarriage

One of the features of the machine about which we were not able to obtain very definite details is the undercarriage. It is understood that this is to be of the four-wheeled type, with two large wheels approximately under the centre of gravity, and with a smaller pair under the nose to prevent turning over. From the fittings on the *fuselage* it is assumed that the axle will hinge on the lower *longeron*, and run out a considerable distance, terminating in a slight bend just inside the wheel. The latter is to be sprung, how we do not yet know, by a telescopic strut to the wing. A very



SOME CONSTRUCTIONAL DETAILS OF THE H.A.C. MONOPLANE : 1. Rib at root of wing, with fittings for joining two halves together. Eight bolts, four on top and four underneath, secure the two wing halves. 2. The wing spars are secured to the fuselage hoops by a form of turnbuckles. 3. Steel strips running up the side of the wing spars transmit the load from the lift fittings. 4. A crank lever in the aileron system. 5. View into cabin portion of fuselage. Wall broken away to show details. 6. The engine mounting is of great simplicity, and allows free access to any part of the Rolls " Eagle." 7. The construction of the rear portion of the fuselage, in the vicinity of the tail trimming gear.



THE H.A.C. MONOPLANE : Some constructional details. 1. Diagrammatic perspective sketch of the general arrangement of the wing. 2. Details of spar and rib construction. 3. Section through a spruce strip used for the wing covering. 4. The raked rib of the wing tip. 5. Details of leading edge, which is covered with thin three-ply wood. 6. Piece of three-ply rib web, as fitted between spars. 7. Nose-piece of a double rib. 8. Larger view of method of building up spars and ribs.

substantial metal fitting on the wing receives the strut, and, in order to distribute the load over the spar, this fitting incorporates an aluminium packing piece of ample area, against which the telescopic strut abuts. In order to turn the bending stress into a purely compressive stress in the spar, a bracing cable or wire is taken to the fitting on the lower *longeron*, on which the axle hinges, and the *fuselage* is here reinforced by a tie rod running underneath the belly of the *fuselage* to the fitting on the other side. This tie rod is anchored in trunnions working in the fitting on the *fuselage*. To a certain extent the wire or cable running from the wing to the *fuselage* will help in bracing that particular wing spar against flying loads, although it will not, of course, help to any extent in resisting twisting stresses in the wing.

The front pair of wheels will presumably be carried on two small vees, judging from fittings on the *fuselage*.

The Tail

Of very characteristic outline, the tail plane, elevators, rudder and fin are of more orthodox construction than are the main planes. The tail plane, for which a very substantial worm trimming gear is provided, has spars of straight taper, spindled out to an I section. The vertical fin has a stout post fitting into brackets on the back of the stern post, and to it the rudder is hinged by eye-bolts. The fin curves over the top of the tail plane, and fin, rudder, tail plane, and elevators are of symmetrical streamline section.

Cabin Accommodation

The middle portion of the *fuselage* is devoted to cabin accommodation for the passengers. Normally, seats will be provided for six passengers in the cabin, but should it be desired to use the machine for goods carrying the space available is reasonably large, and even bulky goods could be carried, provided the packages were small enough to go through the doors. Of these there is one on each side, near the front of the cabin, and three windows on each side, aft of the doors, serve to admit the light.

An emergency exit through the roof of the cabin is provided. This takes the form of a box of three-ply wood, built on to the roof and projecting up inside a cut-out portion in the trailing edge of the wing. On top this exit is covered with a hinged trap door of sheet aluminium, provided with *louvres* for the ventilation of the cabin. Aft of the cabin is a lavatory, while in front, under the pilot's seat, is a space for luggage.

The Pilot's Cockpit

Placed as it is in front of the wing, and with the nose of the *fuselage* fairly pointed, the position of the pilot's cockpit should ensure a very good view forward, which is a point not always given due consideration by designers. In the H.2 the pilot is placed high, his head level with the leading edge of the wing, out of which a portion has been cut to accommodate him. The front portion of the cockpit is formed by a deep three-ply fairing built on to the top of the *fuselage* proper. The controls will be of more or less standard type, as will also the equipment of instruments, etc.

At present a batch of four machines is coming through the Bleriot Works, and it is understood that they are intended for the Larkin Company in Australia, for service on the Brisbane-Sydney-Adelaide route. The addition of such very up-to-date flying stock to these services should materially help towards establishing commercial aviation on a sound basis in Australia.

As regards weights, performance figures, etc., we have not at present been able to obtain any information, but there would appear to be every reason to think that, with its good wing sections and a well-shaped body, the new Handasyde monoplane will be fairly fast, especially as the fitting of a Rolls-Royce "Eagle" for but six passengers should result in a fairly large reserve of power. A little later, when the first machine has been tested, we hope to be able to supplement this description with further details and with figures of weights and performance.

* * * *

THE ROYAL AIR FORCE

London Gazette, July 11, 1922

General Duties Branch

Flying Offr. D. L. Evans, M.C., D.F.C., is granted a permanent commn., retaining his present substantive rank and seny.; Oct. 24, 1919. *Gazette*, Oct. 24, 1919, appointing him to a short service commn., is cancelled. Flight Lieut. A. W. Bird, D.S.O., resigns his permanent commn., and is granted the rank of Maj.; April 18. J. C. Jeffrey, M.C., is granted a short service commn. as a Flying Offr. for three years on the active list, with effect from, and with seny. of July 1. Flight Lieut. A. H. Wann is restored to full pay from half-pay; June 13 (substituted for *Gazette*, June 23). Flying Offr. G. E. Randall, D.F.C., to take rank and precedence as if his appt. bore date April 1, 1919. Reduction to take effect from July 1. Flying Offr. M. Pennycook is dismissed the Service by sentence of a General Court-Martial; July 4. Flying Offr. A. M. G. Cosgrave relinquishes his short service commn. on account of physical unfitness for full flying duties, and is permitted to retain rank of Lieut.; July 12. Flying Offr. F. A. Benfield is placed on retired list on account of ill-health contracted on active service; July 12.

Stores Branch

The following are granted short service commns. as Flying Offrs. for Accountant duties, with effect from dates indicated. Their names will be placed on the gradation list immediately below those of the officers indicated in brackets.—*Flying Offrs.*—R. E. Barrett; May 16 (R. G. Dyer). L. J. Marden; May 16 (A. B. Holt). F. W. Healey; May 19 (F. H. Wakeford).

Flying Offr. E. J. Stokoe relinquishes his short service commn. on account of ill-health; July 12.

Medical Branch

The following are granted permanent commns. in the ranks stated, with effect from the dates indicated, retaining their present seny., except where otherwise stated. *Gazettes* of dates indicated in brackets, appointing them to short service commns., are cancelled:—

Flight-Lieuts.—A. Briscoe, M.B., July 13, 1920; July 13, 1920. T. Montgomery, M.B., B.A., July 13, 1920; July 13, 1920. G. H. H. Maxwell, Aug. 24, 1920; Sept. 14, 1920. S. E. Elphick, April 4, 1921; April 12, 1921.

Flying Offr. (since promoted).—R. Boog-Watson, June 7, 1920; June 15, 1920.

The following Flight-Lieuts. are transferred to the Reserve Class D. 2 (July 13):—W. A. Malone, J. P. Wells, B.A., C. H. Young, M.B.

Memorandum

The permission granted to Sec. Lieut. W. Cougle to retain his rank is withdrawn on his joining the Army.

ROYAL AIR FORCE INTELLIGENCE

Wing-Commanders: I. T. Courtney, C.B.E., from C. and M. Party, Felixstowe (Coastal Area), to Headquarters, Coastal Area (Supernumerary). 13.7.22. Henry Ashbourne Treadgold, M.D., B.A., from Air Ministry (D.M.S.) to R.A.F. Depot (Inland Area) (Supernumerary). 30.6.22. C. F. Kilner, D.S.O., from Boys' Wing (Cranwell) to H.M.S. *Argus* (Coastal Area), to command R.A.F. Unit. 15.8.22. G. P. Grenfell, D.S.O., from Instrument Design Establishment (Inland Area) to No. 1 Flying Training School (Inland Area) (Supernumerary). 17.7.22. R. J. F. Barton, O.B.E., from R.A.F. Depot (Inland Area) to command Boys' Wing (Cranwell). 1.8.22.

Squadron-Leaders: C. P. Ogden, O.B.E., from Marine and Armament Experimental Establishment (Coastal Area) to R.A.F. Depot (Inland Area) (Supernumerary). 15.7.22. D. S. K. Crosbie, O.B.E., from Air Ministry (D.O.I.) to R.A.F. Depot (Inland Area) (Supernumerary). 19.7.22. E. W. Craig M.C., M.B., from R.A.F. Depot (Inland Area) to Air Ministry (D.M.S.). 30.6.22. J. Sowrey, A.F.C., from R.A.F. Depot (Inland Area) to R.A.F. Cadet College (Ground Wing) (Cranwell). 1.8.22. F. W. Stent, M.C., from R.A.F. Depot (Inland Area) to M.T. Repair Depot (Inland Area). 1.8.22. R. E. Bell, M.B. (Medical), to Half-pay List. 30.7.22.

Flight-Lieutenants: N. R. Fuller. The notifications which appeared wherein this Officer was posted from R.A.F. Depot to No. 1 Flying Training School, with effect from 1.7.22, is hereby cancelled. Hon. J. H. B. Rodney, M.C., from Central Flying School (Inland Area) to No. 24 Squadron (Inland Area). 1.7.22. R. F. Durrant, A.F.C., from No. 10 Group Headquarters (Coastal Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 18.7.22. E. F. Turner, from R.A.F. Depot (Inland Area) to No. 10 Group Headquarters (Coastal Area). 13.7.22. H. M. K. Brown, from 39 Squadron (Inland Area) to School of Technical Training (Men) (Inland Area). 10.7.22. C. E. Wardle, from No. 24 Squadron (Inland Area) to School of Technical Training (Men) (Inland Area). 6.7.22. E. R. Pretyman, A.F.C., from No. 56 Squadron (Middle East) to No. 25 Squadron (Inland Area) (Supernumerary). 4.7.22. R. H. Smyth, M.C., from No. 1 Stores Depot to No. 1 Flying Training School (Inland Area). 1.7.22. J. Roberts, from R.A.F. Depot (Inland Area) to M.T. Repair Depot (Inland Area). 10.7.22. W. L. Fenwick, from No. 2 Squadron, No. 12 Wing (Ireland), to No. 24 Squadron (Inland Area) (Supernumerary). 17.7.22. H. A. Tweedie, O.B.E., A.F.C., from R.A.F. Depot (Inland Area) to Air Ministry (D.O.I.). 19.7.22. T. C. Luke, M.C., from Inspector of Recruiting (Coastal Area) to R.A.F. Depot (Inland Area) (Supernumerary). 14.7.22. D. Mitchell, from Egyptian Group Headquarters (Middle East) to No. 4 Flying Training School (Middle East). 26.6.22. W. C. Green, M.C., from No. 4 Flying Training School (Middle East) to Stores Depot, Egypt (Middle East). 26.6.22. J. F. Lawson, A.F.C., from No. 5 Flying Training School (Inland Area) to Record Office (Inland Area). 1.8.22. E. J. P. Burling, D.S.O., D.F.C., from No. 230 Squadron, Felixstowe (Coastal Area), to School of Naval Co-operation and Aerial Navigation (No. 230 Squadron) (Coastal Area). 10.7.22. E. E. Isaac, M.C., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area), on appointment to Temporary Commission. 3.7.22. W. D. Miller, M.B., from Marine and Armament Experimental Establishment to R.A.F. Depot (Inland Area) (Supernumerary). 12.7.22. O. St. Leger Campion, from R.A.F. Central Hospital (Coastal Area) to No. 2 Squadron, No. 12 Wing (Ireland). 10.7.22. T. R. S. Thompson, M.B., from No. 56 Squadron (Middle East) to Stores Depot, Egypt (Middle East). 10.6.22. T. J. Thomas, M.B., from No. 4 Flying Training School (Middle East) to Engine Repair Depot (Middle East). 2.6.22.

LONDON TERMINAL AERODROME

Monday evening, July 17, 1922.

The weather is as persistently against aviation this year as it was in favour of it last year, and during the week there has been a mixture of good, bad, and indifferent flying weather. The morning newspaper services to Paris, Brussels, and Holland have been held up some mornings in the latter part of the week, and pilots have had some pretty rough trips at times. Generally speaking, however, the persistent bad weather is not interfering now to any great extent with the regularity of the services. Competition is becoming so keen that flights are being made in weather which, a month or two ago, would have been considered unfit. In fact the spirit of the early days of the air services, when it had to be very bad weather indeed to stop flying, is slowly returning.

The number of air travellers still shows a slight increase, and it is now hoped that in August and September the expected "boom" in passengers may to some extent be realised, and that there will be enough traffic to keep all lines reasonably busy. The French lines still continue to carry the bulk of the goods traffic to Paris, while an overwhelming majority of the passengers travel by the British lines.

The Instone Air Line have now got the Vickers Vimy "City of London" back from the Vickers works at Weybridge, where she has been fitted with a new set of wings. It is claimed that these give greater lift, as well as bigger speed in the air and lower landing speed. The "Vimy" has been on the service during the week, but owing to engine trouble had to land twice on a return journey from Paris.

Entrants for the Round-Britain Race

The Surrey Flying Services have been having a busy time lately. They have been erecting another Avro to add to their joy-ride fleet, and, with this completed, have now started on the erection of a D.H. 9. This machine is, I understand, being built to the order of the Duke of Sutherland, President of the Navy League, and is to be entered by him in the round-Britain race for the King's Cup, which is at present fixed for September 9 and 10. The machine is, so far as is at present arranged, to be flown in the race by Capt. A. F. Muir. Another Croydon entrant for this race, by the way, is Mr. Courtney, who is to fly a Siddeley "Siskin" with a Jaguar engine.

Capt. Muir informs me that owing to the success which attended the reduction in the price of joy-rides to 5s., on the occasion of the Royal Meteorological Society meeting at Croydon, the Surrey Flying Services have decided to try the experiment of reducing the fare to 5s. during the week-end, when there is a crowd at the air-station, and when the weather is suitable for dealing rapidly with numbers of joy-riders. This scheme was started on Saturday last, and, although the weather was not exactly of the type to encourage joy-riding, a good number of passengers were carried in two Avros by Capt. Muir and Mr. Youell. In addition, Capt. Muir has been making flights for the testing of parachutes during the week.

Turn Indicators for "Air Expresses"

The D.H. 34's, both on the Daimler and Instone lines, are now being fitted with Reid turn-indicators, and the pilots are extremely pleased with the sensitiveness and efficiency of these instruments. In one test, made at dusk on Friday in misty weather, the pilot put his head down inside the cockpit so that it was impossible for him to see the ground and, using the indicating lights of the turn-indicator to guide him, kept the machine flying straight for mile after mile without the slightest difficulty.

Handley Page Transport are now running their services exclusively with W. 8's, keeping an 0-400 in reserve. The D.H. 18 they were running has been taken over by the Instone Air Line, and the Bristol ten-seater is being reconditioned at Bristol, after which, I understand, the Instone Air Line will also take over this machine. Their fleet will be even more mixed than at present, as they will have D.H. 34's, D.H. 18's, one D.H. 4, one Vickers "Vimy" and a Westland or two; while they are expecting the return of the Vickers "Vulcan," together with one or two more of the same type, which, with the Bristol, will give them no less than seven different types of machine. It is certainly a striking contrast in policy to the other two British firms, who are confining themselves to one type of machine.

Mileage of the Aerial Cabin-Boy

During the week the first air cabin-boy completed his first 20,000 miles flying in the Daimler D.H. 34's. He has made over 90 trips between London and Paris and is becoming quite a seasoned air traveller. It is interesting to note also that the D.H. 34 G-EBBS has, under the Daimler management, now completed something like 50,000 miles of flying in a period of three months.

The entrance to the aerodrome has now been further ornamented by the addition of a number of sign-boards giving the number of the buildings and the names of the firms occupying them, the Post Office having a special sign-board all to itself. The different styles and sizes of the letters used have caused no little comment amongst those firms whose names are "writ small."

The K.L.M. still continue to "get the goods," and on several occasions recently have had to duplicate their services, being unable to carry the number of passengers wishing to travel, in addition to the regular consignments of goods. One firm of hat manufacturers in Holland are consigning their entire output of hats for the English market per K.L.M., and it is no unusual sight to see anything up to 30 parcels of hats unloaded from an incoming monoplane.

IN PARLIAMENT

All-Metal Aeroplane

Sir W. Joynson-Hicks, on July 10, asked the Secretary of State for Air whether his attention has been called to the statements in reference to the mode in which the Air Ministry has dealt with Messrs. Short Brothers' all-metal aeroplane; whether the said 'plane has been tested by pilots in the Air Force; what is their opinion upon it; whether any machines have been ordered; and, generally, what is the view of the Ministry in regard to this machine?

Captain Guest: My attention has been called to the statements which have appeared in the Press and to which I assume my hon. friend refers. The history of this case is as follows: This aeroplane was built and exhibited at Olympia by the firm in 1920. It was not designed to meet any particular Service requirement. Nevertheless, with a view to the encouragement of originality and enterprise, it was immediately purchased by the Air Ministry, and, as the structure incorporated certain novelties, the use, in particular, of a certain alloy of aluminium, the aeroplane was in 1921 sent to the Royal Aircraft Establishment to test the suitability of this material to withstand corrosion and vibration. In this connection, the problem of corrosion (tests of which must necessarily take a considerable time) is one of the greatest importance, and is, at the present time, being investigated by a special Sub-Committee of the Department of Scientific and Industrial Research. Pending a Report of this Sub-Committee, and until a satisfactory solution of the problem has been arrived at, it is clearly most undesirable to place a large order for these aeroplanes. It is, therefore, not intended to order any more at present. In answer to the second and third parts of the question, owing to the doubt as to the strength and reliability of the material used, it was not considered desirable to put this aeroplane through full air tests, but permission was granted to a pilot of the Experimental Section to fly it without load and without unnecessary manœuvres. As a result of these modified tests, a favourable report on the behaviour of the aeroplane in the air was received.

Sir W. Joynson-Hicks: Do I gather that they have been testing the metal of this machine for nearly eighteen months?

Captain Guest: Yes. I think it is apparent that the process of testing for corrosion must take a considerable time for us to satisfy ourselves.

Viscount Curzon: Pending the Report of the Sub-Committee, will Messrs. Short be allowed to construct any further machines to the same drawings?

Captain Guest: No. No further orders can be given until the test is completed.

Viscount Curzon: Will they be allowed to make further machines on their own account, and without Government orders for them?

Captain Guest: I think it would be inadvisable for the Government to do so.

Sir W. Joynson-Hicks: Can any date be given for the completion of the test?

Captain Guest: The moment the Industrial and Scientific Research Sub-Committee have reported, we shall get on with the business or close it down.

Territorial Air Force.

Lieut.-Col. Pownall asked whether it is intended to recruit a Territorial Air Force service; if so, whether the Territorial associations will be made use of in this connection; and what grants will be made to them for the expenditure which this extra duty will involve?

Captain Guest: The answer to the first question is that it is the intention to form an Auxiliary (or Territorial) Air Force, but the date at which it will be possible to introduce the Bill, which is already drafted, is at present doubtful; it has not been decided whether it will be proceeded with this year, as the whole policy of Home Defence is still under the consideration of the C.I.D.; to the second, in the affirmative; to the third, that the scheme will provide for grants being made to the county associations concerned, proportionate to their responsibilities and services.

Air Defence Brigades

Captain Viscount Curzon on July 11 asked the Secretary of State for War whether an anti-aircraft brigade for the defence of London is to be formed in the Territorial Army; if so, what is to be the strength of the force and what will it cost; whether the War Office have any figures to show how large an anti-aircraft force would actually be required to defend London from attack by an air force as large as that of France; and whether the decision can be reconsidered, with a view to devoting the money to aircraft in lieu of ground defence?

Sir L. Worthington-Evans: As the answer to this question is somewhat lengthy, I will, with my hon. and gallant friend's permission, circulate it in the Official Report.

Viscount Curzon: Could I not have an answer to the last part of my question, as to whether the decision can be reconsidered with a view to devoting the money to aircraft in lieu of ground defence?

Sir L. Worthington-Evans: I think my Noble Friend had better see the entire answer. If the House likes, I can read it, but it is very long.

Following is the answer:

As a beginning to the future organisation for the air defence of Great Britain, two air defence brigades, Territorial Army, for the defence of London are included in the current year's Estimates, and steps are now being taken to form them. This has been done in consultation with the Air Ministry.

The provisional peace establishment for the ground troops of an air defence brigade, Territorial Army, is approximately 1,633 all ranks, including the signal section. These numbers do not include the squadron or squadrons, Royal Air Force, co-operating with the ground troops. The total strength of two brigades as above is, therefore, approximately 3,266 all ranks. The above establishment has been agreed to by the Air Ministry, who were consulted.

The total annual cost of an air defence brigade, Territorial Army, as given above—exclusive of the squadron Royal Air Force—is about £55,000, and for two brigades it will therefore be £110,000.

The decision to raise the ground troops of two air defence brigades for the defence of Great Britain has been reached after careful study of present and future strategical conditions. It is not in the public interest to disclose the considerations which have animated the War Office in deciding to raise these ground troops. The due apportionment of the available money for defence against air attack between aircraft and ground defence troops has been, and still is, the subject of careful consideration.

Naval Aircraft.

VISCOUNT CURZON, on July 12, asked the Parliamentary Secretary to the Admiralty how many aeroplanes, pilots, and observers are now available for working with the Royal Navy for reconnasisance, fighting, torpedo carrying, bomb dropping, and observation, respectively; and how many are actually required to bring all aircraft carriers and ships fitted with flying platforms up to full establishment?

Mr. Amery: The aircraft (apart from reserves) allotted for working with the Fleet from ships and carriers are as follows:—

18 reconnaissance planes.
6 fighters.
12 torpedo planes.
18 spotting planes.

The personnel available is sufficient to man these aircraft. It is not in the public interest to give the information asked for in the second part of the question.

Viscount Curzon: Does the right hon. gentleman think the Navy is sufficiently prepared for war in the air with only 12 torpedo planes allotted to it?

Vice-Admiral Sir R. Hall: Are the personnel of the naval wing trained at sea or on shore?

Mr. Amery: I must ask for notice of that question.

Lieut.-Commander Kenworthy: Has the practice of fitting every light cruiser with one fighter been departed from, or are they still able to carry them and the machines are available?

Mr. Amery: I gave information the other day of the number of ships which are fitted to carry aeroplanes.

Viscount Curzon: Do the Admiralty really consider that these six fighting planes are sufficient for the requirements of the Fleet?

London to India Air Service

MR. L'ESTRANGE MALONE asked the Secretary of State for Air (1) whether the Civil Aviation Advisory Committee has yet considered the question of a London to India service with heavier-than-air craft; when this Report will be published; and whether he will take steps to see that this Report is available to Members of this House before the Burney airship scheme to India is approved or submitted to this House;

(2) whether his Department has considered the Burney airship scheme; what recommendations have they made thereon; whether the Air Ministry is aware that a London to India service with aeroplanes could be put into operation with more certainty, in a shorter time, with less capital expenditure, and smaller Government guarantees; whether any air transport firms have submitted projects of this nature; and whether he can give an assurance that schemes of this nature operating with heavier-than-air craft will receive as favourable consideration as the Burney airship scheme?

Captain Guest: With regard to the first question, the question of the practicability of an Imperial Mail Service to India, operated by heavier-than-air craft, has been, and still is, under consideration by the Civil Aviation Advisory Board, and I am expecting to receive their report at an early date. I intend to publish the report as a White Paper, and I hope to be able to issue it before the House rises. As regards the second question, the Burney Airship Scheme has received the full consideration of the Air Ministry. As I stated in my reply to the hon. Member on May 18, the Ministry considered that from a technical point of view the scheme was a notable advance on previous proposals of this kind, and that it offered a reasonable prospect of satisfactory operation between India and this country. Commander Burney's proposals were then referred to the Committee of Imperial Defence for consideration. As the Committee have not yet given their decision, I do not think it would be proper for me to make any further statement on the matter at present. In answer to the third part of the question I would prefer to await the publication of the Report of the Civil Aviation Advisory Board before attempting to compare the relative advantages of these two aerial transport schemes. The answer to the fourth part of the question is in the negative; to the fifth, in the affirmative.

Aircraft and Engines

VISCOUNT CURZON asked how many firms are at present engaged, either wholly or partly, in the construction of aircraft and engines; how many of these have intimated that they will have to close down unless some work can be given to them; and whether he can state what limitations or conditions, if any, are imposed by his Department upon firms engaged upon the construction of aircraft and engines for the Royal Air Force when tested, accepted, or rejected, respectively?

Captain Guest: The answer to the first question is that eighteen firms are engaged in the construction of aircraft; as regards engines, four major firms are engaged in the construction of engines, whilst four other firms are engaged to a lesser degree; to the second, that, for the reasons stated in my reply to my noble and gallant friend on the 6th instant, general representations have been made that the firms referred to may have to close down the departments devoted to such construction unless they receive orders sufficient to keep their staffs employed. In reply to the last part of the question, I am not clear what limitations or conditions my noble and gallant friend has in mind, but I shall be pleased to send him copies of the conditions of contract applicable to aircraft and engines ordered by the Air Ministry, if he so desires.

Viscount Curzon: Do I understand the right hon. gentleman to say that general representations have been made? Does that mean from the entire industry, practically?

Captain Guest: From deputations representing the industry.

Lieut.-Commander Kenworthy: What action is the Air Ministry or the Government taking on those representations? Do they realise the seriousness of this question? Is anything being done?

Captain Guest: The Ministry is fully aware of the seriousness of the position. If they have not the money they cannot give the orders.

Lieut.-Commander Kenworthy: Is this being represented to the Cabinet? If not, my right hon. friend ought to be in the Cabinet.

(Other Parliamentary questions unavoidably held over.)

IMPORTS AND EXPORTS, 1921-1922

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
Mar. ...	14	1,471	118,199	166,607	1,565	100
April...	1,370	3,846	138,983	139,995	450	5,880
May ...	3,350	2,416	59,624	167,999	1,818	4,254
June ...	5,181	816	79,713	129,137	—	14,530
	16,753	10,268	543,476	749,419	6,137	25,887

PUBLICATIONS RECEIVED

I.C.A.R. Internationaal Concours Aviatique Rotterdam, 2-17 Sept., 1922. Royal Aero Club of the Netherlands, The Hague, Holland.

Reports and Memoranda, Aeronautical Research Committee:—No. 586.—(1) *Report on Various Airscrews designed for S.E. 5.* By the Aerodynamics Staff of the R.A.E. (2) *Report of some Experiments with Model of the S.E. 5 and Models of these Airscrews.* By the Aerodynamics Staff of the N.P.L. July, 1921. Price 3*s.* net; by post, 3*s.* 2½*d.*

No. 689. *The Canonical Forms of the Equations of Motion of an Aeroplane in Still and Gusty Air.* By Prof. G. H. Bryan, F.R.S. February, 1921. Price 9*d.* net, by post 10½*d.*

No. 692. *Notes on French and Italian Aeronautical Practice with Particular Regard to Airships.* By J. R. Pannell, A.M.I.M.E. Price 2*s.* 6*d.* net. By post 2*s.* 7½*d.* London: H.M. Stationery Office, Kingsway, W.C. 2.

No. 744 (*Ae.* 11). *Theory of Initial Motions and Its Application to the Aeroplane; being a Sequel to R. and M.* 689. By G. H. Bryan, Sc.D. July, 1921. Price 9*d.* net; by post 10*d.*

AERONAUTICAL PATENT SPECIFICATIONS

***Abbreviations*:** cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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17,714. J. KELLY. Helmet for aviators, etc. (181,617.)

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8,650. H. S. WILDEBLOOD. Wings. (181,828.)
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(*Continued from* p. xiv.)

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Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5. Dalston 1893.

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French Air Ministry Type Test, June, 1922.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 6–20	**French Gliding Competition at Clermont-Ferrand**
Aug. 7	**Aerial Derby Starting at Waddon**
Aug. 12	**Schneider Cup Seaplane Race, at Naples**
Sept. 2–17....	**International Concours Aviatique, Rotterdam**
Sept. 9–10....	**1,000 Miles Race round Britain for the King's Trophy**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsch (300 kil.)**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

Position of Research

ELSEWHERE in this issue we publish a brief review of the Annual Report of the Aeronautical Research Committee, which has now taken the place of the old National Advisory Committee for Aeronautics. The Report gives an indication of the amount of work which has been done during the year with which it deals (1921–22), and although much has been accomplished, the Report clearly indicates that much yet remains to be done. In fact, the further we progress, the further we appear to discover we still have to go. There is no need here to deal with all the problems that are awaiting solution; suffice it to indicate a few of the more pressing.

From the point of view of civil aviation, there would appear to be two outstanding problems, which are vital to the progress and safety of flying. One is that of stability and control. Important as is the question of stability, it is perhaps less so than that of control, especially at low speeds and large angles of incidence, and more particularly lateral control. The longitudinal control of the majority of machines is already fairly satisfactory, but it is a well-known fact that when the critical angle of lift is approached, the *ailerons* become, as the pilots say, "sloppy." Closely connected with the problem is that of rudder control. It appears that what is required is ample rudder control at low speeds, to counteract the yawing moment caused by the *ailerons*, but the problem is very complicated.

The second vital problem to which reference has been made is that of the power plant and its installation. It is obvious that if, at one stroke, we could produce a power plant which was absolutely free from breakdown, and which was, moreover, more economical in fuel consumption than present engines, the majority of our troubles would be over. The question of research into the possibilities of using other types of engines, other fuels, fire-proof installation, etc., is therefore one of the utmost importance, and the Report indicates that work along these lines is being carried out.

From the foregoing it might be concluded that all was well with research, if two of the most pressing problems are receiving attention. This is, however, far from being the case, and it is greatly to be feared that the importance of research is not fully realised in high places. The Committee evidently think that if the technical aspect of research leaves the authorities cold, the financial side may touch them. Thus on page 5 of the Report it is stated that "The whole of the work supervised by the Aeronautical Research Committtee costs about 1 per cent. of the vote for the R.A.F. and the Air Ministry. The money which would have come to this country had 'R. 38' been a success would have maintained the research of the Committee in full activity for a period of five years." And yet all work on airship research has been abandoned, although a very great deal could have been learned from a relatively few and inexpensive tests carried out with one of the existing ships. The regrettable accident to "R. 38" provides an instructive example of making insufficient use of the advice of research workers, and of how it is possible to be "penny wise and pound foolish." Although the crisis which threatened the Aerodynamics Department of the N.P.L. in September, 1921, has, apparently, been passed, there is still ample grounds for misgivings as to the future of research, and, as Professor Bairstow points out in a very well-reasoned letter to *The Times* of July 22, the explanation may possibly be found in the Report on the Air Conference, in which the Director of Research stated that the Directorate of Research was an engineering as well as a scientific organisation, and that probably as much as four-fifths of its work relates to experimentation with specific appliances, the balance being research, pure and applied. Space does not allow of referring to it in greater detail this week, but we hope to return to the subject in a subsequent issue of FLIGHT.

◆ ◆ ◆

Half-Yearly Report on Civil Aviation

For the first time the Half-Yearly Report on the Progress of Civil Aviation is issued by the Directorate of Civil Aviation, instead of by the Controller-General of Civil Aviation, following upon the resignation of General Sir F. Sykes and the appointment of General Sir Sefton Brancker to the post of Director of Civil Aviation. Apart from this alteration, the Report (some notes on which are published on p. 422) follows the practice of previous Reports. There is little in its pages which calls for comment, the progress of civil aviation having been fairly steady—*especially abroad.*

At home the number of continental flights has decreased from 644 during the corresponding period last year to 485 from October, 1921, to March, 1922, but the number of passengers carried has slightly increased, from 1,418 to 1,686. In the case of goods there has, however, been a decline from 38 tons to 17·6 tons, and it would appear that the French lines are getting the majority of the goods traffic.

The failure of the air mail is strikingly shown up in table E on page 17 of the Report. During the period October-March, 1920-21, the number of letters posted for transmission to Paris by air mail was 32,810, while during the corresponding period this year the number was only 12,900. This is, of course, mainly due to the unsatisfactory terminal arrangements, and to the fact that the London-Paris route does not lend itself to air mail services with any advantage over existing mail facilities. To be of any value the route should be very much longer.

International Air Congress, London, 1923

The announcement that an International Air Congress, on the lines of that held in Paris in November last year, is to be held in London in 1923 can hardly be received with other than satisfaction by all interested in the future of aviation. We have repeatedly urged, in these columns, the necessity for the closest co-operation between nations if aviation is to play the part of which it is capable in the communications of the world. Aviation, by its very nature, must be of an international character, and the first congress did a great deal of good in bringing together representatives of various nations to discuss problems affecting international air services and their organisations. We therefore welcome the decision to hold the second congress in London next year, probably, it is stated, during the last fortnight in June. The fact that the Duke of York has consented to become President of the General Council, and Lord Weir of Eastwood Vice-President, should at once assure the status of the Conference, and, as the list of names published elsewhere in this issue will show, a very strong organising committee has been got together, which should be a guarantee that the arrangements—which are to include visits to aircraft works and air stations and possibly the Air Pageant—are the best possible. If the organising committee carry out an energetic propaganda abroad the attendance should be both large and representative, and aviation in general cannot but benefit from such a congress.

◆ ◆ ◆

The Aerial Derby

As announced a few weeks back, the Aerial Derby is to be flown from Waddon aerodrome. We have repeatedly pointed out the unsuitability of the ground for this race, not only on account of the nature of the aerodrome, but also because there is always the possibility of the race being held up owing to the ordinary traffic of the aerodrome. Another point is that Waddon is difficult to get to by train, 'bus, or tram, unless special trains from Victoria and/or London Bridge are run for the occasion, in which case matters would be a little better. It appears, however, that the proprietors of the Hendon aerodrome had exaggerated ideas of its value, and, as a consequence, Hendon will not even be a turning point. We are sorry that the race is not to be held at the historical starting point, but the Royal Aero Club must necessarily have the commercial side in mind when making its choice under the present somewhat handicapped position.

As to the race, it is otherwise to be flown over much the same circuit as in previous years, but in the opposite direction—*i.e.*, clockwise. This alteration has, we believe, been made in order that spectators should not have to face the sun (if any) when watching the machines coming in.

At the moment of writing there are, sad to relate, only two definite entries, but there is little doubt that a good "field" will materialise at the last moment, as in previous years. The first closing date of entry was July 26, but by paying an extra entrance fee machines may be entered up to Monday, July 31. For some reason or other entries are always late, and so one need not dispair of having a good showing, at least as varied as last year's. In any case, the new Bristol will take some beating, and Mars I will once again challenge all newcomers. Possibly also one or two fast French machines may turn up, but at present all is uncertainty.

THE MAYENBERGER SPORTING AMPHIBIAN

IN a recent issue of our South American contemporary *Aviacion* (Buenos Aires) there appeared a brief description of a small and somewhat novel amphibian " one-and-a-half-plane," the invention, it appears, of one Hermann Mayenberger. Unfortunately, details of the more interesting features are by no means complete, and the nationality of the machine is somewhat obscure. However, we give our readers what information is available, together with general arrangement drawings.

This machine has been designed with the object of fulfilling the requirements of the sportsman, the farmer, or commercial man who wishes to be independent of the railway or other means of communication. Simplicity of construction has been a main consideration, without, however, causing any sacrifice to aerodynamical requirements, strength, etc.

As may be seen from the accompanying drawings, the body consists of a short rectangular-section *fuselage*, tapering abruptly towards the rear, and very deep in front, where the lower portion is formed into a hydro plane or float. Projecting from the sides of the latter are two short stumps of wings which carry the main landing wheels. These, it would seem, are hinged at the top extremities of thin struts or forks so as to fold upwards, out of the water, beneath the main plane.

At the rear of the float, below the *fuselage*, is a third wheel, which is connected to the control operating the rudder, and thus serves to steer the machine when on the ground.

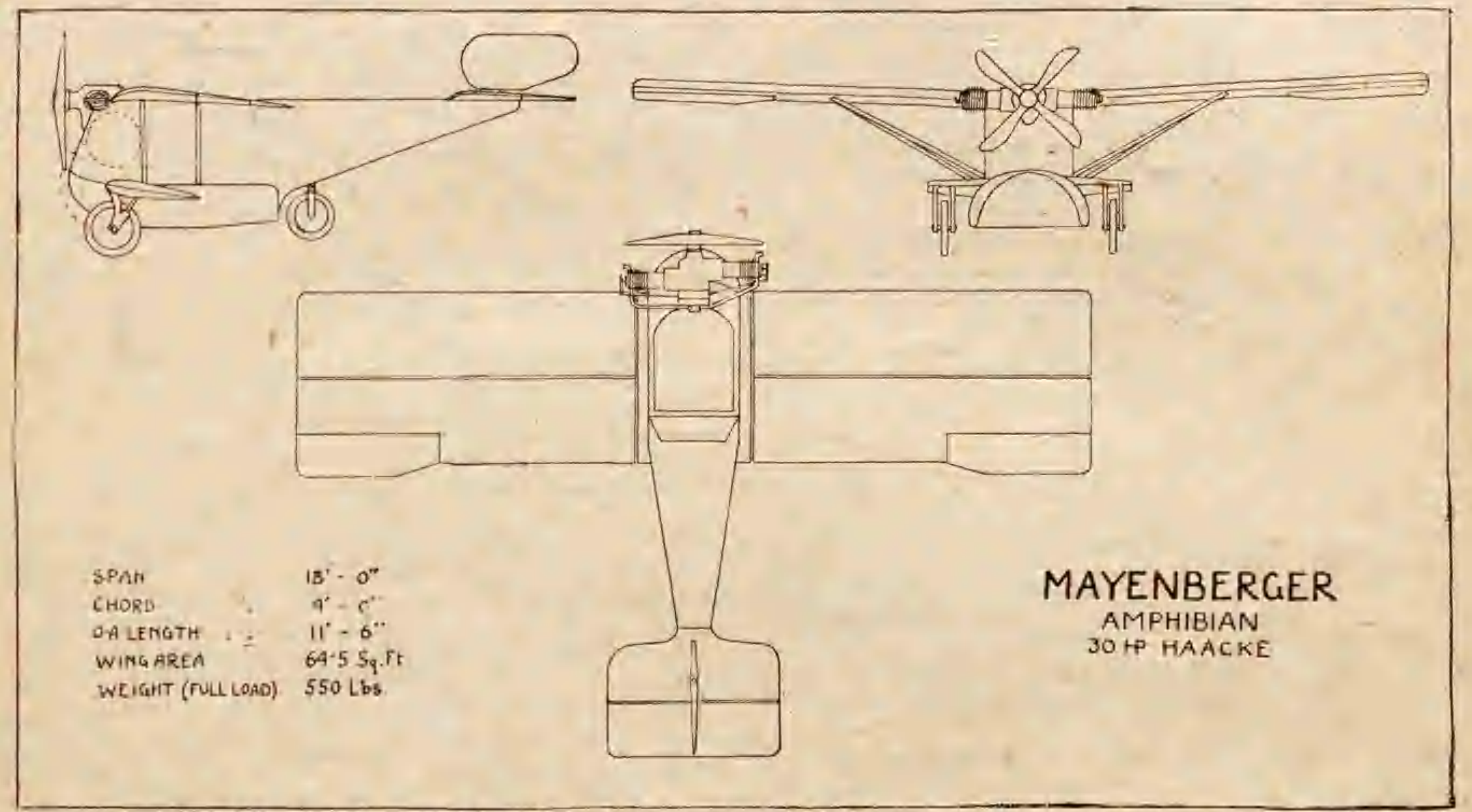
The main planes, which are set at a slight dihedral angle, are attached to short wing-roots mounted on the top *longerons* of the *fuselage*, and their incidence—5° flying horizontal—is such as to allow a low landing speed. It will be observed that each wing is divided into two sections, transversely, the object of which is, apparently, to allow the trailing portion to hinge down, when the front portion then folds back—thus occupying the minimum of space when folded.

They are braced by a pair of struts each side, extending from the bottom of the *fuselage* up to the wings. No other bracing, it is claimed, is necessary. As to how the folding of the wings, and raising wheels, is achieved is not stated, but the mechanism for folding the wings is contained within the latter.

The tail planes consist of a lifting stabilising surface—to the trailing edge of which is hinged a one-piece elevator—mounted on the top of the *fuselage*. Above, is an oval-shaped balanced rudder, but no vertical fin. The control of the machine is somewhat novel, and all controls are concentrated round the main control wheel—all, both for engine and machine, being operated by hand, and no pedals of foot bar are employed. It is claimed that the control of the machine is thus extremely simple. All control cables and rods are placed out of the way and within the *fuselage*. Unbalanced *ailerons* are mounted at the rear extremities of the main planes.

The pilot's cockpit is large and roomy, being situated in the deepest portion of the *fuselage*, in the centre of the wings. Immediately behind the pilot's cockpit is a compartment containing a parachute apparatus, consisting of two parachutes, superimposed, attached to the pilot's seat, and capable of supporting the weight of the machine, thus allowing it to glide safely to earth in case of emergency—at least, so it is claimed ! The parachutes are released by means of an automatic button, situated on the control wheel, and are shot out of the compartment—whichever part of the machine they are stowed—by means of elastic, unfolding at the same moment.

The engine, a 2-cyl. 30 h.p. Haake, is mounted in the nose of the *fuselage*, and drives a four-bladed tractor screw, 3 ft. diameter, covered with a thin covering of metal for protection against water, spray, etc.



THE MAYENBERGER SPORTING AMPHIBIAN : General arrangement drawings.

It is claimed that this little amphibian can, when its wings have been folded back, be driven along ordinary roads—like an automobile—with ease and safety. This appears to be a reasonable claim, inasmuch as the third wheel, at the rear, being connected to the rudder control, should render steering an easy matter, whilst the small diameter of the tractor screw allows the latter to be employed as a means of propulsion with comparative safety. It is also stated that the machine can be stored in any ordinary garage, etc., owing to its small overall dimensions with the wings folded.

The principal characteristics of this machine are :—

Span	18 ft. 0 ins.
Chord	4 ft. 0 ins.
Overall length	11 ft. 6 ins.
Overall height (over tractor screw)	5 ft. 0 ins.
Area of wings	64·5 sq. ft.
Weight of machine empty	297 lbs.
Weight of machine with full load	550 lbs.
Weight/h.p.	18·3
Weight/sq. ft.	8·5
Maximum speed	93 m.p.h.
Cruising speed	74 m.p.h.
Range	370 miles
Ceiling	12,800 ft.
Engine	30 h.p. Haake.

PROGRESS OF CIVIL AVIATION

Half-Yearly Report

A HALF-YEARLY REPORT on the progress of civil aviation—the sixth of the series—covering the winter period from October 1, 1921, to March 31, 1922, has been issued by the Air Ministry as a White Paper. As before, the report is divided into two parts, the first containing information regarding Civil Aviation in Great Britain and the Empire, the second dealing with Progress in Foreign Countries.

In accordance with the announcement made at the Air Conference held in February, 1922, a permanent Civil Aviation Advisory Board, to take the place of the Advisory Committee on Civil Aviation, of which Lord Weir was Chairman, has been established under the Chairmanship of the Under-Secretary of State for Air "to advise generally on the development of Civil Aviation and to report upon any specific point which may from time to time be referred to the Board by the Secretary of State for Air." In addition to the Director-General of Supply and Research and the Director of Civil Aviation, representatives to serve on this Board have been nominated by the General Post Office, Royal Aeronautical Society, Air League of the British Empire, Royal Aero Club, Society of British Aircraft Constructors, Lloyd's, Association of the British Chambers of Commerce, Federation of British Industries, Accident Offices Association, and the Institute of Transport.

At the present stage of civil air development the tables appended to Part I, dealing with civil flying and accidents, have considerable value as showing that in spite of difficulties there is no actual decline in the use of air transport, but that on the contrary a steady rate of increase has been maintained and that the efficiency of the British Continental services has improved.

Taking the passenger traffic to and from the Continent, it is shown that during the six winter months, October, 1921, to March, 1922, the total of passengers arriving and departing on British machines was 1,686 as compared with 1,418 during the same period in 1920–21 and 796 in 1919–20.

That the British companies have had the major share in the total traffic is also plain, since the arrivals and departures on machines of all nationalities flying on all cross-Channel routes during these three half-yearly periods were 2,511, 2,023 and 887 respectively.

The report states that a considerable increase in traffic is essential if the air transport firms are to obtain a commercial basis of operation, but points out that the traffic figures for the first quarter of this year are, at least, encouraging. During these three months, the total number of passengers carried by both British and foreign companies between London and the Continent, was 981; 676 of these were carried by British firms. The British position has, therefore, been improved as compared with the same period last year when the total number was 670, of which 240 only travelled by British lines.

Imports and exports of goods by air did not maintain in the 1921–22 winter period the high level attained in 1920–21, but this may possibly be due to general trade depression.

Between August, 1919, and March, 1922, the total value of imports by air amounted to £1,157,556, and of exports £605,759, a grand total of £1,763,315.

The report draws special attention to the increase in efficiency of the British Continental air services duing the winter months as compared with former years; during the three months, December, January and February, the average efficiency of the services was 79.4 per cent, as compared with 66.2 per cent. for the corresponding months in 1920–21. For the whole year 1920, the efficiency of operation was 80.2 per cent., and only in four months was this figure exceeded. For 1921, the figure rose to 89.2 per cent., and only in four months did the efficiency fall below 90 per cent. The 90 per cent. efficiency rate was not reached in any month in 1920.

It is satisfactory to note that for the first time there has been no fatal accident during a half-yearly period.

International Air Convention.—An amended form of the proposed declaration relating to Article 5 of the Convention was prepared by Great Britain, and it was hoped that agreement to this formula would enable ratifications of the Convention to be deposited. (The Convention was actually ratified on June 1, becoming operative in the countries which ratified 40 days after that date, and the first meeting of the International Air Commission was held at Paris, July 11, 1922).

The temporary agreement between Great Britain and France has been amended with respect to the corridors of entry for aircraft. The French corridor now extends from Etaples to the Belgian frontier, while the British corridors have been abolished.

Communications (Signals and Navigation).—At the suggestion of the Handley Page Co., a system has been introduced at Croydom aerodrome for locating aircraft by sound and informing pilots of their position in relation to the aerodrome when arriving in bad weather. This system is effective within a radius of about 10 miles from the aerodrome. The officer in charge of the control tower at Croydon determines the direction of the aircraft by means of a sound locator, and informs the pilot by wireless telephony in which sector of a circle surrounding the aerodrome he is flying.

Regulations are to be introduced for the compulsory carriage of wireless by British passenger and goods aircraft. Meanwhile, all British aircraft (with the exception of two small machines) operating on the air routes between England and the Continent under the subsidy scheme are already equipped with wireless telephonic apparatus. The French Air Transport companies have agreed that all their larger passenger-carrying aircraft on the London-Paris service shall be so equipped by the middle of August this year, and the Dutch authorities are making similar arrangements.

Estimates.—The estimates for 1922–23 include £364,000 for Civil Aviation, and in addition £86,500 for the Headquarters Staff, of which £51,000 is for the Meteorological Office Staff. £200,000 of the vote for Civil Aviation is to be applied to the direct assistance of "approved" British firms operating cross-Channel air services; £79,000 is allotted for Meteorological services (excluding Headquarters Staff); £38,000 for the upkeep of aerodromes; £15,000 for expenditure on air routes, surveys, wages of W./T. personnel, etc.; £8,000 for technical equipment; and £61,000 for works and buildings at Croydon, Lympne, Malta and the Kidbrooke wireless station; and the illumination of air routes at home and in Egypt.

From the section of the report dealing with civil aviation in foreign countries we quote a few figures relating to France and Germany.

France.—The vote for Civil Aviation in 1922 amounts to 147,210,970 frs., including 45,382,000 frs. for air transport subsidies, an increase of approximately 14,000,000 frs. on 1921. In consequence of this increased assistance, air transport companies are extending and amplifying their services. The statistics of French civil aviation in 1921 show that approximately 1,460,000 miles were flown and 10,305 passengers were carried, in the course of 6,513 flights. A committee has been formed, called the Comité Française de Propagande Aéronautique, with the object of contributing in every possible way to the development of France's air power.

Germany.—At present there are in Germany five important air transport companies, and twelve mail air routes have been approved for regular operation by the Ministry of Transport. The amount of work carried out by German civil aircraft, flying on regular air lines, between April 1 and October 31, 1921, is shown by the following figures:—Number of passengers carried, 6,820; miles flown, 1,933,700; weight of mails carried, 67,600 lbs.; percentage of scheduled flight carried out, 90.8.

◆ ◆

British Airway Efficiency

THE official returns show that the flight efficiency figures for the three British companies on the London-Paris route for June, flying having taken place on each day of the month, are as follows:—

Handley Page Transport, Limited, made seventy flights, of which sixty-nine were completed within the required period of four hours, the efficiency being 98.6 per cent.

Daimler Hire, Limited, carried out eighty-five flights, of which eighty-two were made within the required time, showing an efficiency of 96.5 per cent.

The Instone Air Line made one hundred flights, of which ninety-six were completed within four hours, giving an efficiency of 96.0 per cent.

One French company carried out 111 flights, with an efficiency of 80.2 per cent., and the other companies forty-two flights, the efficiency being 76.2 per cent.

◆ ◆

Avanti Savoia

DURING the last six months fifteen Savoia flying boats have flown 18,050 kms. (11,200 miles) over the Mediterranean without accident, most of the flights being made during the winter months.

REPORT OF THE AERONAUTICAL RESEARCH COMMITTEE FOR THE YEAR 1921–22

THE Annual Report of the Aeronautical Research Committee for the year 1921–22 has just been published. As in previous years, the report gives a summary of the work of the past year, although it should not be confused with the technical reports known as Reports and Memoranda, which contain the technical details of the various experiments. The present report refers to the subjects that have been dealt with, but does not go into technical details.

The Committee pay a warm tribute to the work done by those who lost their lives in "R.38," notably Mr. Campbell, Mr. Pannell and Mr. Duffield, all of whom had been closely connected with the work of the committee, and it is pointed out in the report that experiments were planned which, had they been allowed to take place, would have rendered obvious the danger of fast flight at low altitudes in "R.38." But even without these experiments, it is stated, it would still have been an important safeguard had the committee been put in a position to study the drawings and calculations relating to the design, and it is pointed out that the investigations into the cause of the accident to "R.38" have shown how much may be lost by not realising at an early stage that the committee were in a position to give, and had published, advice, since proved to be useful and correct. The Committee, therefore, naturally regret the decision to abandon research with airships, and they have urged the importance of carrying out a quite limited scheme of research with one of the existing ships before she is completely dismantled or otherwise disposed of. In view of these facts, it is not without interest to note that the report states that "The whole of the work supervised by the Aeronautical Research Committee costs about 1 per cent. of the vote for the Royal Air Force and Air Ministry. The money which would have come to this country had "R.38" been a success would have maintained the research of the Committee in full activity for a period of five years. In another way, it may be stated that, should the work of the Committee lead to a reduction by one of the aeroplanes written off per year as a result of crashes, it would have earned the cost to the Air Ministry of the fees paid to its members."

The report further states that in September last they were asked to consider a serious curtailment of the activities of the Aerodynamics Department of the N.P.L., but, as a result of urgent representations, arrangements have since been made for the department to be maintained.

Aerodynamics

Turning now to the more technical aspects of the report, which are contained in a supplement, the report states that the Aerodynamics Sub-Committee has met nine times during the past year, and has dealt with a large number of papers on full scale, and on wind channel experiments. It is stated that a series of international trials on model wings and model airships have been initiated. The models have been carefully constructed to conform to the many methods of test used in the different laboratories, and it is hoped that the results, when finally collected together, will be of material assistance in co-ordinating all wind channel experimental work. At present, as is well known, there is considerable differences in the results obtained in the wind channels of the different countries, and the utilisation of results is thereby hampered.

Some time ago it was announced in this journal that in America work is progressing on the construction of a wind channel in which the air is compressed so as to obtain high values of VL. It is gratifying to find it stated in the report that a channel on somewhat similar lines is contemplated for the N.P.L., although it appears that at present it is only intended to try out the scheme in a 1-foot channel, which does not appear to us to be large enough for the purpose.

Regarding the question of stability and control, two wind channels at the N.P.L. are now devoted almost exclusively to work on these problems, and it is to be hoped that methods may be discovered for maintaining the lateral control of aeroplanes near the stalling angle. At present this is, perhaps, one of the most serious difficulties, as the majority of machines cannot be landed at their minimum speed, owing to the controls becoming "sloppy" just when they are most needed. From the report, it appears that experiments are being initiated with machines fitted with ordinary *ailerons*, with floating inter-plane *ailerons*, with large rudders, and with a special form of control which gives rise to a yawing moment of reverse sign to that given by ordinary *ailerons*.

On the subject of aeroplane wings a great deal of work has been carried out, and it is interesting to note that the vortex theory of Prandtl and others at the Göttingen laboratory has received considerable attention, and that an analysis has been made at the N.P.L. to establish the soundness, in so far as monoplane aerofoils are concerned, of the Prandtl aerofoil theory.

Apart from the problems of control at low speeds, perhaps the subject which interests practical designers most is that of scale effect. For certain fairly normal wing sections the scale effect is not serious, and generally the full-size wing gives greater lift and a better L/D than indicated by model experiments. When it comes to high-lift wings, however, appreciable doubt still appears to exist, and it is interesting to see it stated in the report that for such wings the maximum lift coefficient of the full wing may actually be smaller than that of the model. Not only so, but the gain in maximum lift coefficient obtained by using a high-lift wing may be only about one-half of that indicated by model experiments.

With reference to tail planes, the report states that recent experiments on an S.E.5A have shown that with this machine the loss in tail plane efficiency is caused: by wing interference, 5 per cent.; *fuselage*, 15 to 20 per cent.; and gap at the elevator hinge, 15 per cent. It would, therefore, appear that the effect of wing interference may be smaller than generally imagined, and that the shape of the *fuselage* and the gap between tail plane and elevator are of very considerable importance. Although it should be a relatively simple matter to remedy the latter, it would appear that it might be worth while to experiment with a slotted tail plane of the Handley Page type. If that should be found more effective than the ordinary tail plane and elevators it might be possible materially to reduce the size of tail which is now usually necessary.

Internal Combustion Engines

The report states that the Engine Sub-Committee have held seven meetings in the past year. Of the work undertaken, reference may be made to the research work on detonation, in regard to which continuous progress has been made at the N.P.L. with the programme initiated by Sir Dugald Clerk. A thorough investigation has been made into the effect of turbulence in producing detonation in hydrogen air mixtures, and the research is now being extended to other fuels, including various forms of liquid fuel. General research is being devoted to the use of a number of fuels under varying conditions. The Air Ministry, it is stated, have initiated a considerable programme, part of which will be carried out at the R.A.E., and part by Messrs. Ricardo, Ltd., The experiments will include an investigation into the possibility of obtaining higher economy, the use of fuels in supercharger units, and the possibility of using gases, other than hydrogen, to accelerate the rate of combustion. It is also hoped to carry out certain engine research work at Universities, and the report states that two Ricardo units for experiment are being supplied, one to Cambridge and one to the Armstrong College, Newcastle. The report further states that work is proceeding at the R.A.E. on a variety of engines, including the use of heavy oils in Diesel type engines, but that this is not regarded as hopeful on account of the inherent heavy weight of this type of engine.

The use of engines in which a stratified charge is employed, first suggested by Mr. Ricardo in a paper read before the Royal Aeronautical Society, and published in full in FLIGHT, gives promise of good fuel economy, and it is satisfactory to find that work on this problem is included in this year's programme. Owing to the great fuel economy which is rendered possible by the use of hydrogen added to ordinary fuel, it is regrettable to find it stated in the report that "owing to the discontinuance of the airship service it has been decided that, since the experiments have no immediate application to heavier-than-air craft, they should be discontinued." As stated in FLIGHT recently, these experiments are now being continued privately by Mr. Ricardo in connection with the Burney airship scheme.

The Fire Prevention Sub-Committee, which has met eleven times during the past year, has, it is stated, directed its attention almost entirely to the investigation of fires occurring on crash. It is concluded that the chief danger arises from the contact of inflammable materials with hot parts of the engine, and that the worst offender in this respect is the hot exhaust pipe. The report states that the most promising line of development appears to be the use of separate exhaust pipes from each cylinder, the pipes to have in no part of their length sharp bends, and to be at a sufficiently low temperature before being led into a common manifold. The existing temperature of exhaust manifolds and pipes, which may vary from 550° C. to 650° C, should, the report points out, be reduced to a comparatively safe temperature of 350 to 380° C. Preliminary experiments suggest that if the radius of the exhaust pipes exceeds a certain figure—greater than 3 ins.—the temperature will be found to be lowered to near this safe limit.

In connection with this subject, experiments have been carried out at the R.A.E. on the ignition temperature of various materials when brought into contact with a hot exhaust pipe. It was found that petrol will not ignite on a hot exhaust pipe, but other materials, particularly lubricating oil, fabric, etc., are liable to catch fire at a comparatively low temperature.

In the case of multi-engined aeroplanes, the Sub-Committee are of the opinion that the petrol systems are very complicated, and are considering proposals for simplified systems. It was also noted that in almost all designs the electric cables and the petrol tubes were placed in close proximity to one another, which feature is considered undesirable.

The Report of the Aeronautical Research Committee for the year 1921–22 (T.1702 (revd.) D.2.Misc., 151) is published by His Majesty's Stationery Office, and may be purchased from H.M. Stationery Office, Imperial House, Kingsway, W.C. 2, the price being 2*s*. 6*d*. net.

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS

AERIAL DERBY AT WADDON AERODROME, CROYDON, ON AUGUST BANK HOLIDAY, MONDAY, AUGUST 7, 1922

Prizes.—The following prizes will be presented by the Royal Aero Club:—Fastest time (winner of the Aerial Derby), trophy and £300; Handicap, 1st prize, trophy and £150; 2nd prize, £75; 3rd prize, £50.

Entries.—The entry fee is £10. Entries close on Wednesday, July 26, 1922, at 12 noon. Late entries will be received up to 12 noon on Monday, July 31, 1922. Late entry fee £15.

For this year's race, the course will be flown in the opposite direction to that of previous years, the turning points being in the following order:—Brooklands Aerodrome, Weybridge, Hertford, Epping and West Thurrock.

The gates at Waddon Aerodrome, Croydon, will be opened at 1 o'clock, and the competitors will be started on handicap times, the slower machines leaving about 2 o'clock. Two circuits of the course have to be made, and it is hoped the race will be completed before 5 o'clock.

Other Events

August Open Handicap: 16 miles

Prizes: 1st, £30; 2nd (if five or more starters), £10. Open to all types of aeroplanes.

Air League Challenge Cup.—A team race is being arranged between R.A.F., Kenley (the present holders), and another R.A.F. Station.

The machines to be used will be S.E.5's, kindly placed at the disposal of the Club by Aircraft Disposal Co., Ltd., and the Royal Aero Club Avros.

Exhibition Flights.—By well-known pilots.

KING'S CUP (Circuit of Britain Race), presented by HIS MAJESTY THE KING

THE Regulations have now been finally approved by His Majesty the King, and will be issued in a few days.

The date suggested for the contest is two days during the second week of September.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JULY 16 AND JULY 22, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h m.		
Croydon–Paris	56	197	22	39	55	2 27	H.P. W8B G-EAPJ (1h.42m.)	B. (3), D.H. 9 (1), D.H. 18 (1), D.H. 34 (4), G. (8), H.P. W.8B (3), Sp. (2), V. (2).
Paris–Croydon	57	136	10	35	53	2 59	D.H. 34 G-EBBS (2h. 5m.)	B. (5), D.H. 9 (1), D.H. 18 (1), D.H. 34 (3), G. (9), H.P. W.8B (4), Sp. (2) V. (2).
Croydon–Brussels ...	9	50	6	6	9	2 16	D.H. 34 G-EBBR (2h. 4m.)	D.H. 18 (1), D.H. 34 (1), V. (3).
Brussels–Croydon ...	9	32	—	5	9	2 48	D.H. 34 G-EBBR (2h. 34m.)	D.H. 18 (1), D.H. 34 (1), V. (2).
Croydon–Rotterdam–Amsterdam.	12	8	12	12	12	2 20§	Fokker H-NABM (2h. 3m.)	F. (6).
Amsterdam–Rotterdam–Croydon.	12	2	12	12	12	3 2 §	Fokker H-NABM (2h. 33m.)	F. (8).
Totals for week ..	155	425	62	109	150			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys. § Rotterdam.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Sp. = Spad. V. = Vickers Vimy, Vulcan, etc. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijke Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

Incidental Flying.—Mr. Hayns and Capt. Stocken were busy during the week testing some dozen machines, for the Aircraft Disposal Co., at Croydon, and flying five of them to Brussels. These machines consisted of two Bristol Fighters, seven D.H. 9's, one Martinsyde F.4 and one S.E. 5a.

The De Havilland Co. maintained a daily service between Lympne and Brussels.

INTERNATIONAL AIR CONGRESS, LONDON, 1923

FOLLOWING on the Congrès International de la Navigation Aérienne held in Paris in November, 1921, it is proposed to hold a similar congress in London towards the end of June next year. Group-Capt. H.R.H. the Duke of York, K.G., G.C.V.O., R.A.F., has consented to become President of the General Council of the Congress, and the Rt. Hon. the Lord Weir of Eastwood, P.C., has accepted an invitation to become a Vice-President. A strong Organising Committee, representative of all phases of British aeronautical activity, including the Air Ministry, has been formed, with His Grace the Duke of Sutherland as Chairman. This Committee is constituted as follows :—

Vice-Chairmen.—Maj.-Gen. Sir F. H. Sykes, G.B.E., K.C.B., C.M.G. ; Maj.-Gen. Sir W. S. Brancker, K.C.B., A.F.C. (Director of Civil Aviation) ; Lieut.-Col. M. O'Gorman, C.B. ; Sir Henry White-Smith, C.B.E. ; Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P. ; Brig-Gen. P. R. C. Groves, C.B., C.M.G., D.S.O.

Members.—Air Ministry : Brig.-Gen. F. L. Festing, C.B., C.M.G. ; Brig.-Gen. R. K. Bagnall-Wild, C.M.G., C.B.E. ; Air-Commodore J. M. Steel, C.M.G., C.B.E.

Royal Aeronautical Society : Lieut.-Col. A. Ogilvie, C.B. ; Mr. Griffith Brewer ; Lieut.-Col. W. Lockwood Marsh, O.B.E.

Royal Aero Club : Col. F. Lindsay Lloyd, C.M.G., C.B.E. ; Lieut.-Col. F. K. McClean ; Mr. H. E. Perrin.

Society of British Aircraft Constructors : Mr. C. R. Fairey ; Capt. P. D. Acland ; Mr. Charles V. Allen.

Air League of the British Empire : Mr. G. Holt Thomas ; Hon. Sir Newton J. Moore, M.P. ; Mr. Shirreff Hilton.

Air Transport : Sir Samuel Instone ; Mr. F. Handley Page ; Col. F. Searle.

General Post Office : Brig.-Gen. Sir F. H. Williamson, K.C.B., C.B.E.

General Secretary : Mr. Charles V. Allen.

Technical Secretary : Lieut.-Col. W. Lockwood Marsh, O.B.E.

The Congress will be open to all countries which are signatories of the International Air Convention, or are represented on the Fédération Aéronautique Internationale ; individual invitations being issued through national committees in process of formation in each country. Membership will be divided into two classes : (*a*) Ordinary Members ; and (*b*) Associate Members, comprising the families of ordinary members, at a subscription of £1 and 10s. respectively.

According to present arrangements, the Congress will occupy one week during the last fortnight in June, 1923, the reading of papers alternating with visits to various aircraft factories and establishments. It is hoped that the Air Ministry will be able to arrange for the Royal Air Force Pageant to take place on the Saturday of the Congress Week, and that the Royal Aero Club may organise a race meeting on the Tuesday or Thursday. Monday, Wednesday and Friday will be devoted to the reading of papers, and discussions thereon, which will be divided into four or more main groups or sections, which will hold simultaneous sessions in different rooms.

As the time available for the reading of papers will be limited, a "Reading Committee" is to be formed, though it is hoped to arrange that the official report of the Congress, to be published later, shall contain a wider selection of the papers sent in. An official reception will be held in the evening of the Monday of the Congress Week, and the proceedings will be closed by an official banquet on the Saturday.

It is important that the Congress should not be confused with the British Air Conference called each year by the Air Ministry. The latter is of a domestic nature dealing with aeronautical matters so far as the British Empire is concerned. The Congress, on the other hand, is essentially international in character, and is intended to be one of a series to be held in varions countries at which experts may meet to discuss the technical and scientific development of aeronautics in all its aspects.

NOTICES TO AIRMEN

Pilots' Licences and Examination in Navigation, etc.

1. With reference to Notices to Airmen Nos. 13, 28 and 55 of 1921, the technical examinations therein referred to were brought into operation on July 11, 1922, for all persons applying for licences as pilots of flying machines, or for renewal of such licences.

2. The subjects of these examinations are as follows :—

Class A Licences (for Private Pilots).—Knowledge of rules as to lights and signals, rules of the air, and rules for air traffic on and in the vicinity of aerodromes. A practical knowledge of international air legislation.

Class B Licences (for Pilots of Passenger or Goods Flying Machines).—As for Class A Licences, with the following additions : Map reading, use of compass, location of position and elementary meteorology ; practical knowledge of the special conditions of air traffic.

3. Attention is directed to the syllabuses of these examinations published with Notices to Airmen Nos. 13 and 55 of 1921.

4. The examinations, which will be *viva voce*, will be conducted by an Air Ministry Board, and in the case of applicants for licences for flying passenger or goods aircraft, or for renewals of such licences, will be arranged, whenever possible, to take place on the same day as medical examination.

(No. 72 of 1922.)

NOTICE TO GROUND ENGINEERS

Flexible Rubber Connections in Aircraft

THE attention of Ground Engineers is directed to the following information with regard to the maintenance of flexible rubber connections as fitted to aircraft :—

1. The term "rubber joint" as used in this notice is to be taken to include all flexible rubber connections in aircraft or on aero engines, for oil, petrol or water.

2. Rubber joints fitted to engines or aircraft that have been stored for a period exceeding three months should be regarded as serving only as dust excluders. Immediately before the engine and/or aircraft first takes the air, all rubber joints throughout the machine should be renewed, the date of the renewal being entered in the aircraft and/or engine Log Books.

3. New joints thus fitted may be considered serviceable for three months from the date of fitting. They should, however, during this period, be freqeuntly examined and renewed if deterioration be detected.

4. After having been fitted for three months, all rubber joints for petrol should be considered under suspicion, and should be frequently and carefully examined. Any signs of restricted flow, collection of particles of rubber in the filter and/or such fittings as three-way petrol cocks, must be carefully watched for, as an indication of the condition of the rubber joint. At least once a month, a joint should be taken out of the petrol system and examined internally and for reduced adhesion between the plies. Immediately any such deterioration is detected, the whole of the joints in the petrol system should be replaced. In every case, all rubber joints for petrol should be renewed six months after the date of fitting.

5. Similarly, joints in the oil and water systems should be specially examined after having been fitted for three months, and periodically removed, but, in these cases, they need not be renewed until the first signs of deterioration are apparent. In the water system the joints that usually deteriorate most rapidly are those through which the water flows at its highest temperature.

6. It is pointed out that deteriorated joints can always be detected by simple examination. Chemical and other special tests are only required to detect liability of deterioration.

7. Great care should be taken that the result of each examination and the date of renewal of all rubber joints are recorded in the Log Books. Particular care should also be exercised that, when fitting rubber joints, all sharp edges at ends of pipes be removed before the rubber tubing is slipped on, as, unless this is done, damage to the interior of the tubing will result. Consequent on such damage, particles of rubber detected in the filters might create the impression that exceptionally rapid disintegration is taking place.

8. All rubber connections, where stored, should be kept in cool, dark and damp places.

9. *Cancellation.*

Notice to Ground Engineers No. 2 of 1920 is hereby cancelled.

(No. 8 of 1922.)

AIRCRAFT AND THE NAVY

AN interesting discussion occurred on July 18 during the Navy Estimates before Parliament upon the position of the Navy to aircraft and the relationship with the Air Ministry. Viscount Curzon, after referring to the much-debated question of capital ship construction, said the wisdom of building such naval craft was called in question owing to the menace from below and above the water. It was evident that all was not as it should be with regard to the Royal Navy in the air. The navy of the future must be prepared to take to the air, and a navy that could not do so would be at a hopeless disadvantage with regard to a navy that could. He asked whether the Admiralty were satisfied with the number of 'planes allocated to the Navy. We had nine fighters in the Navy. Could it be said that the Navy was prepared to repel air attack with only that number of machines? Speaking of the necessity of skilled personnel, he said: How could observers make correct wireless spotting signals to the ships dependent upon them for observation unless they were properly trained? The same applied to those who performed the exceedingly important work of scouting and reconnaissance. Unless the men had the proper training they would not be able to say whether they had seen a submarine or a battleship. Only by perfect co-operation between the aircraft and the Navy could they succeed under present conditions. He did not believe that skilled pilots could be supplied at a moment's notice. He would like to know how many observers were trained and how many would be required to bring the establishment up to full strength.

He had heard that it was the case, and he believed it to be true, that the Fleet, which was going to carry out a gunnery programme, carried on with that programme until the ammunition ran out for the year. It was then agreed to interrupt the programme, and recommence when the following year's ammunition allowance became available. When the Fleet was ready to go ahead with their gunnery experiments and progressive training they found that the pilots and observers whom they had been relying upon had been drafted to another quarter of the globe, and the training had to be started *de novo*, and all the ammunition fired away the year before was absolutely wasted. There was absolutely no co-operation there. The Air Ministry further stated that new types of machines for the Navy were to be adopted. When was the Navy going to see those machines in present circumstances, and where were the new types to come from? The Navy had no control over the question of how the money spent on aircraft was allocated. As we were supposed to have a one-Power standard as regarded the Navy, was the Air Force operating with the Navy up to the same standard? The Burney aircraft scheme was a very important one, but they had not the airships necessary to that scheme, or the money to provide them. But other Powers had airships. The United States had no fewer than four working with the Navy and doing experimental work. We could not afford to disregard the experience of other countries. The present arrangement was working very badly from the point of view of the Navy. This was partly due to the system and partly to the spirit prevailing at the Air Ministry. We should do no good unless we had a thorough reconstruction of the Air Ministry.

Lieut.-Col. Moore-Brabazon said the question of airships was one for experts. During the war it was proved that the hydrogen-built airship, from a military point of view, was one of the easiest things to knock out that ever went up in the air. True, America, from the naval point of view, looked with some hope to the airship, but that was because in America helium was found. In this and other countries helium was not findable. The complaint of the noble lord was really that we had not got enough machines. But was not that the complaint all round—of the Army, Navy and Air Force? Everybody admitted that we had not enough machines, but that was a question of money. The system under which we were running our aircraft today was the most economical one; if we went back to the old system there was bound to be duplication, which was so extravagant. The Air Force today had £10,000,000—just over the cost of one battleship—and it had with that to try to keep the Army efficient, the Navy efficient and to run its own independent air force, and, besides, sink money in capital undertakings such as buildings, because we could not have first-class mechanics kept in hovels. If the Air Force were to blame for not having sufficient aircraft, he thought they had been put in a very difficult position.

In regard to ordering new machines—again this was a question of money. Although he thought the machines used for the Navy today were as good as those of any other country, there must come a time, and that early, when the subject of more efficient machines must be gone into. Viscount Curzon, he said, had brought up on this vote the hardy annual of his own Air Force, and he complained bitterly, he thought, of the personnel attached to the Navy. But if they were short of trained personnel at the Admiralty, whose fault was it? Was not the Admiralty asked to find 400 officers for the air and they were to go back to the Navy? Who refused that? The Admiralty, and nobody else.

He had read in *The Times* column after column of arguments between the noble lord and Sir Percy Scott, in which the noble lord maintained how wonderful the capital ship was, and how it could not be knocked out by any aircraft. The noble lord was an expert, and he was not going to dispute that, but he did notice today an amazing nervousness of the possibility of what might happen and the plea that the capital ship might be defended, not by its own inviolability, but by other aircraft. He admitted that the Navy could be made more efficient than it was from the point of view of aircraft; but that was not a matter of organisation but of money. If the noble lord pressed for more money for the Air, he would get a smaller Fleet but one better equipped with aircraft.

Mr. G. Lambert said the first duty of all three defensive forces was to defend this country. Although he did not anticipate any attack upon us at present, could the Admiralty say that the taxpayers' money was being spent to the best advantage, especially as to the £16,000,000 to be spent on two capital ships? Personally, he did not pretend to express an opinion as to the value of the capital ship, but surely it was useless, wasteful and extravagant to spend money on capital ships unless you had sufficient aircraft to protect them. He should like to ask whether some of this money would not be better spent upon aircraft. They wanted to have the question settled as to whether this £16,000,000 should be spent before the Navy had secured a sufficient air force.

Rear-Admiral Sir R. Hall said the complaint of the Navy was that the officers and men who were concerned with aircraft were not part of the Navy. It was only by full and enthusiastic co-operation of the rank and file that they could get full benefit from the new arm.

Lieut.-Comdr. Kenworthy said that apparently Sir R. Hall's charge against the Air Ministry was that when the officers attached to the naval wing of the Air Service were sent to sea to fly aeroplanes used by the Fleet, when they were on board ship, they were not available for watch-keeping, they wore a different uniform and were under their own discipline. If the idea of the Admiralty, as represented by the late Director of Naval Intelligence, was that if he wanted to get control of officers trained in naval flying in order to make them naval officers first and secondly air officers, if their air duties were to be secondary to their naval duties, then heaven help the Air Service and heaven help the Navy. If that was the attitude of hon. and gallant Members, he did not wonder that the Air Minister was keeping a tight hold of his own naval air wing and was resisting the attempt to re-absorb it in the Navy.

Mr. Amery, in replying to points raised, said there was nothing in recent experiments to justify the idea that the capital ship was not capable of defending itself against the menaces with which it was threatened, but, having said that, he did agree whole-heartedly with what was said by Viscount Curzon, that, in an ever-increasing degree, the Navy must consider the importance of the air factor not only from the point of view of the defence of these islands against air attack, but also as an integral part of the fighting fleet.

Upon the question of the relation of the Admiralty to the Air Force, over the marginal region where they came into contact it was vital that their co-operation should be of the fullest kind. One thing he would say was that there was not the slightest idea of challenging the general positions laid down by the Leader of the House in March as to the existence of the separate and independent air force.

The only question in issue to his mind was that of considering how the integrity of naval control over the air units actually working with the fighting fleet could be most effectively secured, consistently with the fullest training of the personnel of those units in every aspect of air science. That question was at present under discussion by the Committee of Imperial Defence and by the Chief of the Air Staff and the First Sea Lord, together with the help and advice of the Colonial Secretary. The air policy for the Navy was laid down in the first instance by the Admiralty, and the

Air Ministry endeavoured to supply what was needed as fully as was practicable. There was necessarily a considerable margin between what the Admiralty would like to see, the experiments which they wished to make, the strength of the Air establishment which they would like to have in their hands at this moment and what the finances of the country at present allowed.

The designing of aircraft for the Navy and the designing of air torpedoes was a matter for the Design Department of the Admiralty, acting, of course, in the closest touch and collaboration with the Air Ministry. The Navy had two aircraft carriers—one in the Atlantic and the other in the Mediterranean. Three more carriers were being completed, and he hoped that two would be ready before the end of the financial year and one before the end of the calendar year. At the present time the Admiralty had the pilots and the aircraft for the two carriers which were actually on service. The United States Navy had a naval air force of which the cost was set down in the present year's Estimates at £3,250,000, which did work for the Navy and, in addition, a certain amount of work from the shore, such as under our organisation would come within the defence work of the Air Force. We had six fighting aeroplanes with pilots actually with the Fleet, and an immediate reserve of three more, and he understood that three others were in reserve under the control of the Air Ministry. The number of 86 fighting aeroplanes which it had been said that the United States Navy had was not the number which that navy had today, but the number proposed for 1923. By the time that the United States proposals were carried into effect we should have a larger provision of aircraft carriers than we had at present, and he trusted a larger provision of aircraft also. The exercises, of which some account had been published in the Press that morning, were not of a wholly novel character, but were part of a series of very valuable and instructive exercises which had been carried out for some time. It was not true that these aeroplanes employed a smoke screen. That was an interesting detail thrown in by the newspaper but not based on actual facts. There was not a surprise. The torpedo-carrying aeroplanes were sighted about 15 minutes before firing their torpedoes. They were attacked in dummy by fleet-fighting planes as they approached. They were under dummy gunfire from escorting light cruisers and destroyers when at a low altitude before firing their torpedoes. Hon. Members would realise the great difference upon the *morale* and steadiness of a flier between dummy fire and real fire directed against him. The attack was developed under conditions which were necessarily favourable to the attack. The number of hits reported under these favourable conditions was not considered to be at all large, from the Admiralty point of view, or, at any rate, not beyond what was expected.

Personals

Married

Flying Officer Henry John Hunter, R.A.F., third son of the late William Hunter, of Reigate, and Mrs. Hunter, of Polmood, Cranbrook, was married on July 19, at St. Andrew's Church, West Kensington, to Moira Gwendolen Hatton, younger daughter of Captain H. G. S. Tuite and Mrs. Tuite, of 19a, Perham Road, W. 14, and niece of Sir Morgan Tuite, Bart., of Sonna, Co. Westmeath.

Austeen Rees, late R.A.F., second son of Mr. and Mrs. Rees, was married, on June 10, at the Cathedral, Victoria, B.C., to Olivette, elder daughter of the late Mr. John Oakley Maund and Mrs. Oakley Maund.

Flight Lieut. Herbert Edwin Tansley, M.C., R.A.F., third son of Mr. and Mrs. W. Jackson-Tansley, of Washwood Heath, was married on July 5, at Uxbridge, to Ann (Shock) Dennis (formerly Brown), younger daughter of Mr. and Mrs. George Brown, of "Samson's," Bourn, Cambridgeshire.

To be Married

The engagement is announced between John Beresford Cole-Hamilton, R.A.F., late R.N., and Sybil, elder daughter of Sir John and Lady Latta, of 12, Portman Square, W. 1.

Killed

Flight Cadet Vyvian Osborne Gillmore was killed in an aeroplane collision at Cranwell, Sleaford, on Friday, July 7.

Capt. Sidney J. Stewart, late R.F.C. (27th, 40th and 208th Sqdns.), who was accidentally killed while flying in Paraguay on July 8, was the eldest surviving son of Mr. and Mrs. Edward Stewart, Alton, Hants. His age was 27.

Item

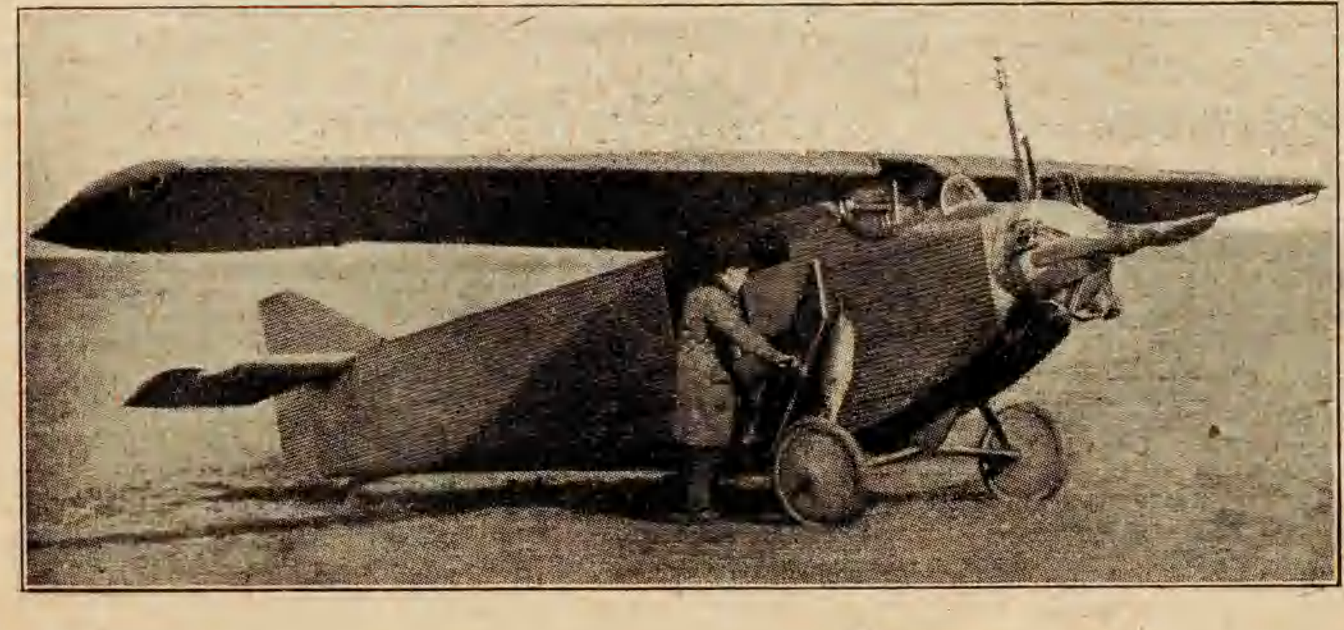
The will of Pilot Flying Officer Geoffrey Robinson, M.C., of the Royal Aircraft Establishment, Farnborough, and late of Sheffield, who was killed in an aeroplane accident near Burnham, Bucks, on February 10, aged 28, has been proved at £274.

* * * *

The Gordon-Bennett Balloon Race

We learn that the following countries and pilots will participate in this year's Gordon-Bennett Balloon Race, which starts at Geneva on August 6:—England.—Ernest Allen, Griffith Brewer and John Dunville; Belgium.—Lieut. Labrousse, Capt. George and E. Demuyter; France.—Maurice Bienaimé, Georges Cormier and Jules Dubois; Italy.—Commandant Barbanti, G. Valle and A. Guglielmetti; Spain.—E. Magdalena and F. Martinez Sanz; Switzerland.—Capt. Armbruster, 1st Lieut. Ansermier and Maj. Gerber; and United States.—Oscar Weslover, H. E. Honeywell and W. Reed.

* * * *



A new Junkers' three-seater: This machine, to which reference was made in FLIGHT recently, is a departure from Junkers' practice in having the wing placed on top instead of low down on the fuselage. The cabin has accommodation for two passengers, and as the engine is a Siemens of 60 h.p. only, the machine is using but 20 h.p. per occupant, which should give very economical running.

LONDON TERMINAL AERODROME

Monday evening, July 24.

DESPITE usual, but inexplicable, fluctuations, passenger traffic on the various London-continental air routes continues to show signs of a definite improvement, and air-line managers are beginning to take quite an optimistic view of the situation, though the rivalry between the different lines remains as keen as ever.

Alterations are being made in the times of one or two of the services. The K.L.M. resume their 10 a.m. service to Rotterdam and Amsterdam today, and will cease running the 6.15 a.m. early morning monoplane which was put on to supply newspapers for the conference at the Hague. The Instone Air Line, now that they are in a somewhat better position as to machines, are resuming their mid-morning service to Brussels, and one of their machines will in future leave the air-station for Brussels at 11.45 a.m.

A striking example of the value of the air services to provincial business men was afforded on Wednesday, when a Liverpool business man travelled to Paris on the 5.30 a.m. Daimler newspaper machine. He remained at business in Liverpool right up to the end of the day on Tuesday evening, and, in fact, did not leave Liverpool until after 9 p.m., reaching London at about 4 a.m. on Wednesday morning. A car was waiting at the station to take him to Croydon, and he was in Paris before 8 a.m. This is a striking illustration of the value of the air services in connection with the night trains from the provinces, and it is a point which the various air services might do well to take up. The advantages offered by air travel on the existing lines are far greater in the case of provincial business, both passenger and goods, than is the case with London, and it would, perhaps, pay one of the air-lines to concentrate on an effort to get provincial business.

The Instone Air Line have now obtained delivery of three Vickers "Vulcans," and all of them have been put on service. This machine is known to the staffs at the air-station by the familiar name of "The Flying Pig," and it certainly is the most peculiar-looking machine on any of the services.

Whims of an American Passenger

MR. YOUELL left for Penzance with an American passenger who wished to see "the end of Britain," on Friday morning; but, after arriving at Yeovil, his passenger expressed a desire to see Birmingham instead. Humouring him in this strange fancy, Mr. Youell flew on to Birmingham, and arrived back at Croydon on Saturday evening.

During the week-end, the Surrey Flying Services were busy taking up 5s. joy-riders, although the weather spoilt business again, and the crowds were by no means as large as could have been wished. The Surrey Flying Services have now three Avros available for taxi work and joy-rides. Two of these are fitted with 120 h.p. Clergets, and the other with an 80 h.p. Renault.

Commander Perrin, of the Aero Club, was at the air-station on Saturday with a bundle of posters announcing the Aerial Derby. He tells me that it is expected that both Sadi Lecointe and Kirsch will take part in the race, which will once again assume an international character.

Mileage Figures from Amsterdam

THE K.L.M. announce that the machines entering and leaving their aerodrome at Amsterdam have now flown a total distance of 1,000,000 kms. This total includes the machines that were flown by Airco and Handley Page in conjunction with the K.L.M. in the early days, and also the machines operated by the French companies on the Paris-Amsterdam route.

The newspapers which now go to Paris each morning at 5.30 a.m. on one of the Daimler D.H.34's, had a remarkably rapid trip on Monday last. From the moment of leaving the air-station at Croydon to the actual delivery at the Paris office, by motor-car from Le Bourget, the time was only 2 hours 7 minutes.

The Napier-engined Handley Page W.8 made a rapid journey to Paris on Wednesday, taking only 1 hour 42 minutes by the official messages. This was claimed in the daily newspapers as a record for a passenger machine. It is certainly a record for a twin-engined machine, but is away behind the times made by single-engined passenger machines. A Napier-engined Airco 16, piloted by Mr. Powell, accomplished the journey between London and Paris in 1 hour 26 minutes, while a similar machine, on an entirely different occasion, flew from Paris to Croydon in 1 hour 27 minutes.

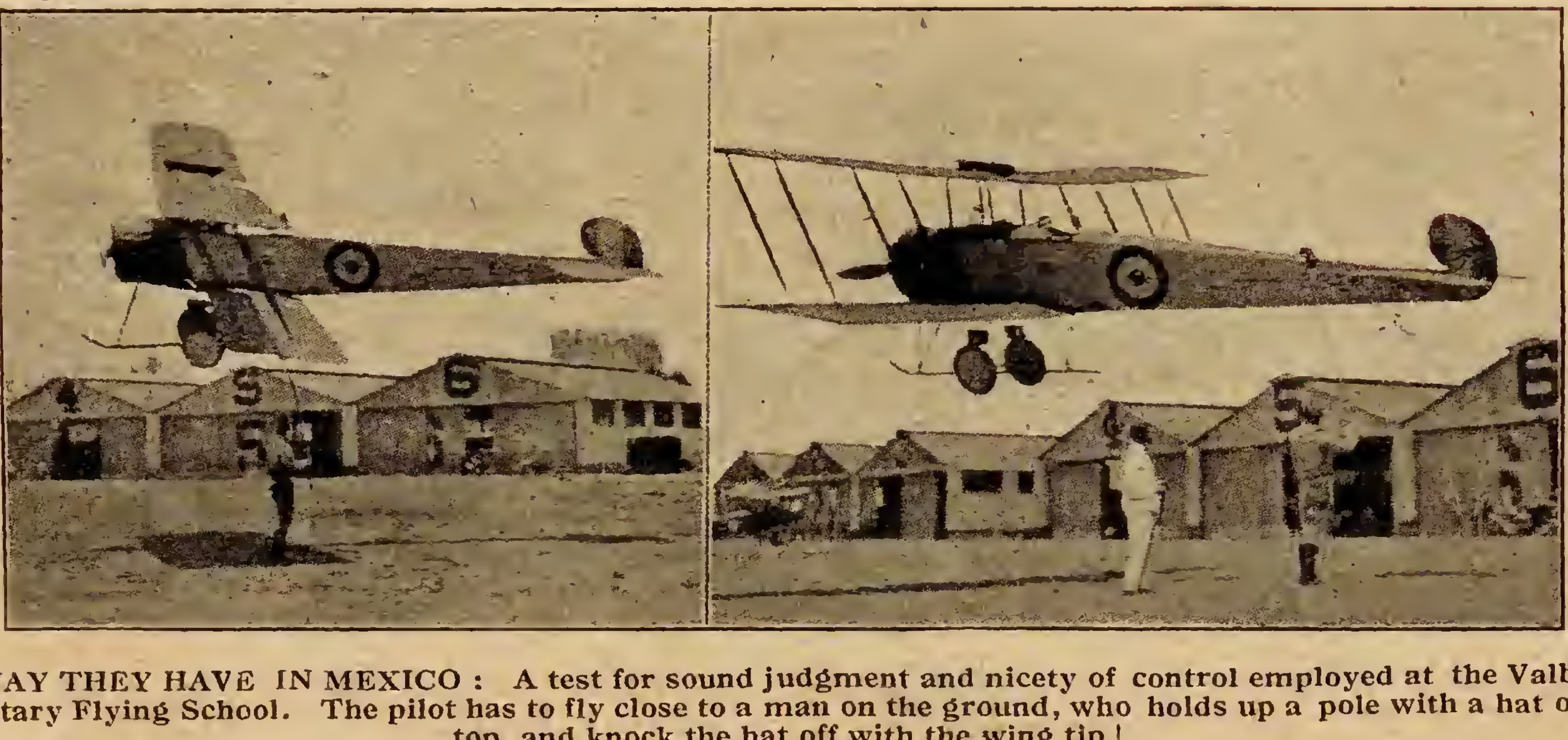
On Monday morning, Maj.-Gen. Sir W. S. Brancker, Director of Civil Aviation, visited the aerodrome in order to perform the opening ceremony in connection with the new repair and test shops of the Daimler Airways. Taking as his text, one of the Daimler D.H.34 "expresses," which those who attended the function inspected with great interest, and which has, during the last three months, flown a distance of 53,000 miles, Gen. Brancker made some very pertinent observations. One thing he said was that he believed that in three years' time commercial aviation would be on a paying, unsubsidised basis, and that in ten years there would be a widespread network of airways throughout the Empire. One specially notable fact in connection with the Daimler "express," which has put up the 53,000 miles record in three months, is that official inspection has shown it to be, if anything, in better flying trim than it was on the day on which it first began flying between London and Paris.

Weather Forecasts from France by Wireless

WEATHER forecasts issued by the French Meteorological Office are now being received by wireless and exhibited side by side with the forecasts issued by our Meteorological Office on the 'drome. A typewritten notice alongside these forecasts calls attention to the fact that no responsibility is accepted by the "meteor" people on this side of the Channel for any statement contained in the French forecasts.

Some of the K.L.M. monoplanes are now to be fitted with wireless sets similar to those fitted to the British machines. In fact, I am told that they are to be fitted by the British Marconi Company and will be maintained in repair from Croydon. It is acknowledged that the wireless sets which are fitted to the British machines are far in advance of any others throughout the world.

There is a persistent rumour at the air-station that the Instone Air Line are about to open a service to Cologne as an extension of their London-Brussels service. It is also rumoured that they are at the same time to close their service to Paris.



A WAY THEY HAVE IN MEXICO: A test for sound judgment and nicety of control employed at the Valbuena Military Flying School. The pilot has to fly close to a man on the ground, who holds up a pole with a hat on the top, and knock the hat off with the wing tip!

IN PARLIAMENT

Royal Air Force Personnel

MR. MALONE on July 12 asked the number of officers and men whose duties do not normally take them in the air, and the number of qualified pilots and observers whose duties normally take them in the air and are now actively so employed?

Captain Guest: Officers and men whose duties do not normally take them in the air include, in the first place, officers belonging to the stores, chaplains, and medical branches, and these number 550. In addition, there are a certain number, about 70, of officers on the general list who are medically unfit for full flying duties. With regard to the airmen, there are 24,535 whose duties do not normally taken them in the air, but a considerable number of these have to go up for the testing of engines, wireless operations, and other duties. The number of qualified pilots and observers, whose duties do normally takes them into the air, comprise not only pilots and observers employed with Service squadrons, but also officers employed as instructors in flying training schools and other instructional establishments. There are also those whose duties include the inspection of stations, or the testing of new devices like cameras, wireless apparatus, bombs, etc., all of which necessitate their going into their air. These, in addition to the pilots, account for practically all the officers on the general list, who, as stated in my reply to my hon. friend on February 27 last, number nearly 2,200, exclusive of the ex-naval warrant officers referred to therein.

Civil Aviation Subsidies

MR. L'ESTRANGE MALONE on July 13 asked the Secretary of State for Air how much of the money allowed for civil aviation—subsidies, etc.—in the 1922-23 Estimates has not yet been allocated; how is it intended to utilise this sum; whether this sum is considered sufficient; whether he has recently received representations as to the serious position of the air industry; and whether he can make a statement as to the Government's policy?

Capt. Guest: I assume that my hon. friend is referring to the sub-head of Vote 8, which relates to "Civil Aviation Subsidies"; if he refers to the Vote as a whole he will see that the allocation of the money included in it is given in fairly full detail in the Air Estimates. As regards the sub-head for subsidies of £207,000, £107,000 was provided for the purchase of machines to be supplied on hire-purchase terms to approved civil aerial transport companies. £100,000 was provided for subsidies in cash to such companies. It is possible that the subsidy grants earned and the requirements in machines may be less than the Estimate, but I am not yet in a position to say what savings will arise or how they will be allocated. In considering the allocation of any savings, the Air Ministry would most certainly have regard to the present position of transport companies—whose not unreasonable estimates of traffic have not been fulfilled—and of the aircraft industry.

Air Power

CAPT. VISCOUNT CURZON asked the Prime Minister whether he is aware that the deputation from the Parliamentary Air Committee to be received by the Committee of Imperial Defence will not include any representative able to speak for the naval side of the case; and whether, in view of the importance of the subject and of the fact that the Royal Navy is very much involved in the consideration of the problems of the air, he will allow an opportunity for certain members of the Parliamentary Navy Committee to appear before the Committee of Imperial Defence and state their views on the naval aspect of the problem of air defence?

Maj.-Gen. Sir J. Davidson asked the Prime Minister whether he is aware that the deputation from the Parliamentary Air Committee to be received by the Committee of Imperial Defence will not include representatives able to speak from the Navy and Army sides of the case; and whether, in view of the importance of the subject and the fact that all three Services are closely involved in the problems of the air, he will allow an opportunity for certain members of the Parliamentary Army Committee to appear before the Committee of Imperial Defence and state their views on the military aspects of the problems of air defence?

The Prime Minister: The most convenient method would appear to be for the Parliamentary Navy Committee, in the one case, and the Army Committee in the other, to get in touch with the Parliamentary Air Committee with a view to a single deputation on the subject.

Viscount Curzon: Is the right hon. gentleman aware that the Parliamentary Navy Committee has met, and endeavoured to get into touch with the Parliamentary Air Committee, and they do not want the representatives of the Navy to accompany them?

The Prime Minister: I am sorry that there should be any difference of opinion. We are only anxious to get as much assistance as possible from Members who take an interest in this matter to help us to come to a right conclusion. We are anxious to hear what can be said by those who are more cognisant of the Navy than the Army, and also those who are specially interested in the Army side of the question. I think that hon. Members who take an interest in the matter in both capacities should be able to come to an agreement as to the deputation to be received by the Committee of Imperial Defence.

Viscount Curzon: Will the deputation to be received by the Committee of Imperial Defence not be limited to four persons?

The Prime Minister: I think it would be a mistake to have more; that is quite ample—two for one point of view, and two for the other.

Viscount Curzon: If the Parliamentary Air Committee do not wish the Navy representatives to accompany them, may I bring the matter to the notice of the right hon. gentleman again?

The Prime Minister: Yes.

Capt. W. Benn: Could not the right hon. gentleman give an additional Supply day to this very important Service?

The Prime Minister: Yes; if there is a general desire, the Government will try to find a Supply day for the purpose. But I do hope before they come that the representatives of the Air Committee in this House will be able to accommodate their views to those of the other gentlemen mentioned, and present their case together before the Committee of Imperial Defence. We should like to have the matter examined by the Committee of Imperial Defence before the discussion in this House.

Burney Airship Scheme

CAPT. VISCOUNT CURZON on July 17 asked the Prime Minister whether the Government have as yet come to any decision upon the Burney airship scheme?

Mr. L. Malone asked the Prime Minister whether His Majesty's Government have yet arrived at a decision in regard to the Burney airship scheme; whether it has yet been approved; and whether they have taken into consideration the relative cost, efficiency and advantages of granting assistance on the same lines to similar schemes employing aeroplanes instead of airships?

The Prime Minister: As a result of several meetings of the Committee of Imperial Defence, it was decided that in view of the need for economy no money should be expended in developing an airship service, either for commercial purposes or with the object of establishing Imperial communications. A special sub-Committee is being appointed, with my hon. friend the Parliamentary Secretary to the Admiralty as chairman, to study in detail the technical aspects of Comdr. Burney's scheme with a view to ascertaining if Comdr. Burney's claims were well founded and if his scheme was likely to produce airships which would be of national value in time of war. Full consideration is being given to the possibility of the employment of airships in connection with Imperial air communications.

Viscount Curzon: Will the Report of this Committee be published, and is the right hon. gentleman aware of the great delay that has already taken place in referring the matter from one Committee to another? I hope this does not mean that there will be any further delay.

The Prime Minister: It is doubtful whether it is desirable to publish the Report of a private Committee of the Committee of Imperial Defence.

Viscount Curzon: Could a general outline of the Report be published, if at all possible?

The Prime Minister: I will consider that.

Aircraft Industry

VISCOUNT CURZON asked the Prime Minister whether his attention has been drawn to the very grave position of the aircraft industry in this country; whether he is aware that it is in immediate danger of complete collapse, and that all development and research is practically at a standstill; that, if this should occur, it will not be possible to provide for expansion in emergency, and that the industry may take years to recover; that it has been admitted by the Admiralty that the present organisation of the Royal Air Force does not provide the Royal Navy with the machines and personnel required, both lighter and heavier than air, for its present establishment; and whether he can state what immediate steps the Government intend to take to meet the grave developments and to provide for future requirements, both civil and military?

The Prime Minister: I am fully alive to the position of the aircraft industry, though I cannot accept all the statements made by my noble and gallant friend, which seem to me to be exaggerated. As I have already announced, the whole question is engaging the careful consideration of the Committee of Imperial Defence.

Viscount Curzon: When the right hon. gentleman says my statement is exaggerated, is he aware that the Secretary of State for Air has already announced that he views the situation with grave alarm?

Naval Aircraft

VISCOUNT CURZON, on July 18, asked the Secretary of State for Air whether any of the machines working from, or with, H.M.S. *Argus* have recently crashed, and how many aeroplanes were available for service, working with the Royal Navy on July 16, 1922, for bombing, fighting, torpedo-carrying, observation, and training, respectively?

Capt. Guest: The answer to the first question is that, since May 15 last, only two aeroplanes have been seriously damaged, and written off, during deck landing practice. Damage to aeroplanes is to be expected in training exercises of this kind, but this does not affect the number of aeroplanes available, damaged machines being at once replaced from the supply held in immediate reserve.

The answer to the second question is, that aeroplanes are available in the following numbers, including the 50 per cent. first line reserve, which is kept at the unit and provides immediate replacements for any damage to unserviceable aeroplanes:—

Reconnaissance.—18 ship planes, 18 float planes, 15 flying boats.
Spotting.—18 ship planes.
Torpedo-carrying.—18 ship planes.
Fighting.—9 ship fighters.
Training.—9 float seaplanes, 12 flying boats.
Development.—6 flying boats, 4 torpedo ship planes.

Thus, there are 127 service aeroplanes in active commission and first line reserve engaged in aerial and naval peace exercises or in naval air training and development. In addition to this, two of the reserve squadrons, comprising 36 aeroplanes, including immediate reserve are, *inter alia*, being used for certain other special forms of naval co-operation. Finally, there is maintained behind these units a main reserve of the various types, amounting to over 200 aeroplanes without pilots, all of which would be available for the reinforcement of the above naval units. The actual grand total of aeroplanes available for all purposes connected with the Navy is 359, exclusive of the two reserve squadrons mentioned above.

Lieut.-Commander Kenworthy: Does not the difference between this answer and the answer given by the Parliamentary Secretary to the Admiralty show a great lack of co-ordination between the Air Service and the Admiralty?

Viscount Curzon asked the Secretary of State for Air whether pilots working with the Royal Navy are interchangeable with pilots working with the Royal Air Force in other areas; whether such changes are in fact made; and whether any of the pilots borne in or attached to His Majesty's Ship *Argus* have recently been changed?

Capt. Guest: In answer to the first question, pilots working with the Royal Navy are interchangeable with those working on other duties, as it is considered necessary to give them the widest possible experience. A certain amount of special practice work is needed in connection with co-operation with the Fleet, and pilots so engaged are, as far as possible, retained in their appointments for a period of four years; though in practice, on account of promotion, or owing to their being required for special appointment, or for some other similar reason, the full period is not always served by all officers.

The reply to the second question is in the affirmative. With regard to the third question, two pilots have been changed during the current year. One of these was required for a course at the Royal Air Force Staff College, and the other for experimental work.

Short Aeroplane Tests

MR. MALONE asked the Secretary of State for Air at what date the tests in regard to corrosion and vibration were actually commenced on the Short Brothers all-metal aeroplane, exhibited at Olympia in 1920 and immediately purchased by the Air Ministry?

Capt. Guest: Investigation on the corrosion of metal alloys which had been initiated during the War, and then suspended, was resumed early in 1921, by a sub-committee of the Department of Scientific and Industrial Research, whose report is waited. (The material used in the Short aeroplane was well-known and is one of those under investigation by the Committee.) As regards the vibration tests, the aeroplane arrived at Farnborough on February 1, 1921, and a detailed examination of the machine took place. Straight flights were authorised in May, 1921, static tests commenced in June, vibration tests in September, and both were completed in November, 1921.

Air Service

LIEUT.-COL. A. MURRAY, on July 19, asked the Prime Minister whether his attention has been drawn to the statement made by the First Lord of the Admiralty, in an address to the 1920 Club, to the effect that the Navy must have control over its Air Service; and whether this statement represents the views of His Majesty's Government?

Mr. Chamberlain (Leader of the House): The Government policy was stated by me in this House on March 16 of this year, and to this statement I have at present nothing to add, as the enquiry into the system of naval and air co-operation which I then foreshadowed is still proceeding. I should add that the meeting addressed by my noble friend was a private one, and reporters were not present. The account of what he said which reached the Press was, I am informed by him, unauthorised and incorrect.

Lieut.-Col. Murray: Can the Lord Privy Seal tell us what the right hon. gentleman did say?

Mr. Chamberlain: Nothing inconsistent with the statement of policy which I made to the House in March last.

Captain Wedgwood Benn: Will the Committee to which the right hon. gentleman has referred give effect to the decision of the Government to maintain the unity and integrity of the Air Force?

Mr. Chamberlain: No, Sir, the decision of the Government was that there should be an integral Air Force, and the Committee to which I have referred, and the appointment of which I then foreshadowed, was to consider methods in which Naval and Air Force co-operation could be most effectively carried out to the advantage of both services, and, above all, to the advantage of the country.

Mr. Lambert: When will the Committee report?

Mr. Chamberlain: I cannot say. It is dealing with very important matters, and with matters, admittedly, of some difficulty. With every good will on both sides there will be no delay, but I cannot fix a time.

Aeronautical Research

Lieut.-Colonel Moore-Brabazon on July 20 asked the Secretary of State for Air if he will state what provision has been made in the Air Estimates for pure aeronautical research; and what percentage of the total Estimates is devoted to this Department?

Captain Guest: The total provision made in the Air Estimates for carrying out research work is £1,147,000. This figure represents the sum which is devoted to all forms of experimental and research work carried out under the direction of the Air Ministry, and into this work enters a very substantial element of pure research, the cost of which it is not possible to extricate from the remainder of the Vote. It also includes a sum of £47,000, which is specifically confined to pure research work carried out at the National Physical Laboratory, at the Air Ministry Laboratory, and by the Aeronautical Research Committee, the Ordnance Committee and Research Department at Woolwich, and other joint establishments, and also by special consultants.

Air Ministry Economies

Captain Loseby, on July 21, asked the Secretary of State for Air whether, as a result of the Geddes recommendations, any economies have been effected in the secretariat of the Department; if so, to what extent; and how do such economies, if any, compare with the reductions effected in the Directorate of Research?

Captain Guest: The answer to the first question is in the affirmative; to the second, that 29 temporary administrative and clerical officers have been discharged; to the third, that 53 persons on the staff of the Directorate of Research have been discharged or are under notice of discharge.

LOSS OF FRENCH "SPAD" AEROPLANE OFF FOLKESTONE

The Air Ministry announces that the investigation which was previously announced as being made by the Inspector of Accidents into the circumstances attending the unfortunate accident to the French "Spad" aeroplane off Folkestone on June 3, which resulted in the loss of the machine when 3 miles from the coast and the death of all on board, has now been completed. As was foreshadowed in a previous *communiqué*, the finding of the Inspector of Accidents is that the evidence available is insufficient to determine the cause of the accident.

In view of the public interest in the matter a summary of the main facts regarded as established by the enquiry is given as follows:—

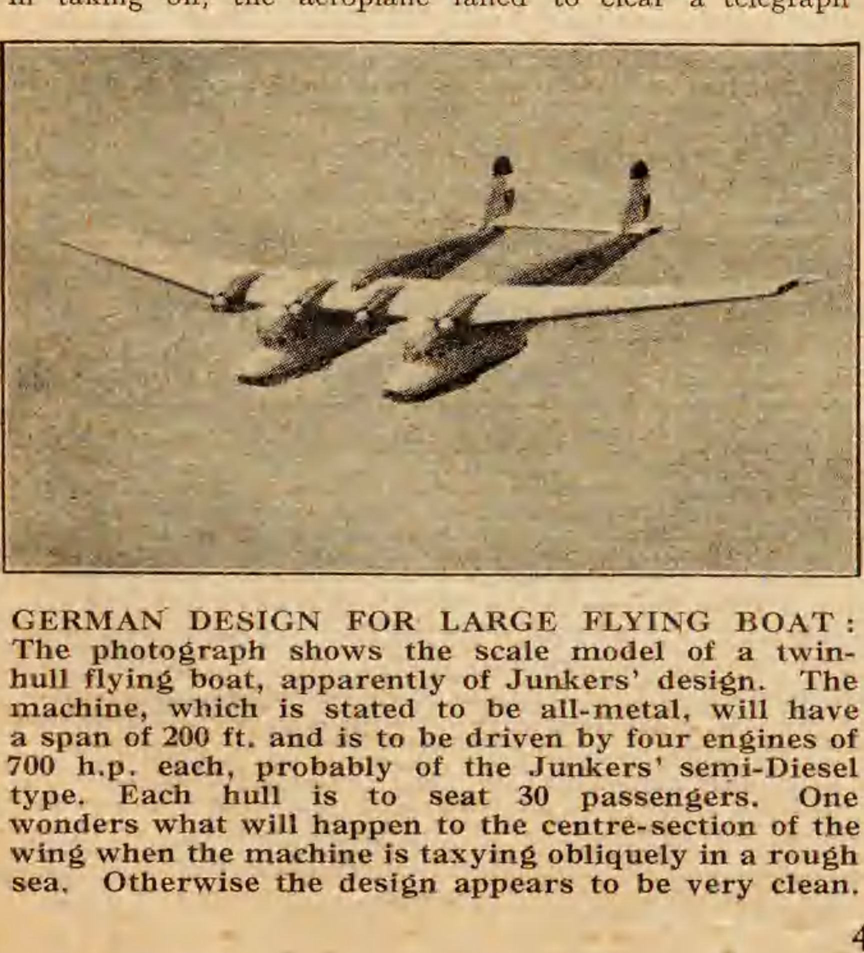
The aeroplane, after undergoing certain modifications, including the installation of a Hispano-Suiza engine, was granted a fresh certificate of airworthiness by the French authorities on April 26, 1922. On May 29, the pilot flew the aeroplane from Paris on its first journey after re-certification, and had a forced landing at Lympne, owing to a broken oil pipe. After repair, he continued the journey to Croydon on June 1, 1922. On June 3, the day of the accident, before the flight was commenced, the machine was examined and passed by an English ground engineer licensed by the Air Ministry. The pilot was experienced, and so far as is known in good health. The weather conditions for flying over the London-Paris route at the time of the accident were fair. The sky was overcast by a layer of cloud at a height of 1,500 to 2,000 ft., accompanied by thin mist over the sea. Visibility inland was good, but over the Channel it was about 4,000 yds. at the surface. The wind was north-west, about 15 m.p.h. The engine was running satisfactorily throughout the flight, but evidence as to the behaviour of the machine after finally leaving the coast is conflicting and unreliable.

In the absence of any evidence as to technical or climatic causes to which the accident could be definitely attributed, the question whether it might have been brought about by any interference with the pilot or the control mechanism was considered. The conclusion was, however, formed that, owing to the almost complete partitioning off of the pilot's cockpit, it was hardly possible for any such interference to have taken place accidentally, and no evidence was found to support a theory that such interference had taken place intentionally.

Albert Medal for R.A.F. Officer

The King has awarded the Albert Medal to Squadron-Leader Charles Curtis Darley, of the R.A.F., in recognition of his gallantry in endeavouring to save life.

On the night of September 27, 1919, a Vickers-Vimy aeroplane, piloted by Captain Cecil Hill Darley, brother of Squadron-Leader (then Flight-Lieutenant) Darley, who was acting as navigation officer, made a forced landing by Lake Bracciano, some twenty miles north of Rome, when on a flight from England to Egypt. On the following morning, in taking off, the aeroplane failed to clear a telegraph pole, and crashed, immediately bursting into flames. Squadron-Leader Darley was thrown clear, but at once rushed to the blazing wreckage and displayed very conspicuous bravery and devotion in persistent, but unavailing, attempts to rescue his brother.



GERMAN DESIGN FOR LARGE FLYING BOAT: The photograph shows the scale model of a twin-hull flying boat, apparently of Junkers' design. The machine, which is stated to be all-metal, will have a span of 200 ft. and is to be driven by four engines of 700 h.p. each, probably of the Junkers' semi-Diesel type. Each hull is to seat 30 passengers. One wonders what will happen to the centre-section of the wing when the machine is taxying obliquely in a rough sea. Otherwise the design appears to be very clean.

Admiralty and Aircraft Exercises

The following is issued by the Admiralty:—

In view of the unauthorised and inaccurate reports which have appeared in the Press with regard to the torpedo aeroplane attack on the Atlantic Fleet which took place off the Isle of Wight on July 7, in the presence of the King, the Admiralty consider it desirable to issue the following brief statement of the facts:

1. The exercise was in no sense novel, and was designed as a spectacle rather than as a critical experiment. Similar exercises have been carried out on several occasions during the past three years, and the results on July 7 only confirmed previous experience.

2. In order to afford practice to the torpedo aeroplanes the Fleet approached to within a few miles of the aircraft base in broad daylight at low speed, on a prearranged day and at an hour signalled in advance to the aircraft. There was, therefore, no surprise attack, and the conditions were essentially unwarlike and unreal.

3. Moreover, as is unavoidable in all peace exercises, the Fleet offered an unresisting target to the aircraft, whose attack was undisturbed by any counter-offensive action, whether by the interference of Fleet aircraft, gunfire from the light cruiser and destroyer screens, or heavy, medium, and anti-aircraft gunfire—combined with splash barrages—from ships in the battle line.

4. The aircraft were thus allowed to develop to the full their offensive, whilst the Fleet was debarred from defending itself in any way. In spite of these favourable conditions the number of hits obtained on the battle line was small and of minor tactical importance.

5. Throughout the operation the pilots of the attacking aircraft showed skill and dash in the handling of their machines, but, as already indicated, the conditions were so unreal that no practical lessons affecting the security of the Fleet can properly be deduced from these exercises.

THE ROYAL AIR FORCE

London Gazette, July 18, 1922

Air-Commodore D. Le G. Pitcher, C.M.G., C.B.E., D.S.O., to be Director of Equipment, Air Ministry (*vice* Air-Commodore C. L. Lambe, C.B., C.M.G., D.S.O.); August 1.

General Duties Branch

Pilot Officer G. S. Brown to be Flying Officer; July 15. E. K. Clifford is granted a short service commn. for three years on the active list as a Flying Officer, with effect from, and with seniority of, July 10. Sec. Lieut. C. C. Musselwhite, Middlesex Regiment, is granted a temp. commn. as a Flying Officer, with effect from, and with seniority of, July 1, on seconding for four years' duty with the R.A.F. Wing Commander C. R. S. Bradley, O.B.E., is placed on half-pay, Scale A; July 16. Squadron Leader J. C. P. Wood is restored to full pay from half-pay; June 1. Flying Officer K. W. McKichan (Lieut. R.A.) relinquishes his temp. commn. on return to Army duty; July 1. Flying Officer D. M. Matthews resigns his short service commn.; July 19.

Stores Branch.

Flying Officer G. W. Longstaff is confirmed in rank; July 5.

Medical Service

E. E. Isaac, M.C. (Capt. R.A.M.C.), is granted a temp. commn. as a Flight-Lieut., with effect from and with seniority of, July 3.

London Gazette, July 21, 1922

General Duties Branch

Sqdrn. Ldr. (actg. Group Capt.) H. C. Ellis, C.B.E. (Lieut.-Col., R.A.F.D.), is seconded for a further two years' duty with the R.A.F.; April 1.

Memoranda

Capt. P. Sidney, Northumberland Fus., is granted permission to retain the rank of Lieut.-Col., R.A.F., on retirement from the Army. The permission granted to F. Horsley to retain the rank of Lieut. is withdrawn on his joining the Army; May 26. The permission granted to A. Wilson to retain the rank of Sec. Lieut. is withdrawn on his joining the Army; July 1.

Gazette, July 11, concerning Sec. Lieut. W. Cougle, is cancelled, and Gazette of June 30 stands.

* * *

THE FRENCH GLIDING COMPETITION

The number of entries for the French gliding and soaring competition, which is to be held at Clermont-Ferrand from August 6 to August 20, has now reached 49. The list up-to-date is as follows, although it appears probable that more may be added before the opening of the competition:—

1. Moriss Abbins
2. Louis de Monge
3. Louis de Monge
4. Eric Nessler
5. E. Dewoitine
6. G. Beuchet
7. E. Derivaux
8. Lucien Coupet
9. J. Gilbert
10. Georges Groux
11. J. Pimoule
12. Max Massy
13. Jules Deshayes
14. Francis Chardon
15. Francis Chardon
16. Francis Chardon
17. Gustave Thorouss
18. Daniel Montagne
19. Usines Farman
20. Henry Grandin
21. J. Rollé
22. Maurice Rousset
23. Henry Potez
24. Georges Sablier
25. Pierre-O. Détable
26. Louis Peyret
27. Aimé Valette
28. Ettoré Bernasconi
29. Maurice Griffrath
30. Lucien Lefort
31. Pierre Alvi
32. Jean Trofin
33. Sté Louis Bréguet
34. G. L. Julien
35. Marceau Aubiet
36. Jules Caux
37. Bellanger Frères
38. Landes et Derouin
39. Aeronautical Engineering Society
40. Louis Clément
41. E. Dewoitine
42. Pierre Levasseur
43. Et. Henri Dits
44. Louis Paulhan
45. Pierre Bonnet
46. Jean Gafner
47. Usines Farman
48. Verrimst-Maneyrol
49. Charles Vercrysse

For the purpose of housing and feeding the *personnel* which will assemble there, a camp has been established, which will be known as "Camp Mouillard." It is situated about 12 miles from Clermont-Ferrand, at the foot of the Puy de Combegrasse, from which the majority of the gliding flights will be started. The competition is international, 42 machines of French design and construction being entered, while Switzerland has entered five, America one and Belgium one. Great Britain is not represented.

The Judges' Committee is composed as follows: Lieut.-Col. Renard, Commandant Destrem, MM. Charles Dollfus, Riffard, Ribourt, and Capts. Philippe and Suffrin-Hebert.

* * *

ROYAL AERONAUTICAL SOCIETY NOTICES

Silver Medal.—At a Council Meeting, held on July 18, it was decided to award the Society's Silver Medal for 1921 to Mr. H. R. Ricardo, for his paper entitled "Some Possible Lines of Development in Aircraft Engines." The Silver Medal will, in future, be awarded annually to the author of the paper which is, in the opinion of the Council, the best paper of those published in the *Aeronautical Journal* each year.

Usborne Memorial Fund.—It is regretted that the subscription of 25 guineas towards this Fund from Sir Trevor Dawson was inadvertently credited to the Pilcher Memorial Prize for Students. This increases the total of the Usborne Fund to £99 14s., and involves a corresponding decrease in the Pilcher Prize to a total of £111.

W. LOCKWOOD MARSH, *Secretary*

* * *

One Million Kilometres of Air Travel.

The K.L.M. (Royal Dutch Air Service Co.) inform us that on July 22, they commemorated the completion of one million kilometres of air travel flown under their direction. Included in this figure are the journeys made by the French lines which were co-operating with the K.L.M. The particulars of the distances flown on the various routes since the commencement in 1920 are as follows:—During 1920, 270,000 kiloms. During 1921: Amsterdam-London and return, 285,200 kiloms; Amsterdam-Hamburg and return, 131,200; Amsterdam-Paris and return, 161,000; Special flights estimated, 24,000.

January 1 to July 10, 1922: Regular air lines, 122,000 kiloms.; special flights, 6,600 kiloms. Total, 1,000,000 kiloms.

Here and in France

At the annual meeting of Vickers, Ltd., last week, Mr. Douglas Vickers, who attended, made a few significant remarks upon our Government's encouragement of aircraft constructors, when compared with the authorities of our French allies. Mr. Vickers said that the firm were getting their share of such aeroplane orders as were being placed, and their types of machines were very successful, but orders came for such small quantities that the cost of designing and experiments bore much too high a proportion to the works' cost of a machine. The position of an aeroplane manufacturer here contrasted very unfavourably with that of the French manufacturer, who got orders for large series of machines, and worked, therefore, with much reduced charges and all the advantages of repetition work.

Newspapers by Air

Beginning as from Saturday last the Daimler Airways now carry the early morning newspapers to Paris. They were unfortunate on Saturday in the weather conditions, which prevented them getting away before 8.30 a.m., but, as the other newspaper machine run by the Messageries Aeriennes did not go at all—its papers travelling by boat and train—they scored a distinct success.

New Swiss Air Lines

According to the Geneva correspondent of *The Times* the Compagnie des Messageries Aériennes, which has obtained the concession from the French Government, will start its Lyons-Geneva air service at the beginning of August.

On July 28 the Paris-Lausanne air service was extended to Geneva, and a daily service Paris-Lausanne-Geneva and *vice versa* established.

Air Mails Up-to-Date

The despatch of letter mails by morning air service to Brussels, which was suspended recently, was resumed last Monday.

Full details of the Air Mail services now in operation are contained in a leaflet which has been issued by the General Post Office. Copies of the leaflet—"Air Mail"—may be obtained, free of charge, on application at the counter of head and branch Post Offices in London and the provinces.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

(The London Aero-Models Association.)

THE Society has received permission from the London County Council for members to fly model aeroplanes on the following open spaces subject to their complying with any instructions which the head keepers may consider necessary to issue :—

Blackheath, —Before 10 a.m.
Parliament Hill, Hampstead.—Saturday and Sunday mornings. Morning and afternoon other days.
Battersea Park, Civil Service Ground.—Before 10 a.m. (Saturdays excepted).
Bostall Heath, "Plateau."—All times.
Brockwell Park, Herne Hill, Cricket Ground.—May to September, before 10 a.m. October 1 to April 30, all day.
Finsbury Park, Field, North of Lake.—Before 10 a.m.
Hackney Marsh :—
  Summer, on Football Ground.—All day.
  Winter, on Cricket Ground.—All day.
Hampstead Heath Extension.—Before 1 p.m.
Ladywell Recreation Ground, S.E.—Before 1 p.m.
Plumstead Common, on military portions.—All day.
Victoria Park, Demonstration Ground.—Before noon, weekdays. Before 9 a.m., Sundays.
Wormwood Scrubs, Centre of Big Scrubs.—Before noon.

A. E. Jones, Hon. Sec., 48, Narcissus Road, N.W. 6.

FLIGHT Challenge Cup Competition.

On Saturday last, the postponed competition for the FLIGHT Challenge Cup was held on Wimbledon Common in spite of very adverse weather conditions. Drenching rain did its utmost to damp the ardour of the competitors, in addition to saturating thoroughly and so impairing the flying capabilities of the machines.

Nearly forty members were present, and out of this number fifteen were ready to do battle for the FLIGHT Cup. Unfortunately, owing to the rain, the start had to be delayed for two hours, and during this period of waiting Mr. Green and Mr. Levy both damaged their models whilst indulging in further trial flights. This reduced the actual starters to thirteen.

The majority of the competitors had machines of the tractor type, but Mr. Burchell had a very original model of the "Old Henry Farman" type with the propeller situated between the main-plane and the tail. Some very fine flying was witnessed with this machine during the tests.

At 7.11 p.m. Mr. Bedford, flying a small tractor monoplane, weighing only 4½ ounces, got away in fine style; the model, rising from the starting-board and reaching a good height, easily accomplished the qualifying 10 seconds duration off the ground. Mr. Hersom and Mr. Aaron were the next away, both models going well, but Mr. L. G. H. Hatfull's machine, which got off at the second attempt, was carried by the strong wind in the opposite direction. Mr. Howes did not get off and fulfil the qualifying duration, whilst Mr. J. Louch's model flew well, but in a contrary direction.

The next competitor, Mr. L. Gray, had entered one of his enclosed-fuselage tractor monoplanes, and got off well at the second effort, making a good line for the first base. Mr. Rippon and Mr. Wilson were not so fortunate, and did not succeed in making the necessary duration, and so were automatically disqualified.

Mr. Whelpton was next off, but Mr. Burchell's model, after rising easily, crashed into another competitor before doing the qualifying duration, and at his second attempt the model refused to rise, due no doubt to some disarrangement caused by the crash. The last competitor away was Mr. D. A. Pavely, with his huge compressed-air driven monoplane, which made a most impressive flight.

Mr. Burchell was now allowed a further attempt, and this time his model immediately rose to a good height and made a flight of longer duration than that of any other competitor. This was very unfortunate for Mr. Burchell, as the longer the model flew the further it went from the official course, with little hope of ever flying back against the strong wind—now very bumpy.

By this time, Mr. Bedford was well on his way to the finishing base, and at 7.37 p.m. he came in, having covered the full course in 26 minutes, during which he made 22 flights—an excellent performance. Mr. Whelpton was also making steady progress, and eventually got home at 7.53 p.m. Mr. Hersom came in two minutes later, and Mr. Gray followed at 8.6 p.m.

Mr. Bedford is to be congratulated on becoming, in such convincing style, the first holder of the FLIGHT Challenge Cup.

Full Results

Mr. Bedford, 22 flights in 26 mins., winner.
Mr. Whelpton, 29 flights in 31 mins., second.
Mr. Hersom, 31 flights in 43 mins., third.
Mr. L. Gray, 37 flights in 46 mins., fourth.

Also flew :

Messrs. Aaron, Burchell, Hatfull, Holton, Howes, Louch, D. A. Pavely, Rippon and Wilson.

Judges : Messrs. A. F. Houlberg and A. B. Clark.

* * * *

PUBLICATIONS RECEIVED

Directorate of Civil Aviation : Half-Yearly Report on the Progress of Civil Aviation (October 1, 1921–March 31, 1922). London : H.M. Stationery Office, Kingsway, W.C. 2. Price 6*d.* net.

Official Gazette of the United States Patent Office : July 4, 1922. Vol. 300, *No.* 1. U.S. Government Printing Office, Washington, D.C., U.S.A.

Canadian Patent Office Record and Register of Copyrights and Trade Marks. Vol. L, No. 27. *July*, 4, 1922. Patent and Copyright Office, Ottawa, Canada. Price 10 cents.

Reports and Memoranda, Aeronautical Research Committee:—

No. 728.—*An Investigation of the Aerodynamic Properties of Wing Ailerons. Part IV : The Effect of Yaw on Balance of Ailerons of the "Horn" Type.* By H. B. Irving, B.Sc., and A. S. Batson, B.Sc. With Notes on Balanced Ailerons of the "Horn" Type, by Capt. G. T. R. Hill, M.C., B.Sc. Sept., 1920. Price 1*s.* net; by post, 1*s.* 1½*d.*

No. 752. *Some Applications of the Vortex Theory of Aerofoils.* By H. Glauert. May 1921. Price 9*d.* net. By post 10*d.*

No. 757. *The Effect of Rate of Loading on the Apparent Strength of Cotton Balloon Fabric.* By G. Barr, B.A., D.Sc. December, 1920. Price 4*d.* net; by post 4½*d.*

No. 758 (*M.* 9).—*Report on the Viscosity of Acetyl Cellulose Solutions.* By C. Visser, B.Sc. Aug., 1920. Price 6*d.* net; by post, 6½*d.*

No. 763 (*Ae.* 24). *Lift and Drag of B.E.2E with R.A.F. 19 Wings ; Comparison of Full Scale and Model Results.* By H. M. Garner and F. B. Bradfield. August, 1921. London : H.M. Stationery Office, Kingsway, W.C. 2. Price 1*s.* net; by post 1*s.* 1*d.*

* * * *

NEW COMPANY REGISTERED

AIR ADS, LTD., was registered as a private company on July 18, with a nominal capital of £1,000 in £1 shares. The objects are :—To carry on the business of advertisement contractors, and especially (but not exclusively) to display advertisements in the sky by means of writing with smoke, powder or other substance, or liquid emitted from aeroplanes or other aerial craft, etc.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : cyl. = cylinder ; I.C. = internal combustion ; m. = motors

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published July 27, 1922

1,665. ZEPPELIN-WERK LINDAU GES. and C. DORNIER. Flying-boat with traction screw. (157,954.)
5,863. RAUL, MARQUIS OF PATERAS PESCARA. Helicopters. (159,218.)
6,867. G. BENNIE. Aerial tracks for guiding aircraft. (182,160.)
9,200. D. M. RAMSAY. Aircraft. (182,196.)
16,908. NAAMLOOZE VENNOOTSCHAP HANDELMAATSCHAPPIJ "CAPASO." Rotary cylinder engines. (169,681.)
17,800. H. SASAKI. Rotary engine. (182,320.)

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xiv.)

INSULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C.1.
City 3115; "Vanduara," Cent. London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15.
Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5.
Dalston 1893.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.

PROPELLERS—

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.

Lang Propeller, Ltd., Weybridge, Surrey.
520-521, Weybridge; "Aerosticks," Weybridge.

PUTTEES—

Fox Bros. & Co., Ltd. (Dept. R), Wellington, Somerset.

RADIATORS AND RADIATOR REPAIRS—

Serck Radiators, Ltd., Warwick Road, Greet, Birmingham.
Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

SPARKING PLUGS—

Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15. Putney 2132, 2133.
"Kaalgee," Phone, London.

SPRAYING PLANT—

Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1.
Holborn 2041; "Aerography," London.

STABILIZERS—

Auto Controls, Ltd., 19, Regent Street, Piccadilly Circus, London, S.W. 1. Regent 3649.

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A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Aug. 6	**Gordon-Bennett Balloon Race, Geneva**
Aug. 6–20	**French Gliding Competition at Clermont-Ferrand**
Aug. 7	**Aerial Derby Starting at Waddon**
Aug. 12	**Schneider Cup Seaplane Race, at Naples**
Sept. 2–17....	**International Concours Aviatique, Rotterdam**
Sept. 8–10....	**1,000 Miles Race round Britain for the King's Trophy**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsch (300 kil.)**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

The Aerial Derby

IN spite of the present unsatisfactory state of the aircraft industry, it might have been expected that the list of entries for the Aerial Derby would have been larger than is, unfortunately, the case. Compared with previous years, ten entries is a very small "field," and there is always the possibility that some of the machines entered may prove non-starters. At the moment of writing there is no reason to suppose that any of the entries, with possibly the exception of the Bristol Racer, will fail to be at the starting line, although it is not often that all machines entered for a race actually face the starter. In the case of the Bristol Racer, it is understood that it may be doubtful whether this machine will be finished, tested and tuned up in time to be at Croydon by August 7. It will be realised that a machine with a maximum speed of well over 200 m.p.h. has to be very carefully balanced and in perfect trim before it is safe to fly it across country, and it almost appears as if the necessary tests will not be completed in time. This is all the more regrettable as the Bristol racer is the only machine which can be considered a serious rival of the Gloucestershire Aircraft Company's Mars I, Napier "Lion," to be flown by J. H. James. Thus, if the Bristol fails to start the Derby will, bar mishaps, cease to be a race, except for the handicap flown in connection with it. Naturally such a state of affairs would rob the Derby of most of its interest.

It had been hoped that some of the fast French machines would have been entered, and the Royal Aero Club has done its best to persuade some of the French firms to compete, but without success. In view of the prosperity of the French aircraft industry, and of the fact that machines could easily be flown over from France for the race and flown back again, thus involving but relatively small expense, this is much to be regretted, as a couple of Nieuport "Sesquiplans" and the Hanriot all-metal cantilever monoplane, for instance, would have added enormously to the interest attaching to the Aerial Derby. However, the fact remains that no foreign competitor has been entered at the moment of writing, and unless the Bristol Racer starts the Derby must be a very tame affair.

Fortunately for the visitors, who, it is hoped, will crowd to Waddon on August Bank Holiday, other items have been included in the programme of the meeting, and there should thus be plenty of good flying to watch. The team race for the Air League Challenge Cup, which is at present held by Kenley, should provide quite a good deal of amusement, competitors having to alight and hand batons to other members of their teams, who will then make a circuit and again pass the batons to the last representatives, who will complete the race, the representative first crossing the finishing line securing the Cup for his station.

In addition to the team race there will be a handicap in which all the Derby machines have been entered, plus three other machines, to be flown by Lieut.-Col. Spenser Grey, Major Chris. Draper, and Lieut. Robb respectively. Thus, if all the Derby machines take part, the handicap should include 13 machines, which should be sufficient to provide good sport. We are rather looking forward to seeing James covering two laps of the eight miles course on the Mars I. If he is not to lose too much on the corners he will have to do some vertical banks, and as these short races are always flown at a very low height, spectators should get a very good idea of the speed of this machine.

Major Chris. Draper has promised to give some exhibition flights, and as he is one of the finest exponents of trick flying his performance should be well worth watching.

◆ ◆ ◆

Circuit of Britain for the King's Cup

The regulations governing the circuit of Britain for the Cup presented by His Majesty the King have now been published, and will be found on another page of this issue of FLIGHT. The impetus which will be given to civil aviation by this gracious act on the part of His Majesty must be very great, and it is to be hoped that owners of machines, and others who have the necessary capital to enter machines, will come forward in large numbers and so help to make the race the success it deserves to be. Already, the Duke of Sutherland, President of the Air League, has promised to enter a machine, and has thus, with others, set an example which we hope many more will follow. As one of the conditions is that machines must be entered by individuals and not by companies, here is an excellent opportunity for wealthy supporters of aviation to come forward and help matters along by entering machines. Up to the present we have had few Mecænates in the aviation world, but the splendid example set by His Majesty can scarcely fail to induce others to give their encouragement, by offering prizes or in other ways. We would suggest that a tremendous amount of good would be accomplished if His Majesty could be induced to be present at Waddon either on the day of the start for the race or the next day to witness the winning of his Cup.

As to the race itself, as this is to be a handicap, all sorts of machines will be admitted, and there appears to be good prospects of a representative list, including many of the modern commercial aeroplanes that are being used on the London–Paris services. There is even a probability of one or two amphibians taking place. The Circuit of Britain which was to have been flown in 1914 had to be abandoned owing to the outbreak of war. That race was, it will be remembered, to have been for seaplanes, and frankly we should have preferred to see the present race flown by this type of machine also. It is, however, unlikely that there are in existence today, under civilian ownership at any rate, a sufficient number of seaplanes to provide the necessary number of entrants, and the decision to make the race an aeroplane contest would, therefore, naturally follow.

At the same time it is regrettable that this country has so far neglected seaplanes that a sufficient number for a race around Britain cannot be found. Even as long ago as 1914 we could muster quite a number of seaplanes, enough for a purely seaplane race, whereas today that does not seem to be possible. There is a warning in this state of affairs which those responsible for our air development would do well to ponder. Probably at least three types of seaplanes, or rather amphibians, will be represented in the Circuit of Britain, and thus, for the first time in our aviation history, we shall see a race in which both aeroplanes and seaplanes are competing.

RECONSTITUTION OF AIR COUNCIL

AN Order in Council, to be published shortly, enacts that the Air Council shall consist of the following members :—

One of His Majesty's principal Secretaries of State, who shall be President of the Air Council.
The Parliamentary Under Secretary of State for Air.
The Chief of the Air Staff.
Air Member for Personnel.
Air Member for Supply and Research.
The Secretary of the Air Ministry.

The main intention of the new Order in Council, which replaces that of October 13, 1920, is to redistribute the business of the Air Council and adapt the organisation of the Air Ministry in such a way as to meet new requirements and increased responsibilities, and in particular to relieve the Chief of the Air Staff of some portions of the detailed administration of the Royal Air Force, which were previously under his direct control.

The main changes are as follows :—

(1) The title of Air Member is given to each of the Members of Council serving in offices held by officers of the Royal Air Force, and the Chief of the Air Staff is described as the first and senior Air Member of Council and principal adviser to the Secretary of State in the direction of the Air Force.

(2) Subject to (1) above, the Air Member for Personnel will be responsible to the Secretary of State for the administration of business relating to the personnel, discipline and organisation of the Air Force, and the Air Member for Supply and Research (lately Director-General of Supply and Research) will, in addition to the business already allocated to him under the previous Order in Council, be responsible to the Secretary of State for the administration of business relating to the equipment of the Air Force.

The Order also provides, having regard to the recent termination of the post of Controller-General of Civil Aviation, and its replacement by a post of Director of Civil Aviation responsible to the Parliamentary Under Secretary of State, that the Under Secretary of State shall in turn be responsible to the Secretary of State for business relating to Civil Aviation.

The Air Council, as reconstituted, is composed as follows :—

Secretary of State and President of the Air Council, Capt. the Right Hon. F. E. Guest, C.B.E., D.S.O., M.P.
Parliamentary Under Secretary of State and Vice-President of the Air Council—The Right Hon. Lord Gorell, C.B.E., M.C.
Chief of Air Staff and Senior Air Member of Council—Air Chief Marshal Sir H. M. Trenchard, Bart., K.C.B., D.S.O., A.D.C.
Air Member for Personnel—Air Vice-Marshal O. Swann, C.B., C.B.E.
Air Member for Supply and Research—Air Vice-Marshal Sir W. G. H. Salmond, K.C.M.G., C.B., D.S.O., p.s.c.
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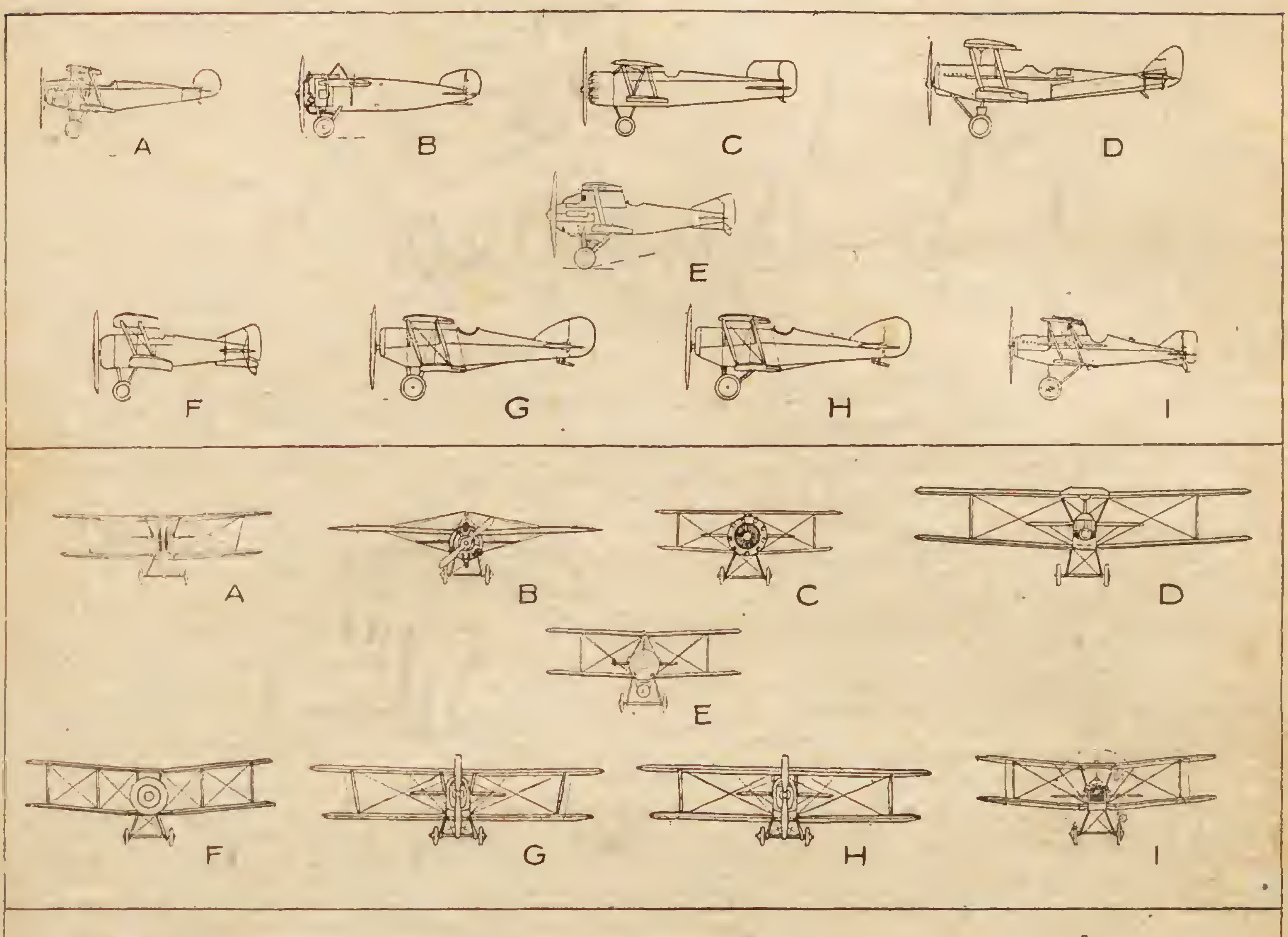
THE AERIAL DERBY



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THE AERIAL DERBY AT A GLANCE: Plan, side and front elevations, to a uniform scale. A, Avro Baby, 35 h.p. Green. B, Bristol Monoplane, 100 h.p. Bristol "Lucifer." C, Bristol "Bullet," 400 h.p. Bristol "Jupiter." D, De Havilland 37, 275 h.p. Rolls-Royce "Falcon." E, Gloucestershire Mars I, 450 h.p. Napier "Lion." F, Gloucestershire Mars III, 200 h.p. B.R. 2. G, Martinsyde F.4, 300 h.p. Hispano-Suiza. H, Martinsyde F.6, 180 h.p. Wolseley "Viper." I, S.E.5A, 200 h.p. Wolseley "Viper."

AERIAL DERBY AND AUGUST BANK HOLIDAY MEETING

Compared with previous years, the list of entrants for the Aerial Derby, which is to be flown over the circuit of London, starting and finishing at Waddon Aerodrome, Croydon, on August 7, is somewhat disappointing. At the time of writing only 10 machines have been entered, and even then it appears somewhat doubtful whether the new Bristol racing monoplane with "Jupiter" engine will be a starter, owing to difficulties in finishing the machine in time.

From the official list, published in the Royal Aero Club Notes on p. 438, it will be seen that the Bristol racer is the only new machine, in the very fast class, entered, and the Derby will be robbed of much of its interest if that fails to start. In fact, barring accidents, "Jimmy" James on the Gloucestershire Aircraft Co. "Mars I," with Napier "Lion" engine, should be a certain winner, as no other machine is within miles of his speed. For the sake of the race it is, therefore, greatly to be hoped that the Bristol racer will be completed and tuned up in time to take part.

The only other new machine entered for the Derby is the de Havilland 37, a very pretty machine built for Mr. A. S. Butler. This machine, however, is a fast touring and sporting three-seater, and is not by any means a racer, although very fast considered as a sporting machine. The rest are all of well-known type, and will be familiar to most readers of this journal. For the benefit of those not intimately acquainted with the history of flying, a brief reference to each of the types entered will be given below.

The Avro Baby, 35 h.p. Green engine.—This machine, which is to be flown by Mr. Bert Hinkler, was designed in 1919 by Mr. Roy Chadwick, chief designer of A. V. Roe and Co. Piloted by Maj. Hamersley it won the sealed handicap flown in conjunction with the Aerial Derby of 1919. Later a similar machine was flown by Bert Hinkler from London to Turin, non-stop, one of the finest performances in the history of flying, considering the low power of its Green engine. Mr. Hinkler then took a Baby out to Australia, and there made another non-stop flight, this time of close upon 900 miles. It will thus be seen that the Avro Baby is one of the most remarkable machines ever built, and the reliability of its 35 h.p. Green engine has been proved repeatedly.

The Bristol Monoplane, 100 h.p. "Lucifer" engine, was designed by Capt. F. S. Barnwell during the war. Originally it was fitted with a rotary engine, but when the Bristol Aeroplane Co. took over the Cosmos engines, and the three-cylinder 100 h.p. "Lucifer" was developed, the monoplane was fitted with this engine. The machine has been flown in public by Mr. C. F. Uwins, chief pilot of the Bristol Aeroplane Co., on several occasions, and has always given a very favourable impression. The smooth running of the "Lucifer," considering it has but three cylinders, has been remarked upon, and the machine itself, with its crescent-shaped monoplane wings, is of very pretty lines. In the Derby the monoplane will be flown by Mr. L. L. Carter.

The Bristol "Bullet," 400 h.p. Bristol "Jupiter" engine, was also designed by Capt. Barnwell, who was, until about a year ago, chief designer to the Bristol Aeroplane Co. This machine has also appeared in several races, piloted by Mr. Uwins, but has not been fortunate enough to win any big race. In last year's Aerial Derby this machine was second, while in the Derby of 1920 it came in third. If the Bristol racing monoplane fails to start, the "Bullet" will be the only rival James has to contend with, and it is unlikely that it will prove a serious competitor for first place in the Derby, although it is very much faster than any of the other machines entered. The 400 h.p. Bristol "Jupiter" was the first radial air-cooled engine of high power to pass the Air Ministry type tests, and lately the French rights have been acquired by the Gnome and Rhone Co., so that the "Jupiter" will probably be constructed in considerable numbers in France. In the Derby the "Bullet" will be flown by Mr. R. A. de H. Haig.

The Bristol Monoplane Racer, 400 h.p. Bristol "Jupiter" engine.—This machine is the "dark horse" of this year's Derby. Designed by Mr. Reid, who has succeeded Capt. Barnwell as chief designer of the Bristol Aeroplane Co., this racer has been credited with tremendous speeds. As the testing and tuning up of such a fast machine is naturally a delicate matter, there is considerable doubt as to whether the machine will be finished, tested and tuned up in time for the Derby. As to the actual design, little information is available beyond the fact that the machine is stated to be a monoplane, fitted with the famous Bristol "Jupiter" engine. We understand that a retractable undercarriage is fitted, which should add a good many miles to the speed of the machine. Owing to the fact that the "Jupiter" is of large diameter, a fairly big *fuselage* is required to streamline it, and this, of course, affords a good opportunity of providing space for tucking away the undercarriage inside the body when the machine is in flight. A similar arrangement was, it may be remembered, employed in the Dayton-Wright monoplane which was entered for the Gordon-Bennett race at Etampes. If a starter, the Bristol Racer will be flown by Mr. C. F. Uwins, chief test pilot of the Bristol Aeroplane Co.

The De Havilland 37, 275 h.p. Rolls-Royce "Falcon" engine.—As already mentioned, this machine was designed and built by the De Havilland Aircraft Co. for Mr. A. S. Butler as a fast touring and sporting machine. At present Mr. Butler has the distinction of being the only private owner-pilot in this country, and his very sporting support of aviation, in the form of purchasing and piloting his own private machines, is an example which other wealthy sportsmen might well follow. It will be remembered that Mr. Butler some years ago bought a Bristol "Tourer" with Siddeley "Puma" engine, on which he did a lot of touring, and also took part in last year's Aerial Derby. His mount this year is a good deal faster, and although not a racing machine the new D.H.37 should put up a very good show.

As regards the machine, it is a three-seater tractor biplane of orthodox design, but incorporating many detail improvements to which space does not allow of referring here. The D.H.37 is fitted with a Rolls-Royce "Falcon" engine, the only one in the race, and for that reason, no less than on account of the fact of it being a new design, the performance of the D.H.37 will be watched with interest. The speed is over 120 m.p.h. with full load. Presumably Mr. Butler will not carry any passengers in the race.

Gloucestershire Aircraft Co. "Mars I," 450 h.p. Napier "Lion" engine.—With a maximum speed of somewhere in the neighbourhood of 200 m.p.h., the "Mars I," which is to be flown by Mr. J. H. James, should be a certain winner if the Bristol Racer does not turn up, no other machine being within 20 m.p.h. of its speed. The "Mars I," which was the winner of the Derby last year, is already so well known as to require no introduction to Flight readers. Designed by Mr. H. P. Folland, chief engineer and designer of the Gloucestershire Aircraft Co., the "Mars I" is unusual chiefly on account of the placing of the tank, which rests on the top of the *fuselage* and extends right up to the top plane. This machine, with its Napier "Lion" engine, is the holder of the British speed record of 196 m.p.h., and since establishing that speed the machine has been considerably cleaned up.

The Gloucestershire Aircraft Co. "Mars III," 200 h.p. B.R.2 engine.—Also designed by Mr. Folland, the "Mars III" is similar to the famous Nieuport "Nighthawk" designed by Mr. Folland while he was chief engineer to the British Nieuport firm, except that the "Mars III" has a B.R.2 rotary engine of 200 h.p. in place of the A.B.C. "Dragonfly" of the "Nighthawk." The machine, which is a two-seater training 'bus, will be flown by Mr. L. R. Tait-Cox.

Martinsyde F.4, 300 h.p. Hispano-Suiza engine.—This machine was designed by Mr. G. H. Handasyde during the latter part of the war as a high-performance single-seater fighter. Owing to the Armistice the machine was not built in large quantities, but several machines are in existence, the present one being entered by the Aircraft Disposal Co. It is to be flown by Capt. Rex Stocken, of the A.D.C.

The Martinsyde F.6, 180 h.p. Wolseley "Viper," which is being flown by Mr. F. P. Raynham, is very similar in appearance to the F.4, but has a smaller engine and differs from the F.4 in certain minor details. Like the F.4, it was designed by Mr. Handasyde before he severed his connection with the Martinsyde firm and established as a separate company the Handasyde Aircraft Co. The performance of the machine in the race will be interesting chiefly because it is being flown by Mr. Raynham, who is one of the very earliest British pilots, and certainly the oldest pilot (as regards number of certificate) flying in the Derby.

The S.E.5a, 200 h.p. Wolseley "Viper" engine.—Designed at the Royal Aircraft Establishment at Farnborough during the war, the S.E.5a was at one time a favourite single-seater fighter. Incidentally, it might be mentioned that Mr. Folland also had a hand in designing this machine, being at that time on the designing staff of the R.A.E. Mr. Folland thus appears to have more machines in the race than any other designer. The S.E.5a which is to be flown in the Derby by Mr. H. H. Perry, has been entered by the Aircraft Disposal Co.

The following table shows the winners of previous Aerial Derbys, and the times made by them. It is interesting to see how the speeds have increased from year to year, the greatest jump being made at the first Derby after the war :—

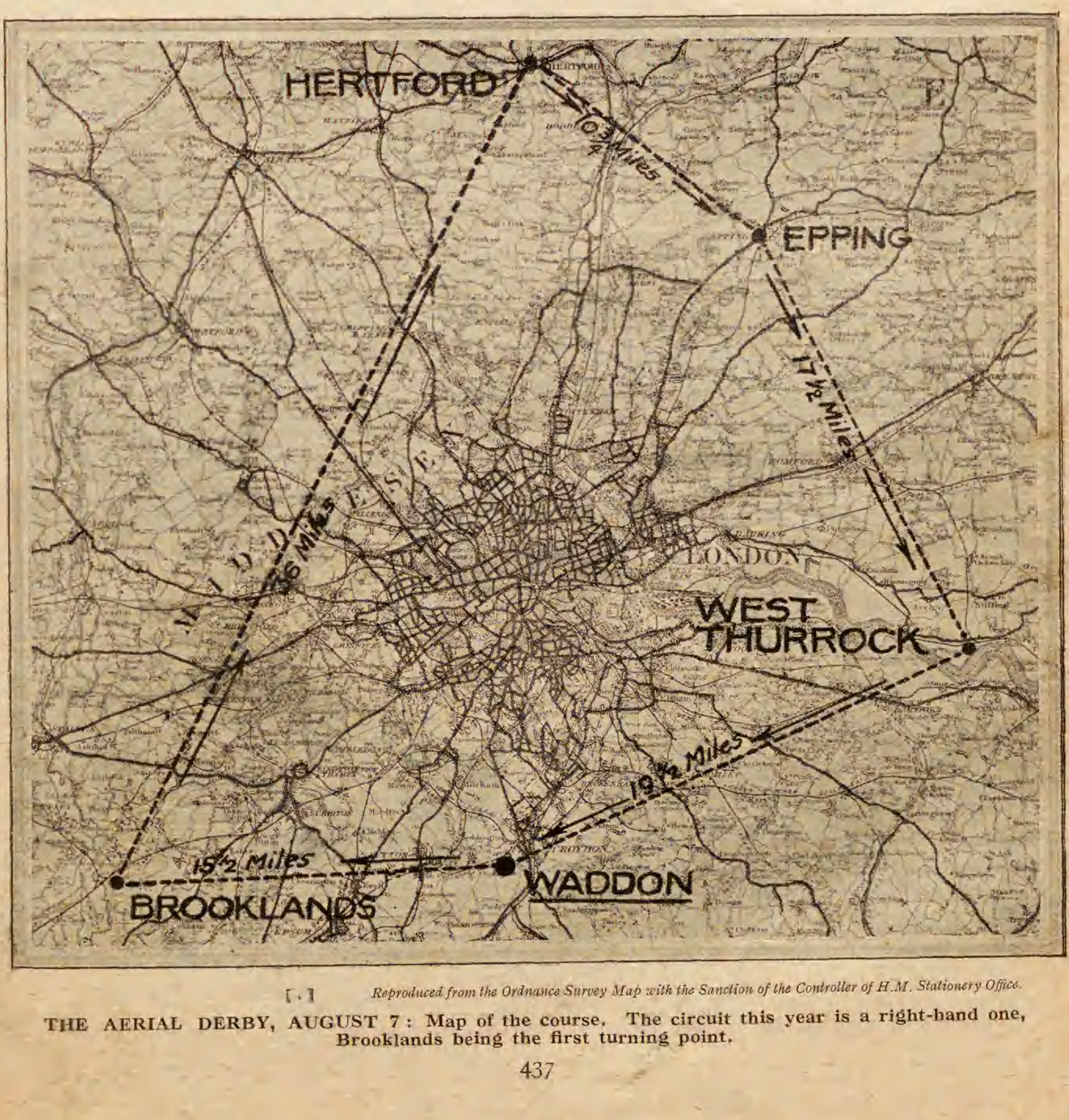
Winners, Distances and Speeds of Previous Derbys

Date.	Winner.	Machine.	Distance. Miles.	Speed. M.p.h.
June 8, 1912	T. O. M. Sopwith	70 h.p. Gnome-Blériot Mono.	81	58·5
Sept. 8, 1913	Gustav Hamel	80 h.p. Gnome-Morane-Saulnier Mono.	94·5	74·7
June 6, 1914	W. L. Brock	80 h.p. Gnome-Morane-Saulnier Mono.	94·5	71·8
June 21, 1919	G. Gathergood	450 h.p. Napier-Airco 4R	94·5	129·3
July 24, 1920	F. T. Courtney	300 h.p. Hispano-Suiza Martinsyde	205	153·4
July 16, 1921	J. H. James	450 h.p. Napier-Gloucestershire Mars I	205	163·3

Other Events

In addition to the Aerial Derby two more races are being flown at Waddon on August 7. One of these is a relay race for the Air League Challenge Cup, presented by Maj.-Gen. Sir Sefton Brancker, Director of Civil Aviation, which is being contested for by the present holders, the R.A.F., Kenley, and by the R.A.F., Uxbridge. The machines to be used are four S.E.5a's lent by the Aircraft Disposal Co., and two of the Aero Club Avros. One representative of each team will be started off on S.E.'s and make a circuit. On landing they will hand a baton to two representatives on Avros, who will then make a circuit and land, handing the batons to the last two representatives on S.E.'s, who will make the last circuit (of 8 miles), the first man home being the winner. This race should provide quite good sport, and help to keep visitors interested while the Derby is being flown. The second race is the August Open Handicap, and is for the Derby machines plus three more entries. It consists of two circuits of the 8 miles course. In addition Maj. Chris. Draper will give demonstration flights. Those who had the good fortune to see him flying the B.A.T. "Bantam" at the Elta show will know what to expect.

For the information of such visitors as do not run their own motor conveyance, it may be mentioned that one can reach the Waddon aerodrome by taking train to Waddon station from Victoria, special trains being put on for the occasion. From Waddon station it is but a few minutes' walk to the aerodrome. An alternative route is by 'bus from Piccadilly Circus to West Croydon, getting off outside West Croydon station and taking a Sutton tram to Plough Lane. The first of the machines flying in the Derby should be started about 2 p.m. The gates will be opened at 1 p.m., and luncheons will be procurable in the enclosures from the time of opening the gates.



Reproduced from the Ordnance Survey Map with the Sanction of the Controller of H.M. Stationery Office.

THE AERIAL DERBY, AUGUST 7: Map of the course. The circuit this year is a right-hand one, Brooklands being the first turning point.

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS

AUGUST BANK HOLIDAY MEETING AT WADDON AERODROME, MONDAY, AUGUST 7, 1922

AERIAL DERBY, 1922

Entrants

Entrant.	Pilot.	Machine and Engine.
Aircraft Disposal Co., Ltd.	Capt. R. H. Stocken	Martinsyde F.4 (300 h.p. Hispano-Suiza).
Aircraft Disposal Co., Ltd.	H. H. Perry ..	S.E.5a (200 h.p. Wolseley "Viper")
Gloucestershire Aircraft Co., Ltd.	J. H. James ..	Mars I (450 h.p. Napier "Lion").
Gloucestershire Aircraft Co., Ltd.	L. R. Tait-Cox ..	Mars III (200 h.p. B.R.2).
Bristol Aeroplane Co., Ltd.	L. L. Carter ..	Lucifer Monoplane (100 h.p. "Bristol" Lucifer).
Bristol Aeroplane Co., Ltd.	R. A. de H. Haig	"Bristol" Bullet (400 h.p. "Bristol" Jupiter).
F. P. Raynham	F. P. Raynham ..	Martinsyde F.6 (180 h.p. Wolseley "Viper").
A. S. Butler ..	A. S. Butler ..	D.H.37 (275 h.p. Rolls-Royce "Falcon").
A. V. Roe and Co., Ltd.	Bert Hinkler ..	Avro Baby (35 h.p. Green).
Bristol Aeroplane Co., Ltd.	C. F. Uwins ..	Monoplane Racer (400 h.p. "Bristol" Jupiter).

AIR LEAGUE CHALLENGE CUP

Presented by Maj.-Gen. Sir Sefton Brancker, K.C.B., and Mr. Philip S. Foster.

(Holders—Royal Air Force, Kenley)

The race for 1922 will be a Relay Race between the following teams from the Royal Air Force at Kenley and Uxbridge:—

Royal Air Force, Kenley

Flight-Lieut. James M. Robb, D.F.C.	S.E.5a.
Flight-Lieut. Roy W. Chappell, M.C.	Avro.
Flight-Lieut. Francis L. Luxmoore	S.E.5a.

Royal Air Force, Uxbridge

Flight-Lieut. Walter H. Longton, D.F.C., A.F.C. ..	SE 5a.
Flying Officer Frank G. Gibbons, D.F.C.	Avro.
Squadron-Leader Frank L. Robinson, D.S.O., M.C., D.F.C.	S.E.5a.

The race is over a distance of approximately 24 miles, being three laps of the circuit of approximately 8 miles.

One representative of each team will start together in S.E.5a aeroplanes. At the end of the first lap they will land on the aerodrome, hand a baton to a second representative of each team, who will then fly the second lap in Avro aeroplanes. At the end of the second lap, the second representative of each team will land on the aerodrome and hand the baton to the third representative of each team, who will then fly the third lap in S.E.5a aeroplanes.

On completing the third lap the aeroplanes will cross the finishing line in flight.

The winning team will be the one whose representative, having properly completed the course, is the first to cross the finishing line.

(The S.E.5a aeroplanes in this race have been kindly loaned by the Aircraft Disposal Company, Ltd.)

AUGUST OPEN HANDICAP (16 miles)

Prizes: 1st, £30; 2nd (if five or more starters), £10. Open to all types of aeroplanes.

The race is over a distance of approximately 16 miles, being two laps of the circuit—Waddon Aerodrome, Purley Downs Golf Club and Beddington Cement Works.

The handicap allowances will be announced on the Event Board. Each competitor will be started at his handicap time, and the winner will be the competitor who, having properly completed the course, is the first to cross the finishing line in flight.

Pilot.	Aeroplane and Engine.
Capt. R. H. Stocken.. ..	Martinsyde F.4 (300 h.p. Hispano-Suiza).
H. H. Perry	S.E.5a (200 h.p. Wolseley "Viper").
J. H. James	Mars I (450 h.p. Napier "Lion").
L. R. Tait-Cox	Mars III (200 h.p. B.R.2).
L. L. Carter	"Lucifer" Monoplane (100 h.p. Bristol "Lucifer").
R. A. de H. Haig	Bristol "Bullet" (400 h.p. Bristol "Jupiter").
F. P. Raynham	Martinsyde F.6 (200 h.p. Wolseley "Viper").
A. S. Butler	D.H.37 (275 h.p. Rolls-Royce "Falcon").
Bert Hinkler	Avro Baby (35 h.p. Green).
C. F. Uwins	Monoplane Racer (400 h.p. Bristol "Jupiter").
Flight-Lieut. Walter H. Longton, D.F.C., A.F.C.	S.E.5a (200 h.p. Wolseley "Viper").
Lieut.-Col. D. A. Spenser Grey	Avro (110 h.p. Le Rhone).
Flight-Lieut. James M. Robb, D.F.C.	S.E.5a (200 h.p. Wolseley "Viper").
Maj. C. Draper	Avro (110 h.p. Le Rhone).

Exhibition Flights by Maj. C. Draper, D.S.O.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JULY 23 AND JULY 29, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying Mails	No. of flights carrying Goods	No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
						h m.		
Croydon–Paris	59	194	21	42	59	2 35	D.H. 34 G-EBBR (1h. 52m.)	B. (5), D.H. 9 (1), D.H. 16 (1), D.H. 18 (1), D.H. 34 (4), G. (6), H.P. W.8B(3), Sp. (2), Vu. (2).
Paris–Croydon	60	102	9	36	59	3 1	D.H. 34 G-EBBQ (2h. 7m.)	B. (5), D.H. 9 (1), D.H. 16 (1) D.H. 18 (1), D.H. 34 (4), G. (7), H.P. W.8B (4), Sp. (3) Vu. (1).
Croydon–Brussels ...	12	42	7	11	12	2 23	Vulcan G-EBBL (2h. 11m.)	D.H. 18 (1), D.H. 34 (2), Vu. (3), W. (1).
Brussels–Croydon ...	12	30	—	6	12	2 58	D.H. 34 G-EBBR (2h. 13m.)	D.H. 16 (1), D.H. 18 (1), D.H. 34 (3), Vu. (2), W (1).
Croydon–Rotterdam–Amsterdam.	12	12	12	12	12	2 27§	Fokker H-NABS (2h. 12m.)	F. (6).
Amsterdam–Rotterdam–Croydon.	13	8	12	12	13	2 53§	Fokker H-NABH (2h. 30m.)	D.H. 9 (1), F. (6).
Totals for week. ...	168	388	61	119	167			

AIR CIRCUIT OF GREAT BRITAIN

For the King's Cup, which has been presented by His Majesty The King for a circuit of Great Britain by aeroplane, a number of entries have already been promised, including the following :—

The Duke of Sutherland (President of the Air League).
Lieut.-Col. Frank K. McClean (Vice-Chairman of the Royal Aero Club).
Sir Samuel Instone (Instone Air Line).
Sir Henry White Smith (Bristol Aeroplane Co., Ltd.).
A. V. Roe (A. V. Roe and Co., Ltd.).
H. Scott-Paine (Supermarine Aviation Works).
A. S. Butler (de Havilland Aircraft Co.).
Brig.-Gen. J. G. Weir, C.M.G. (J. and G. Weir, Glasgow).
Col. M. O. Darby (Aircraft Disposal Co., Ltd.).
F. P. Raynham.

In addition to the above, Boulton and Paul, Ltd., of Norwich ; Armstrong-Siddeley Motors, Ltd., Coventry ; Gloucestershire Aircraft Co., Cheltenham ; Aircraft Disposal Co., Ltd., Croydon ; Handley Page Transport Co., Croydon ; Fairey Aviation Co , Hayes ; and Short Bros., of Rochester, are preparing machines for the race.

The race will be a handicap under the Competition Rules of the Royal Aero Club, and the King's Cup will be awarded to the entrant of the aeroplane which first completes the circuit of Great Britain of approximately 850 miles under the following conditions :—

Supplementary Regulations

Date.—The race will commence on Friday, September 8, 1922.

Organisation.—The race shall be conducted by the Royal Aero Club under the Competition Rules of the Royal Aero Club.

Competitors.—The entrant and pilot or pilots must be British subjects. The entrant must be an individual and not a company.

Aeroplane.—The aeroplane, including the engine or engines, must have been entirely constructed in the British Empire.

Entries.—The entry fee is £25. This fee, together with the entry form, must be received by the Royal Aero Club, 3, Clifford Street, London, W. 1, not later than 5 p.m. on Monday, August 28, 1922.

All entry fees received will be applied towards payment of the expenses of the Royal Aero Club in conducting the race. Any balance not so expended will be refunded *pro rata* to the entrants.

Air Navigation Regulations.—Competitors must comply with the Air Navigation Regulations in force.

Course.—The course will be approximately 850 miles, starting and finishing at Waddon Aerodrome, Croydon, with controls at several large towns in England and Scotland. The course will be divided into two sections to be completed on two consecutive days, the sections being divided into stages by the controls.

Controls.—The controls at which competitors must land will be communicated later, together with a schedule of the minimum time that competitors must stay at each control.

The time of arrival at each control will be taken at the moment of crossing a line between two marks on the ground. This line must be crossed at a height of not more than 500 ft.

Handicap.—The aeroplanes will be handicapped on a time allowance basis for the complete circuit, and a proportion of the total handicap will be allotted to each section.

Starting.—Competitors will be started from Waddon Aerodrome, Croydon, in accordance with the proportion of their handicap allotted for the first section, and will be timed from the given signal to start. At the end of the first section the aeroplanes will be housed for the night.

Competitors will be started on the second section in accordance with the proportion of their handicap allotted for that section, plus or minus the time gained or lost on their handicap for the first section.

Each competitor and his aeroplane must be on the starting line 15 minutes before his official time of starting. Should any competitor fail to start within five minutes of his being given the signal to start by the official starter, he must remove his aeroplane from the starting line, if and when so ordered, and shall only be allowed to start with the sanction of the official starter. His time shall be taken as from the original signal to start.

Landings.—Landings between the controls are allowed.

Time Cards.—Each competitor before starting will be supplied with a time card, on which will be entered his time of arrival and starting time from each control. The competitor is alone responsible for the safe custody of his card, and for its being produced and entered up at each control, and for the production of same when duly called upon.

Landings, repairs and alterations, and any change of personnel, must be entered on the time card.

Repairs.—Individual replacements and repairs to the aeroplane and engine may be made, but neither must be changed as a whole. Any repairs or adjustments must be carried out by the pilot and/or crew.

Verification of Aeroplanes.—Aeroplanes must be at Waddon Aerodrome, Croydon, completely erected not later than 10 a.m. on Wednesday, September 6, 1922, for verification by the officials. Any competitor not having his aeroplane ready for presentation to the officials by the specified time will render himself liable to exclusion from the race.

Pilot and Crew.—The pilot and/or crew must not be changed during the race, except in the event of a special emergency, and then only at a control with the consent of the official at the control.

Spare Parts.—Only such spares are permitted as are carried in the aeroplane.

Labour.—Labour will be provided at each control to man-handle the aeroplanes and swing the propellers.

The Committee of the Royal Aero Club reserves to itself the right to add to, amend, or omit any of these rules should it think fit.

◆ ◆ ◆ ◆

NOTICES TO AIRMEN

Isle of Sheppey : Danger Area.

Aerial gunnery and bombing targets have been established on the shore and in the sea in the vicinity of Leysdown Aerodrome on the east side of the Isle of Sheppey. The position is approximately in latitude 51° 24′ N. and longitude 0° 56′ E. (see map published with Notice to Airmen No. 51 of 1922).

Firing and bomb dropping on these targets takes place at frequent intervals. Pilots are warned, therefore, that it is dangerous to fly over this area at an altitude lower than 3,000 feet.

No warning signals to aircraft are displayed, but red flags are flown on the shore near the targets as a warning to the public and shipping. (No. 73 of 1922.)

Pilots' Licences (Class " B ") : Extension of Licences to Cover Further Types of Flying Machines

With reference to paragraph 61 of the Air Navigation Directions, 1922 (A.N.D.3), Pilots holding licences for flying passenger or goods flying machines, who desire the extension of their licences to cover a further type of machine, will be required to carry out satisfactorily the following flying tests on the type for which the extension is required :—

1. Three " take-offs " and " landings " with machine " light."
2. Three " take-offs " and " landings " with full load.

They will further be required to show by an oral examination that they have a practical knowledge of the flying machine for which the extension is required, particularly with regard to the installation of the engine(s) and the functioning of the petrol, oil and water systems.

In the case of pilots employed at or flying from the London Terminal Aerodrome, Croydon, the flying tests will be observed by the Civil Aviation Traffic Officer, and the examination in flying machine and engine(s) will be carried out by the staff of the Aeronautical Inspection Directorate.

On satisfactory completion of flying tests and technical examination the Civil Aviation Traffic Officer will make the necessary extension of the licence.

Applications for observation of flying tests and for technical examination should be made to the Civil Aviation Traffic Officer when required.

In the case of pilots who are unable to attend at Croydon for flying tests and technical examination other arrangements will be made on application to the Secretary (D.C.A.), Air Ministry.

These arrangements will come into operation on August 1, 1922.

(*No.* 82 *of* 1922.)

THE DE HAVILLAND AEROPLANE HIRE SERVICE

Flying for Less than Taxi Fares

In these days of subsidised uncommercial flying, it is gratifying to discover that a great deal of non-subsidised flying is being done. Not only so, but actually such flying is done entirely as a commercial proposition, and, most important of all, is paying its way. For a considerable time, the De Havilland Aircraft Co., Ltd., of Stag Lane Aerodrome, Edgware, Middlesex, has had in operation a number of machines, ready at short notice, for flights to anywhere. When first started, there was some doubt as to whether the "air taxi" could be made to pay at charges which would be likely to appeal to the public. These doubts have been set at rest long ago, and the De Havilland Aeroplane Hire Service has been established quite independently of the main firm.

At present there are ten machines available for hire, mostly of the "D.H.9C" and "D.H.16" limousine types. Although these may be said to be merely converted war types, they have proved themselves capable of doing very good commercial work, and the rates at which they are to be hired are such that, with full load, the cost is but very slightly greater than that charged by "approved" companies on the London-Paris route. Thus the "D.H.9C," which has accommodation for three passengers, two of whom are seated in a small cabin, can be hired at an inclusive rate of 2*s.* per mile, or £8 per flying hour. With full load of three passengers the cost therefore works out at the surprisingly low figure of 8*d.* per passenger per mile, or less than taxi fare.

The "D.H.16," which has a limousine body, seats four passengers, and can be had for 2*s.* 6*d.* per mile, or £11 per flying hour, which is even more economical. If the machines are required for goods, the former has a capacity of 650 lbs., while the latter carries 800 lbs. The distance from Croydon to Paris is about 240 miles, so that a machine may be hired from this firm for the journey at an inclusive fee per passenger of £8, as against the £6 6*s.* charged by the regular air lines. In view of the fact that, by hiring a machine, one is not limited to either route or destination, this fee is certainly remarkably low, and it is not surprising that so many avail themselves of the opportunity to use the air taxis, that the entire "stable" is generally fully occupied.

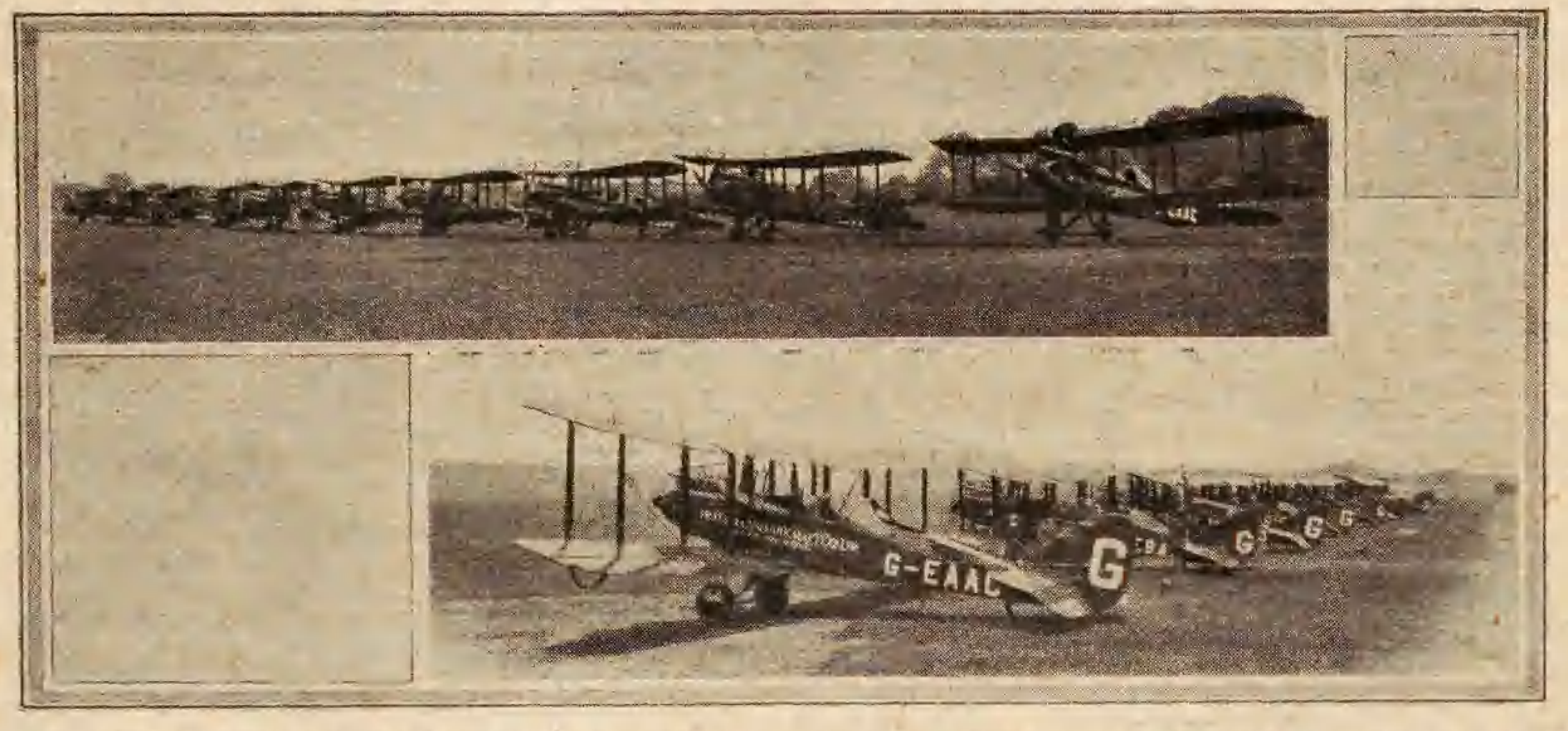
It might be mentioned that during June more than 20,000 miles were covered by the machines of the De Havilland Hire Service, flying on a variety of errands. At present a newspaper service is being maintained between Lympne and Ostend, the machines leaving early in the morning. The starting point was transferred to Lympne on account of its relative freedom from early morning mists, from which Croydon suffers rather badly.

The uses to which the air taxis are being put are so varied that it is impossible for us to do more than indicate a few. The famous long flights made by Mr. Cobham are already so well known that we need not elaborate the subject here. Flights for newspapers, carrying photographers or conveying photographs, are almost daily occurrences, while on three occasions lately, it has been possible for passengers who had missed their train from London to Southampton to get to the latter port in time to catch liners which would otherwise have been missed.

Tours through Belgium and Northern France, seeing the battlefields from the air, are popular with tourists, and as the only stipulation is that machines must alight at certain aerodromes for customs on entering a country, and the passengers have their passports in order, this method of touring is delightfully free from worrying formalities, not to mention the comfort of the journey itself as compared with hours spent in stuffy trains.

Owing to the large demand for machines during the summer months, it is as well to order as long in advance as possible, although it is often possible to get a machine, even for an extended tour, at a few hours' notice, by writing, telegram, or telephone to the company.

The address of the De Havilland Hire Service has already been given. The telephone number is Kingsbury 160-161, and the telegraphic address "Havilland, Edgware." All enquiries are promptly dealt with.



THE DE HAVILLAND AEROPLANE HIRE SERVICE : Line-up of the ten machines which at present constitute the "stable."

* * *

Germany's Reply to Restrictions

From Berlin it is reported that the German Government has sent a note to Denmark, Norway, Sweden, Holland and Switzerland informing the respective Governments that only aeroplanes conforming with the restrictions placed upon German aircraft will be permitted to cross the German frontier. This is a clever move on the part of the German Government, and obviously intended to reduce the handicap which the restrictions of the Allies places upon German civil flying. If any of these countries wish to run services into Germany they can now only do so by using machines of as low power and fuel capacity as those to which the Germans themselves are restricted.

Giant French Flying Boat under Test

At the last Paris Aero Show was exhibited by Marcel Besson a scale model of a huge quadruplane flying boat, which was then stated to be in course of construction. Reference to this machine was made on p. 776 of our issue of November 24, 1921, in our report on the Paris Show. The machine is now stated to be at St. Raphael undergoing tests. The arrangement of the wings is unusual, the four planes being arranged as two biplanes, of which one set is staggered in relation to the other. The strutting is of X formation. The cabin is a separate unit from the boat hull. The dimensions are: Span, 95 ft.; length, 69 ft.; height, 23 ft.; and wing area, 2,750 sq. ft.

AIR FORCE AND THE NAVY IN THE LORDS

A discussion of some moment took place in the House of Lords on July 27, in response to a question to the Under-Secretary of State for Air by the Marquess of Londonderry. The Marquess asked whether the Government realised the anxiety of the nation with regard to the alleged deficiencies of the Air Service in all its branches, especially with regard to its naval and home defence sides, and whether he was in a position to make a statement. It was imperative, he said, that there should be real co-ordination between the three arms of the Service. He had recently noticed that a journalistic war was being waged against the Air Ministry. He did not know how far it had disturbed the Air Minister. The criticism as usual, in his opinion, was intended to injure the Government rather than benefit the Air Service. He hoped the Government would be able to tell their lordships of the relative importance of the three arms of the Service. The arguments in favour of a separate Air Force appeared to him overwhelming, and he did not want the Air Force unduly developed at the expense of the Navy or Army, or *vice versa*. But he wanted the money that would be necessary to allocate to the Services apportioned with a close regard to the actual services which each arm could render. There was the question of civil aviation, and its bearing on the fighting Service—how far civil aviation could be the reservoir in time of war for the Air Service. How much would it cost to raise a large reserve through the instrumentality of civil aviation? Would it be less costly than providing regular squadrons?

Lord Montagu of Beaulieu thought the Air Ministry had been unjustly attacked by some of its critics for not doing certain things for which it had not the money. He had never seen any reason to change his opinion that an independent Air Ministry and Air Service were vital to the country. As time went on he thought there was more reason for maintaining that separate Air Service. A terrible attack from the air would be the first sign of war in the future, and the Navy and the Army would not be able to ward it off. It was absolutely vital that we should have an independent Air Force, continue the Air Ministry, and regard it more and more as our first line of defence. Air Service training was a thing quite apart from any other form of training. The idea that they could take a naval officer or a military officer for a time and then return him to his Service was a fallacy. They must get the air officer young and keep him as long as they could. He supported the request made by the noble marquess. He considered that the Air Ministry had done extremely well, considering the limited means at its disposal.

Lord Sydenham said there might have been exaggerations in the Press, but he thought the anxiety which the public had felt on this subject had been fully justified. The present position was dangerous and deplorable. Though it was probable there would be no great war for several years, only dreamers believed wars were at an end. The Navy would be incomplete and handicapped if it were not provided with an adequate Air Force thoroughly trained at sea. It must be an integral part of the Navy. The Admiralty ought to be responsible for the strength and efficiency of its own air branch.

Viscount Long said he became convinced in the early stages of the Conferences in 1919-1920 that the proposal to set up an Air Ministry with absolute control of the Air Force of either the Army or Navy, or both, was doomed to failure. If they were to secure both efficiency and economy they must have an Air Force which was part of the naval system under the control of the Navy and run by them. They needed a review of the whole situation, naval, military, and air. He hoped the Government would not commit themselves immediately to the final adoption of the plan now working. We must have an Air Ministry, for which there was plenty of work. It must have charge of the selection of types of flying machine, the purchase of materials and construction. But the Navy must be responsible for its own Air Force, have full control over it, and its cost should be a part of the Navy Estimates.

Lord Gorell, Under-Secretary of State for Air, said the Marquess of Londonderry had stated that the Air Ministry had been suffering under a journalistic war. He would not go quite so far as that. There had been a very great deal of attention paid to the whole question of air power lately, and that was a very hopeful sign. Some of the criticism had been of great assistance. The great bulk of it had been very uninformed. There was no doubt that in certain quarters, there had been deliberate misrepresentation. He was asked only the previous day by a friend of his why it was that certain journals seemed to have been inspired by personal animus in their attacks on the Air Ministry. He gave then the reason he would give their lordships, that there were certain journals controlled by Lord Rothermere, who was, for a short time, in charge of the Air at the Hotel Cecil, and whilst there was in daily contact with our present Air Marshal—who was certainly distinguished for saying frankly and straightforwardly what he thought. It might be presumed that that straightforwardness and frankness might have ruffled Lord Rothermere, and that he was not now able to forget and take a wider than the personal view.

In October last year he went very fully into the cost of a separate Ministry. He attempted then to show that so far as cost could be estimated at all, a separate Air Ministry was less costly than two Services would be, and no answer had been given to the figures he gave. The first question of the noble marquess he could answer quite definitely. There was, undoubtedly, now a great potential menace from the air. If there should be unhappily in the future an outbreak of a great war, we could confidently rely upon the air playing a very much greater part than it did in the last war. It was probable that the raiding would be continuous on docks, factories, food depots, and on mobilisation places, and that called, undoubtedly, for a revision of our ideas. It was fairly obvious that it would be the endeavour of every belligerent Power to put out the maximum of air effort in the very first days of the war. There was a considerable divergence of view as to whether the menace from the air was greater than that from the sea. It must to some extent be hypothetical.

Except for the fact that the German Fleet was at the bottom of the sea the old menace remained, and one could go no farther in any claims in regard to the air than to say that to the old menace had been added this great and almost unknown new menace. Nothing that land or sea forces could do could prevent this menace from the air. All he could say about the allocation of funds was that the question had been before the Committee of Imperial Defence for a long time, and they were carefully considering the matter. They had seen and heard in the Press comparisons between the air power of this country and the air power of France. Did anyone who had had experience of the past war regard the air power of France as a menace to this country? He absolutely refused to believe the word "menace" in that connection. Our strength and that of the French would, if necessary, maintain peace and establish it.

Having dealt with the distribution of our air squadrons, he said as regards ground organisation during the war, it took 86 men on the ground to keep one machine in commission in the air. That number had been considerably reduced, but it must always be large. As to the cost of squadrons, the total estimated expenditure on the Royal Air Force, including India, for 1922–23, was £15,177,500, for 32 squadrons, which was roughly £474,300 each. If they added 20 squadrons at home to these, the total cost would be £17,227,000 for 52 squadrons, and the cost per squadron would be roughly £331,300. If the number was increased to 100 squadrons, the total cost would be £24,000,000, or £240,000 per squadron. So that the larger the organisation was, the less relatively the overhead charges were.

After defending the policy of the Ministry in regard to buildings, he dealt with the relations of the Air Force and the Navy. There were in co-operation with the Navy, employed on reconnaissance, spotting, torpedo-carrying, and bombing, 62 machines, and in training, etc., 21, a total of 83. In addition, there were reserve machines to cover replacement 46, and reserve in store 229, giving a total of 275, making a grand total of 358 machines. As to the Army, there had been definitely allotted 28 machines, and there were 45 units upon which the Army could call for co-operation, while an addition of 18 units were available in urgent circumstances, and 20 for training, making a total of 111. In addition, there were 60 held as a first reserve, and 6 more were available for assistance in field training. These figures could be varied according to the requirements of the Army and Navy. The Army and the Navy had the fullest operational control over the units allotted to them. It was an entire travesty of the facts to say that naval and military commanders had no responsibility for them. The Geddes Committee recommended that the aircraft available for co-operation with the Navy should be cut down from 6½ squadrons to 2. The Navy at present had 5½ squadrons, which was a "cut" of one. The Committee recommended in regard to the Army that the aircraft should be "cut" from three squadrons to one. The Army had 2½ squadrons, a "cut" of a half.

There were more squadrons allocated for co-operation with the Navy than there were for independent work—preference had been given for the requirements of the Navy.

But for the existence of the Air Ministry, there would not have been so many aircraft available for the Navy. He hoped no more would be heard of reversion to an extensive and disastrous duality.

As to the policy of reconditioning of old machines, he maintained that it was the outcome of a national demand for economy. That policy was now beginning naturally to come to an end; and in the near future it would be necessary to ask for money for the purchase of new machines. Air power could fairly claim today that it could prevent any invasion on a large scale by sea. As a general proposition, it could fairly be said that this country was ahead both in force and design. As far as our experimental types were concerned, the position was absolutely satisfactory with regard to other countries, and very great progress was being made.

As an illustration of possible progress in the near future, he quoted a passage from the forthcoming report of the Civil Aviation Advisory Board, now in process of being signed. They said it must be recognised that an all-red air route could not be mapped out from England to India, but that it was anticipated that soon this would be nearly, if not entirely, achieved by a machine which could make a trip comprising Paris, Marseilles, and Malta—1,130 miles—in one flight. Speaking of the policy of the substitution of air force for other force, he contended that the progress made had not been bad, but we must be careful not to go too fast. Where the new force was more efficient for the same expense, or equally efficient for less expense, it was the intention of the Government to use air force. While they wanted to see a healthy civil aviation, both from the industry and the machinery point of view, the first question was how far it could help the defence of the country. How much was it worth while to pay towards it in order to make it a reserve for Service aviation? It was probable some new arrangement would have to be made in regard to the cross-Channel services in order to obviate loss. He had been assured by a prominent member of the aircraft industry that they would rather that whatever money was available was spent wholly on Service aviation. They had, therefore, to beware of adopting broadcast the suggestion that by subsidising civil aviation they promoted the power of defence. The Government not only had a definite air policy, but it had a sane policy the country could have taken up—namely, to avoid expense as far as that was justifiable and to build up the nucleus of a very efficient organisation which would be capable of expansion.

* * *

IN PARLIAMENT

R.A.F. Personnel

Lieut.-Commander Kenworthy, on July 25, asked the Secretary of State for Air what is the total personnel of the Royal Air Service, male and female, respectively; how many of these are considered to be available to act as pilots and observers in the air, respectively, when required for active service, and not including personnel under training; and how many of these latter are allocated for service with the Royal Navy?

Capt. Guest: According to the latest returns available, the answer to the first question is 28,906 and 46 respectively, the latter figure representing the personnel of the Royal Air Force Nursing Service; to the second, 1,714 fully trained pilots and 109 observers, excluding those under flying training. It would be difficult to assess the proportion of this number of pilots and observers who can be said to be employed on naval duties, but there are 373 first line aeroplanes in service units without counting training or reserves, and these are manned by 461 pilots and 92 observers, of whom 84 pilots and 35 observers work with the Navy, namely, about 20 per cent. Of the remaining 1,253 pilots, the proportion employed on work with the Navy is probably about the same.

Lieut.-Commander Kenworthy: Does not the right hon. gentleman think it very anomalous that, with a very big Navy and a acomparatively small Army, only 20 per cent. of the available pilots are attached to the Senior Service?

Capt. Guest: The hon. and gallant gentleman forgets that two-thirds of the Royal Air Force is stationed oversea.

Lieut.-Commander Kenworthy: Have we not got numerous fleets overseas, and ought not they to have their proper proportion of pilots?

Torpedo School, Gosport

Viscount Curzon asked the Secretary of State for Air whether he can give details as to the experimental Royal Air Force torpedo school at Gosport and as to the work carried on there?

Capt. Guest: The Air Force establishment referred to at Gosport is not a torpedo training school; it is a flight maintained for experiments with the running of torpedoes from aircraft and for the study of modifications to aircraft fittings and to torpedoes in connection with such work. In this work the Naval Torpedo School, described as H.M.S. *Vernon*, closely co-operate. The flight consists of three machines, with an establishment of 4 officers, one of whom is attached from the Navy, 18 other ranks, and 3 civilian assistants.

Naval Officers and Air Training

Commander Bellairs asked the Parliamentary Secretary to the Admiralty whether he will clear up misunderstandings by stating the reasons why young officers were not forthcoming when the Air Ministry asked if 400 could be seconded from the Royal Navy?

Mr. Amery: There is no record at the Admiralty of the Air Ministry having asked for a definite number of officers (400) to be seconded to the Royal Air Force. Early in 1920, however, the Air Ministry asked that a certain number might be seconded for training as pilots, and, after discussion, a Fleet Order was issued in July, 1920, inviting officers to volunteer. The response to this invitation was very unsatisfactory, in spite of senior officers having been asked to bring the matter to the notice of young officers, and only seven names were received, these seven starting training in September, 1920. During the winter of 1920-21 further discussion took place with the Air Ministry with a view to the seconding of a further number of officers, the ultimate total aimed at being 100, but the conditions, which the Admiralty thought were necessary to secure enough volunteers to make the scheme a success, were found to be unacceptable to the Air Ministry. As there appeared to be no possibility of agreement, the matter dropped, the Air Ministry taking steps to find from other sources all the pilots required. The Admiralty have, of course, no power to second an officer to another service without his consent.

Major Sir B. Falle: Will the offer be repeated?

Mr. Amery: I am willing to discuss the matter with the hon. and gallant member.

Naval Aircraft

Lieut.-Commander Kenworthy, on July 26, asked the Parliamentary Secretary to the Admiralty how many aeroplanes, seaplanes and pilots are at present with the China, East Indies and North American squadrons, respectively, or available for immediate service with those squadrons?

Mr. Amery: No aircraft are at present with these squadrons. All fleet aircraft will be available for service in any waters as aircraft carriers become available.

Lieut.-Commander Kenworthy: Are steps being taken to supply these squadrons which are designed and placed for operating on wide stretches of sea where aeroplanes are of vital import?

Mr. Amery: We are pushing forward aircraft carriers.

Lieut.-Commander Kenworthy: Are not the cruisers on these foreign stations permitted and able to carry their own aircraft, as in the War?

Mr. Amery: Will the hon. and gallant gentleman please give me notice?

Capt. Viscount Curzon asked what are the types of aeroplane which have to be engaged by a fighting aeroplane at sea; whether any other duties are required of such a machine; and when were the fighting aeroplanes now in use in the Royal Navy constructed?

Mr. Amery: The types of aircraft which it is expected fighting aeroplanes would have to engage at sea at the present time are as follows—other fighters, bombing, reconnaissance, torpedo and spotting aircraft, seaplanes and flying boats. They would also attack the enemy as and when opportunity offered. The information asked for in the last part of the question is not in the possession of the Admiralty.

Viscount Curzon: Does my hon. friend think six fighters plus three without pilots are sufficient to discharge these duties of the Navy?

Mr. Amery: That is a matter to be discussed on the Votes.

Viscount Curzon asked whether there is now at sea or capable of being worked at sea in the Royal Navy or the Navy of any other country in the world, so far as the information at the disposal of the Admiralty is concerned, an aeroplane capable of sinking one of our capital ships by either bomb or torpedo?

Mr. Amery: The answer is in the negative.

Naval Officers and the R.A.F.

Lieut.-Col. Moore-Brabazon, on July 27, asked the Secretary of State for Air if any naval officers have been seconded to the Air Force during the last 12 months for training as pilots; and whether any difficulty has been experienced in getting naval officers for flying training?

Capt. Guest: Seven naval officers were seconded to the Royal Air Force in 1920, since which date no others have been seconded, in spite of the earnest desire of the Air Ministry to secure volunteers.

Marine Craft

Viscount Curzon asked what is the number of marine craft maintained by the Air Ministry; where are they built and where are they repaired; how many men are required to man them; and where do they obtain their nautical knowledge?

Capt. Guest: The answer to the first question is that the establishment of marine craft maintained in use in connection with the operation and salving of aircraft is as follows:—Power driven craft, 35; pulling boats, 21; barges, etc., 3. There is also a surplus of War stocks of marine craft which is held as a reserve and for replacement. These craft were, for the most part, taken over by the Admiralty on the formation of the Air Force in 1918; to the second, that the information as regards building is not in all cases available, but the craft have mainly been built by Messrs. Thornycroft, Messrs. Cox and King, and Messrs. Gibbs. The repairs are carried out by direct contract; to the third, that the answer is 127; to the last, that training is for the most part carried out in the Royal Air Force units to which the boats belong, and also at a small marine training establishment at Calshot.

Viscount Curzon: Do the figures just given include any craft which are maintained on the Tigris?

Capt. Guest: I think not. I will look into it.

Air Force Reserve

Viscount Curzon asked the Secretary of State for Air whether he can give any details as to the new Air Force Reserve; whether it is intended to provide out of this Reserve for the equirements of the Navy; whether any of the pilots provided under this scheme would be able to fly on and off an aircraft carrier or off a flying platform; if not, how long would be required to train them and how many carriers would be required for the purpose; whether observers are included; how long would be required to train them for their duties; and whether it is considered that the annual training provided for under the scheme is sufficient to train pilots and observers to carry out their duties in the squadrons of the Royal Air Force attached to the Royal Navy?

Capt. Guest: I am glad of this opportunity of correcting a misapprehension which has arisen. The statements which have appeared in the Press recently to the effect that a new Air Force Reserve was being created are not quite accurate. The position is that officers who were granted short service commissions in 1919 for a period of three years' service on the active list, followed by a period in the Reserve, will commence to pass into the Reserve this year. The first officers will be transferred in September. The Reserve is intended to provide for the requirements of the Air Force at a time of national emergency including the duties of the Air Force in connection with the Royal Navy. A number of the pilots who are at present serving on short service commissions, and who will in due course pass into the Reserve, are fully trained and experienced in naval work. The Reserve also includes observers. It is considered that the annual training provided for under the scheme will be sufficient to keep pilots and observers in training to carry out any Air Force duties which they may be called upon to perform, including duties in the squadrons of the Royal Air Force attached to the Royal Navy.

Aeroplane and Engine Orders for Constructors

SIR H. BRITTAIN asked the Secretary of State for Air whether, seeing that the House is to adjourn for three months, he can state if his Department will have the necessary funds to enable it to give orders to aeroplane and engine manufacturers, and so enable those selected to keep their works going and their staffs together during the period until the House meets again ?

Capt. Guest : I fear I am not yet in a position to make any statement such as that suggested by my hon. friend, nor can I promise to make an announcement on this subject before the House rises. The possibility of giving further orders to the aircraft industry beyond those already budgeted depends upon the decisions of the Committee of Imperial Defence.

Sir W. Joynson-Hicks : Does the right hon. gentleman realise the necessity for doing something in this matter ? Is he in a position, the money having been already voted, to do something before the House rises ?

Auxiliary Air Force

MR. L. MALONE asked the Secretary of State for Air if he can make a statement as to the proposed constitution of the Territorial Air Force ; and what will be the cost ?

Capt. Guest : The constitution of the auxiliary or Territorial Air Force will in general be similar to that of the Territorial Army, except in so far as differences in regard to service, training and material in the two arms make a divergence necessary. As stated in my reply to my hon. and gallant friend, the Member for East Lewisham, on July 10, it is uncertain when the Bill for the Auxiliary Air Force can be proceeded with, the whole question of home defence, with which this is bound up, being under consideration by the Committee of Imperial Defence. The cost will depend on the size of any such force it is decided to raise.

Mr. Malone : Is it proposed to take the cost out of the battleships which are being built now ?

Royal Air Force (Naval Wing)

LIEUT.-COL. MOORE-BRABAZON asked the Parliamentary Secretary to the Admiralty how many naval officers have been trained as pilots or observers by the Royal Air Force in the last 12 months ; and whether any of them have completed their flying training and become qualified pilots ?

Mr. Amery : No naval officers have been trained as pilots during the last 12 months. Eleven naval officers have been trained as observers.

THE ROYAL AIR FORCE

London Gazette, July 28, 1922

General Duties Branch

R. G. Chapell is granted a short service commn. as a Pilot Officer on probation, with effect from, and with seniority of, July 14. Flying Officer H. St. C. Roy, M.C., is transferred to the Reserve Class B. ; July 26.

Stores Branch

N. E. D. Hutchinson is granted a short service commn. as a Flying Officer on probation for Accountant duties ; July 10. His name will be placed on the gradation list immediately below Flying Officer B. C. Powell. Flying Officer D. C. Gribble resigns his short service commn. ; July 26.

Medical Branch

Flight-Lieut. A. C. Ransford is granted a short-service commn., retaining his present substantive rank and seniority ; July 25.

Chaplain's Branch

The Rev. D. F. Stephens is granted a short service commn., with the relative rank of Sqd.-Leader for purposes of precedence, discipline and administration July 1.

Memorandum

Flying Officer W. Rollinson relinquishes the acting rank of Flight-Lieut. ; June 15. The permission granted to A. Bevan to retain the rank of Lieut. is withdrawn on his joining the Army ; June 26.

LONDON TERMINAL AERODROME

Monday evening, July 31.

THE passenger total is creeping steadily upward. The month's total is well over 1,500, and the prospects for August are quite good, advance bookings being already fairly heavy There is still time for the traffic to reach figures that will justify still bigger developments next year in the way of organising machines and routes.

The A.I.D. have made a thorough examination of the D.H.34, G-EBBS, which the Daimler Airway have run nearly 60,000 miles in three months, and their report on this machine states that it is as good, if not better, than when it came from the makers. This fact will completely alter all ideas of depreciation of machines. At one time 1,000 hours was considered quite a liberal estimate of the life of a machine ; but now, with this machine having completed nearly 700 hours in three months, and being as good as new at the end of it, an estimate of, say, 4,000 to 5,000 hours is quite reasonable, and will cut down depreciation—and thus the cost of running the service—enormously.

Our Early-rising Director of Aviation

MAJ.-GEN. SIR W. S. BRANCKER, Director of Civil Aviation, who has been causing both airway managers and pilots to rise earlier than usual by calling meetings on the aerodrome, to discuss various matters, at the early hour of 9 a.m., flew to Paris on the 5.30 a.m. Daimler newspaper machine on Wednesday last. The weather was very thick, but the pilot tells me that Gen. Brancker thoroughly enjoyed himself, and when they arrived in Paris rather later than usual, and found that they were short-handed for unloading the machine, the General set to work with the rest in order to get the papers unloaded and off to Paris. Gen. Brancker was attending the International Conference on Air Navigation, which was held in Paris on Wednesday and Thursday last.

The Marconi Company are to fit wireless telephones in two new Fokker monoplanes, which are fitted with Rolls-Royce engines, and are to be put on to the K.L.M. service between London and Holland. I understand that the "Puma" monoplanes are not to be fitted with wireless, as it is expected that these will be replaced by newer and more up-to-date machines next season.

Business Men's Bet about a Flight

MR. B. YOUELL, of the Surrey Flying Services, piloted one of that Company's Avros to Walton-on-the-Naze on Wednesday afternoon, carrying as passengers two City men who, during lunch, had made a bet that they would fly. This incident well illustrates the average business man's attitude towards flying. They evidently regard it as extremely dangerous, and it is encouraging to think that there are at least some who have never flown who have the courage to risk it. Mr. Youell landed them in the grounds of a house at Walton-on-the-Naze, and they stayed there until just before dusk, flying back to Croydon in the dark and landing with the aid of the lighting equipment. They were highly delighted with their trip, and intend to fly to Paris later.

During the week-end the Surrey Flying Services had their usual bad weather, but in spite of this two of their machines were kept busy with joy-riders. The third Avro which they have built is now in use, while the old one, G-EARL, which saw service with "Airco," is now in the process of overhaul. This machine must have made more landings than any other machine on the aerodrome.

During the week the Messageries Aeriennes decided to run their 1.15 p.m. service exclusively for goods, and to refuse passengers for this machine They are using the Breguets and Spads, and have removed the seats and interior fittings from the machines so employed. An additional passenger machine, which is whenever possible a "Goliath," has been put on at 4.30 p.m., and will be the last machine to leave for Paris during the day. Incidentally this machine calls at Le Touquet to set down passengers when necessary.

The service of newspaper machines, organised by the De Havilland Aircraft Company from Lympne, is growing rapidly, there being now three a day from there running to Ostend, Brussels and Antwerp, while I understand that they are shortly to start another to Deauville. The old Airco 16's are being used on these services, as well as the three-seater D.H.9's.

The Lep Aerial Travel Bureau are presenting a free insurance policy for £500 to all passengers booking by air at their office during August. Mr. Loader, of Lep Aerial, tells me that it is surprising what low rates the insurance companies are now quoting—the rate being approximately a quarter of what it was two years ago.

American Family Fly to Paris

AN entire American family of eight people travelled by the Daimler Airway on Friday. This family consisted of father, mother and six sons, whose ages ranged from 11 to 20. They had also half-a-ton of luggage, some of which had to be accommodated on the early-morning newspaper machine. They were unable to travel together as there were previous bookings, and they had to be accommodated in two parties of four on the 12.45 p.m. and 2.30 p.m. services.

Handley Page Transport are now prepared to carry passengers' luggage in advance, collecting and delivering it in a similar manner to railway companies. This should be a great boon to passengers, always provided that the Customs difficulties can be got over. Talking of Customs, I understand that the number of duplicate forms now demanded by the Customs people has grown so large that if the increase continues at its present rate there will soon be no room in the machine for anything except Customs forms, and the passengers and freight will have to go by boat and train.

As a result of the new orders issued by the Air Ministry, that pilots must make six landings on a machine before having it put on their licence, the service machines have been delayed on several occasions by these landing tests obstructing the aerodrome, and it has been necessary for the C.A.T.O. to issue a notice forbidding such tests between the hours of 10 and 4.

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SOCIETY OF MODEL AERONAUTICAL ENGINEERS

(London Aero-Models Association.)

THE next important outdoor meeting will be held on Wanstead Flats, Sunday, August 20, at 11 a.m., when members will make an attempt to improve the British records. Members wishing to have a copy of present records can obtain same from Mr. C. A. Rippon (Competition Secretary), 52, Fairbridge Road, Holloway, N. 19.

On Saturday, September 2, the competition for Mr. Felix Kelly's Challenge Cup for Compressed Air Driven Models will be held, full particulars of which have already been published.

Members are requested to attend Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, as often as possible, every Thursday, at 7.30 p.m.

Hon. Secretary, A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

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A Transatlantic Savoia

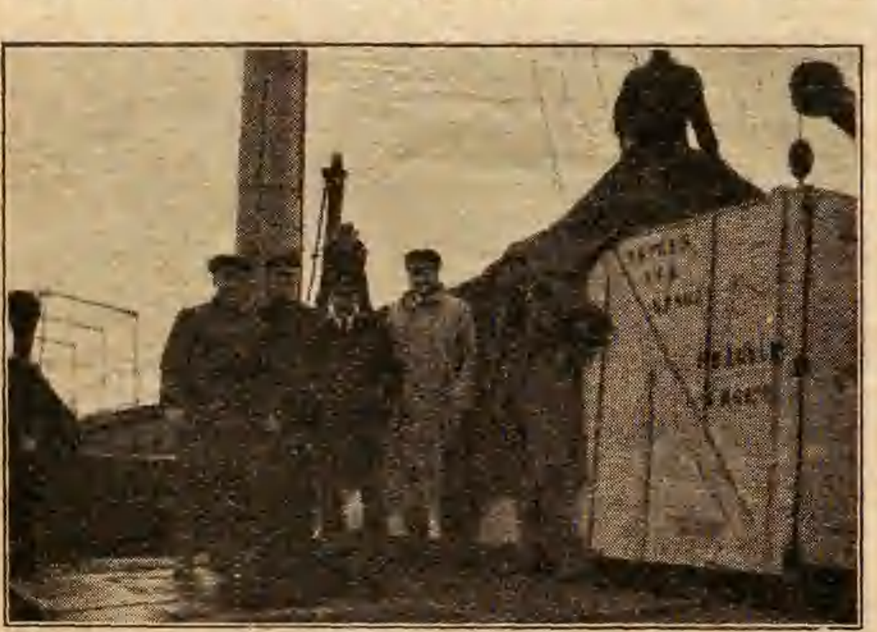
FROM Rome it is reported that the Savoia firm have commenced the construction of a new three-engined flying boat for the Portuguese aviators Cabral and Coutinho, in which it is intended to cross the Atlantic from west to east. The new boat is stated to have a range of about 3,000 miles. A similar boat has been ordered by the Danish polar expedition.

Chanteloup's Stunt

ON July 27 the well-known French pilot Chanteloup succeeded in landing his caudron on the lip of the crater of the Bromo volcano in Eastern Java. The volcano is stated to have been in full eruption at the time. After a stay of a few minutes he took off again and returned to his starting point, Malang.

De Havilland Service to Ostend

THE De Havilland Co., using three D.H. 9's and a D.H. 16, made some 20 flights each way between Lympne and Ostend during last week. Three trips, out and home, were made each day, except on the 26th and 27th ult., when four were accomplished. Goods and newspapers were carried on the outward trips, and 12 passengers on the return trips.



FOR THE SCHNEIDER CUP: Swinging the Napier Lion-engined Supermarine Flying Boat on to the S.S. "Philomel" at Southampton for transhipment to Naples. In the group are Capt. H. J. Field, Mr. Scott-Paine and Mr. Braid. The date for the Schneider Cup was advanced by two weeks, and it was only by the sportsmanlike action of the General Steam Navigation Company in diverting the "Philomel" to Southampton from her normal course to Naples that the Supermarine boat will be enabled to make a bid at Naples to bring back the Cup to England.

PUBLICATIONS RECEIVED

Aeronautical Research Committee, Reports and Memoranda:—

No. 756 (*Ae.* 19). *Tail Loads in Recovering from a Vertical Dive at Terminal Velocity.* By John Case, M.A., and S. B. Gates. April, 1921. Price 1*s.* 6*d.* net. By post 1*s.* 7½*d.*

No. 762 (*Ae.* 23). *Lift and Drag of B.E.2E. with R.A.F. 14 Wings.* By the Aerodynamic Staff of the R.A.E. October, 1921. Price 4*d.* net. By post 4½*d.* London: H.M. Stationery Office, Kingsway, W.C. 2.

No. 767. (Ae. 27.) *The Calculation of the Characteristics of Tapered Wings.* By H. Glauert. May, 1921. Price 3*d.* net. By post 3½*d.*

No. 770. *The Drag Curve of R.A.F.* 14. *B.E.2e Wings Obtained by Full-Scale Experiments.* By the Aerodynamic Staff of the Royal Aircraft Establishment. October, 1921. Price 4*d.* net; by post 4½*d.* London: H.M. Stationery Office, Kingsway, W.C. 2.

No. 776. *Load Factors for Commercial Heavier-than-Air Craft. Report of the Load Factor Sub-Committee. January,* 1922. Price 3*d.* net. By post 3½*d.* London: H.M. Stationery Office, Kingsway, W.C. 2.

No. 777.—*A Directional Hot-Wire Anemometer.* By A. Bailey, M.Sc. Jan., 1922. Price 6*d.* net; by post, 6½*d.* London: H.M. Stationery Office, Kingsway, W.C. 2.

Report of the Aeronautical Research Committee for the Year 1921-22. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 2*s.* 6*d.* net; by post 2*s.* 7½*d.*

Report No. 127. *Aeronautic Instruments, Section III; Aircraft Speed Instruments.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 99. *Notes on the Standard Atmosphere.* By W. S. Diehl. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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9,261. ZEPPELINWERKE GES. and A. ROHRBACH. Carriages for aircraft. (165,773.)
11,440. M. L. TONELLI. Course recording apparatus. (182,594.)
26,755. SOC. ANON. DES AEROPLANES G. VOISIN. I.C. engines. (170,284.)
9,620. HANSA METALL-WERKE GES. Clinometer with cardanically suspended stable pendulum. (182,540.)

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(*Continued from* p. xvi.)

INSULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent. London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5. Dalston 1893.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.

PROPELLERS—

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.

Lang Propeller, Ltd., Weybridge, Surrey.
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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Aug. 6–20	**French Gliding Competition at Clermont-Ferrand**
Aug. 12	**Schneider Cup Seaplane Race, at Naples**
Sept. 2–17....	**International Concours Aviatique, Rotterdam**
Sept. 8–10....	**1,000 Miles Race round Britain for the King's Trophy**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsch (300 kil.)**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

What Does It Really Mean?

MR. LLOYD GEORGE'S statement in the House on June 3, that the Government have decided, as a result of the inquiry by the Committee of Imperial Defence, to adopt the scheme submitted by the Air Ministry to provide a force of 500 machines for home defence at an increased cost of £2,000,000 per annum, has been received with general satisfaction, showing as it does that the Government has at last realised the anomaly of the position into which the country has been allowed to fall in regard to our position in the air. As it had, to all intents and purposes, been universally admitted that the air is now our first line of defence, the three squadrons available for home defence could hardly hold good for long. That the trouble which the Admiralty has been causing lately has been partly responsible for the delay in arriving at a decision can scarcely be doubted, and although the relative positions of the three services has yet to be settled, in the meantime, the announcement of a definite policy to embark upon substantial additions to the Air Force can be accepted as indicating a return to a sane realisation of the changing of methods for maintaining the security of Britain's shores.

There has been a good deal of speculation as to what the announcement really means, and further official statements are required before it is possible to form any very clear opinion, but even at the present moment one or two things do emerge from the Prime Minister's statement on the Cabinet's air policy. In the course of his statement Mr. Lloyd George mentioned that "The inquiries of the Cabinet Committee on Economy in the Fighting Services have advanced sufficiently to enable me to state that this addition to the provision in the Air Estimates will not prevent a reduction in the total Estimates for the Fighting Services for the year 1923–24." In other words, the Government has decided that, by making fuller use of the air and its possibilities, savings can be effected in the other two services. Put a little differently, there are a good many things which the R.A.F. can do more economically than can the older Services. That in itself is an admission which the Air Ministry may well be proud of having secured, and the Cabinet, once having admitted this fact, must logically undertake to see that, this being the case, the R.A.F. and the claims of the Air Ministry are given due consideration in the allocation of funds. The whole question appears to be, therefore, for this year, one of re-allocation of funds rather than of a demand necessitating fresh burdens on the taxpayer.

With reference to the 500 machines for home defence mentioned by Mr. Lloyd George, it is not by any means clear whether this figure relates to new constructions or whether a certain percentage is intended to be "reconditioned" machines, or whether it also includes the machines already in operation. The two million pounds a year extra do not appear to go very far towards 500 new machines, and it appears to be probable that this number will be composed of as many new machines as finances permit, helped out with "reconditioned" machines from stock. It should not be forgotten that, apart from machines, aero engines are required, and it must be assumed that engine manufacturers are to receive their share of orders for new engines. Then there is the ground organisation behind the squadrons, which will cost a considerable percentage of the two million pounds per annum. On the whole, therefore, it can scarcely be assumed that a very great number of new machines and engines can be ordered this year. Sir William Joynson-Hicks has been quoted as stating that, as he understands it, £300,000 will be spent on new machines during the present year, and about one million next year.

At least one thing is deadly certain, and that is that the time has undoubtedly come when the R.A.F. must be equipped with new flying stock. It should be remembered that the present machines are out of date as regards design, and that, given a free hand, our designers could do very much better today. That is not, however, the most important side of the question. Most of the present flying stock was built during the war, of war material, and was, moreover, built with the idea in mind that the life of machines at the front was but short in any case. Many of the materials used were of such a nature that they would not, today, pass the A.I.D., and the fact that they have been stored for three or four years has not improved them. There have been accidents occurring during the last few months to "reconditioned" machines which appear to indicate that the time is long past when this old stock is good enough for the equipment of the R.A.F., even under peace-time conditions.

As we have already said, our designers could do very much better today if given a free hand. Here we would, however, utter a word of warning. The specifications now issued by the Air Ministry are gradually becoming such that designers are unanimous in declaring that, if all the requirements are to be met, the performance will be no better than—in fact, it will be inferior to—that of machines of the 1916–17 period. Factors of safety are being increased, armament is getting heavier, safety devices are demanded, and instruments and "gadgets" without number have to be carried. This may all be necessary, but if it is, no increase in performance is to be expected. It is as well to point this out, since otherwise the general public may well be under the impression that, with extra money being spent, machines should soon be in existence which are vastly superior to present ones. This will not necessarily be the case, for the reasons indicated.

One thing is certain; it would not do at the present moment to begin standardising to any extent. Many components of machines may be standardised, but the machines themselves must be left free to develop, and in this connection it is not inappropriate to quote Dr. Stratton of the American Bureau of Standards, who puts the whole question of development in a nutshell when he says, "Aircraft development depends upon aircraft use." Only by extensive and constant use can development be expected. This contrasts strongly with the Utopian idea prevailing in certain quarters nearer home that we can scrap any branch of aviation for ten years, and then start *de novo* when finances are a bit easier.

Much has been said and written about metal construction lately, and the impression has somehow got about that we are far behind other countries in this respect. Nothing could be farther from facts. We are certainly not doing a vast deal, but what little we are doing is not behind the work done by other nations as regards quality, as exemplified by the metal constructions of such firms as Boulton and Paul and Armstrong-Siddeley. At the same time, work in this direction should be in the front rank for acceleration. It is now two years since Short Brothers designed and built (in six months, we believe) the first British all-metal aeroplane. That machine was purchased by the Air Ministry, but it is still "being considered." Surely two years is sufficient time for deciding whether or not a design is of any value. If not, well perhaps it might be advisable to transfer the job. If, on the other hand, the design is promising, surely the firm should receive encouragement.

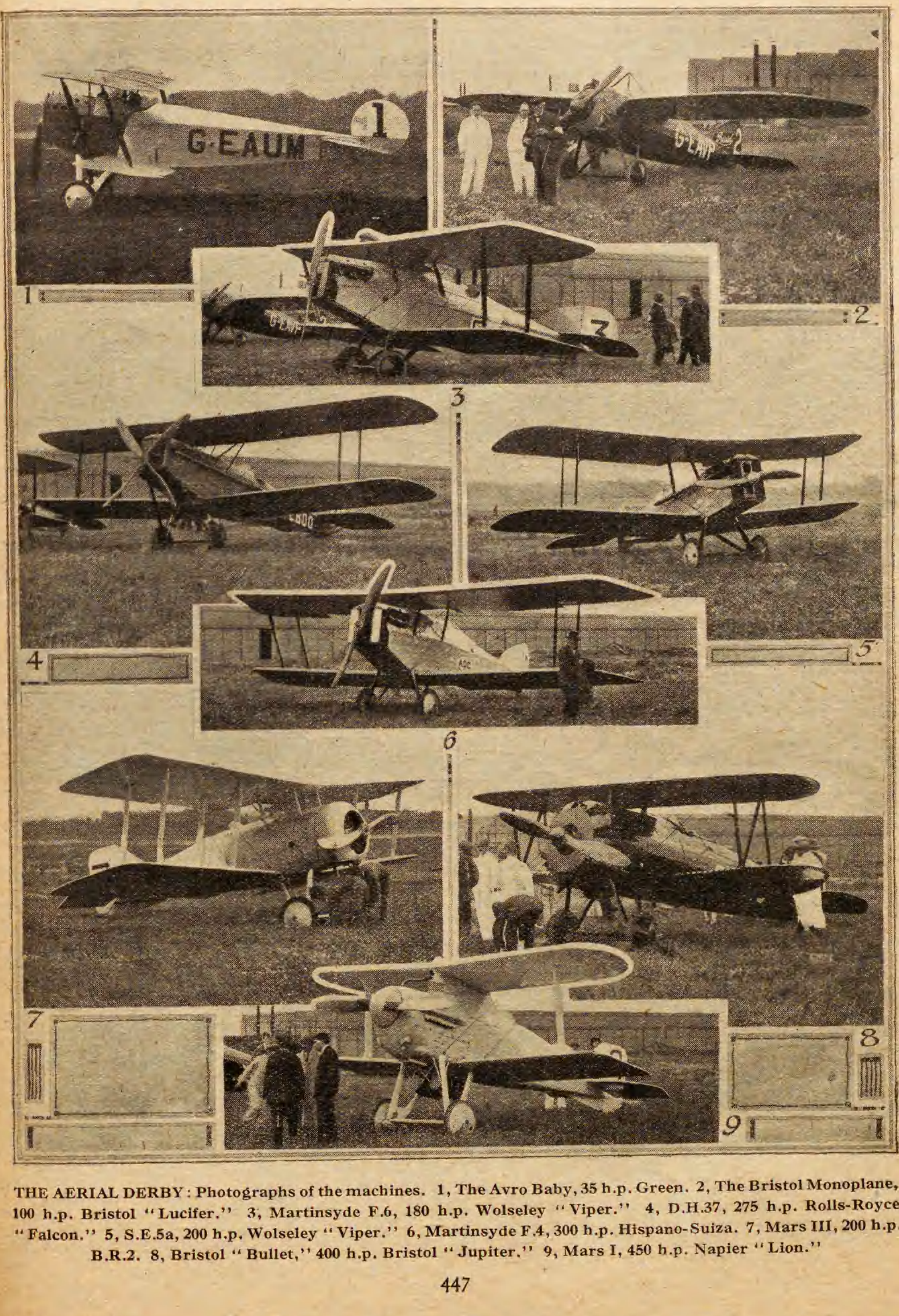
As a result of their own experiments, Shorts are building two more all-metal machines, but these are not to the order of the Air Ministry. Probably when they are complete the Air Ministry will refuse them, but will at the same time decline to give permission for the makers to sell them elsewhere, which is quaint, as if really of no use, why prevent others from trying them out?

◆ ◆ ◆

The Derby The seventh Aerial Derby was not a very interesting affair. As a speed contest it did not exist, owing to the absence of the Bristol racer. It is quite evident that, if we wish to attract foreign competitors, the Royal Aero Club must increase the amount of the prizes. If the first prize in the Derby was £1,000 instead of £300, we should probably get French and Italian competitors, and there would be more widespread interest in our annual event. As it was, there was none; the whole thing was a "family affair," and August Bank Holiday will have done little towards creating interest in British machines abroad.

The most interesting happening of the day—one which was not even on the programme—was the superb flying by Flying Officer Bulman on the Gloucestershire Aircraft Company's "Nighthawk," with Armstrong-Siddeley "Jaguar" engine. This machine was an eye-opener to most visitors, with its phenomenal climb and general handiness. When the R.A.F. comes to be re-equipped this machine must take a front rank in single-seater fighters, although the "Nighthawk," being already several years old as regards design, Mr. Folland can probably do even better now.

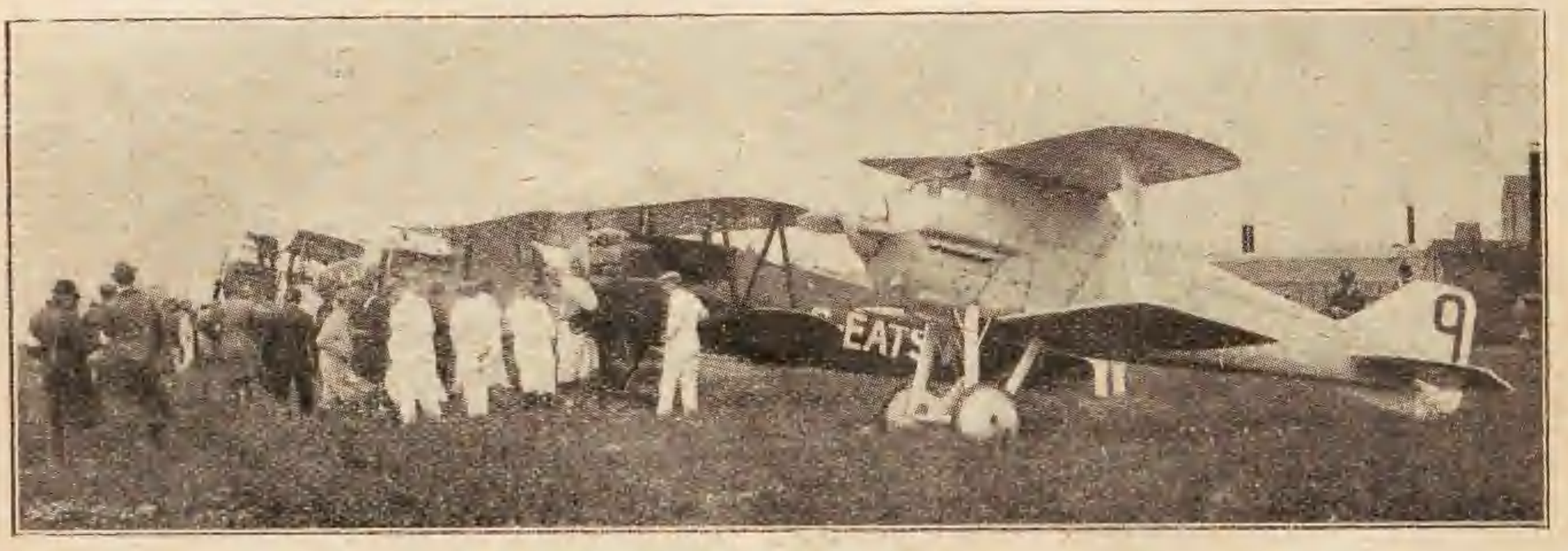
THE AERIAL DERBY



THE AERIAL DERBY: Photographs of the machines. 1, The Avro Baby, 35 h.p. Green. 2, The Bristol Monoplane, 100 h.p. Bristol "Lucifer." 3, Martinsyde F.6, 180 h.p. Wolseley "Viper." 4, D.H.37, 275 h.p. Rolls-Royce "Falcon." 5, S.E.5a, 200 h.p. Wolseley "Viper." 6, Martinsyde F.4, 300 h.p. Hispano-Suiza. 7, Mars III, 200 h.p. B.R.2. 8, Bristol "Bullet," 400 h.p. Bristol "Jupiter." 9, Mars I, 450 h.p. Napier "Lion."

THE SEVENTH AERIAL DERBY

We cannot honestly say that we have been particularly impressed with the Seventh Aerial Derby, which was held at Croydon Aerodrome on Monday (Bank Holiday) last. In fact, in one way or another it seemed even duller than last year's, and there prevailed an atmosphere of indifference and lack of interest over the whole proceedings that made one yearn for the "ordinary" Saturday afternoons at Hendon in the good old days. As regards Croydon Aerodrome as the stepping-off place, we are not sure that we are altogether satisfied on this point either. For one thing, the surface of the ground is none too good from the pilot's point of view, whilst Croydon Aerodrome does not appear to lend itself very well to the organisation, accommodation, etc., necessary for successful race meetings. In this respect the R.Ae.C. did their best, and, we think, very well, all things considered, but there is still room for improvement in several ways. However, to proceed with the Derby.



THE AERIAL DERBY : Line-up of the machines

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To begin with, the weather conditions were decidedly threatening during the early part of the day, the sky being overcast with heavy clouds, and a strong south-westerly wind gave promise of a rough time for the pilots. From about noon spectators arrived in fairly large numbers, and by the time the proceedings were in full swing the enclosures presented a well-filled appearance, but nothing compared with the crowds that have been seen at Hendon on previous occasions, whilst it seemed to us that there were as many spectators lining the "free" vantage points surrounding the aerodrome as there were inside.

Shortly before two o'clock the nine competing machines were lined up on the far side of the aerodrome, opposite the enclosures, and at 1 hr. 52 mins. 26 secs. exactly the first machine, the Avro Baby (35 Green), piloted by Bert Hinkler, was started on the 200-mile journey. Coinciding with his start came a welcome burst of sunshine, and thereafter we were allowed frequent glimpses of the sun and blue sky.

L. L. Carter on the 100 h.p. Lucifer-Bristol monoplane was next away at 2 hrs. 27 mins. 51 secs., and then at various intervals, according to their handicaps (given in the accompanying table), the remaining competitors were sent off as follows :—F. P. Raynham on the 200 h.p. Wolseley-Viper Martinsyde F6, A. S. Butler on the 275 h.p. Rolls-Royce D.H.37, L. R. Tait-Cox on the 200 h.p. B.R.2 Mars III, H. H. Perry on the 200 h.p. Wolseley-Viper S.E.5a, R. H. Stocken on the 300 h.p. Hispano-Suiza Martinsyde F.4, R. A. de Haig on the 400 h.p. Jupiter Bristol "Bullet" and J. H. James on the famous 450 h.p. Napier-Lion Mars I.

C. F. Uwins, who was to have piloted the Bristol Hush-hush monoplane, had to be content with following the others—on the event board, as his mount could not be got ready for the fray in time. At the last minute Butler's engine developed magneto trouble, and he was unable to get away to time, but started off some ten minutes late.

The Aerial Derby : "Chairing" the winner, Mr. J. H. James. One "leg" (on left) of the chair is formed by Mr. D. Longdon, of the Gloucestershire Aircraft Co., while on his right may be seen Mr. L. R. Tait-Cox, fellow pilot and close friend of James.

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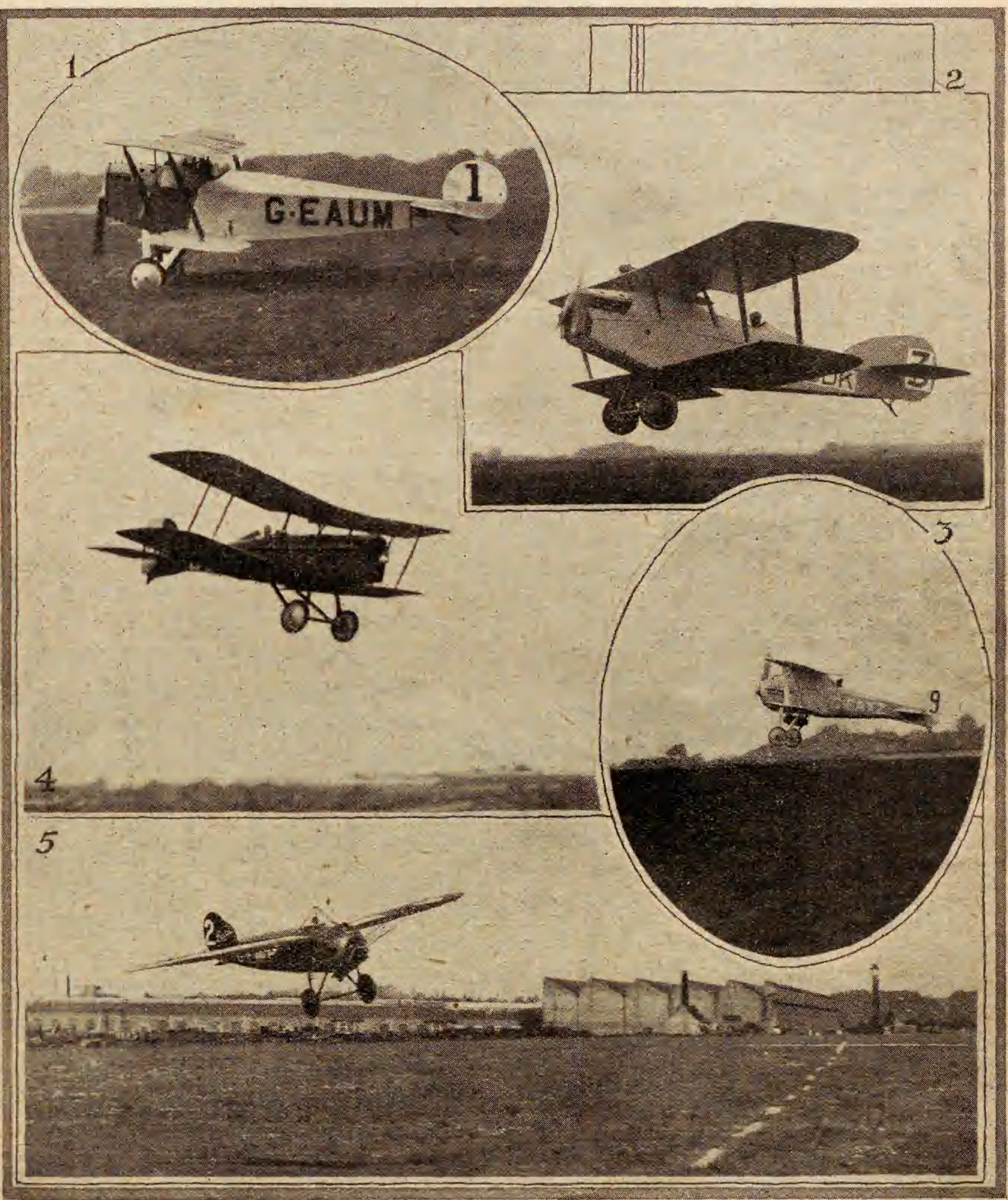
A few minutes before James was signalled away, Hinkler came into view and started on his second lap, with James close on his heels—or rather, tail. By the way, the Baby rocked as it passed over, and it looked as if Hinkler was not having a particularly comfortable trip. News then came in that Stocken was down at Hounslow Heath with plug trouble.

At 15.23 (A.M. time) Carter completed his first lap, passing over in fine style, and seven minutes later Raynham came in. After another six minutes Haig unexpectedly hurtled over on the "Bullet." At 15.40 Tait-Cox arrived, but instead of continuing on his second lap he circled round and landed, thus retiring from the race. A few minutes later three machines were observed approaching, the first to cross over proving to be Perry, the other two, who came in together one minute behind, being Butler and James. Butler also retired at this stage, leaving six machines in the air.

After this there was a brief lull in the proceedings before Flight-Lieut. Bulman (Farnborough) gave a magnificent display of stunt flying on a Nieuport Nighthawk fitted with a 350 h.p. Siddeley Jaguar. Starting with a zoom such as we have seldom had the pleasure of observing before, he came out of this with a half-loop. He then put up some



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FROM THE AERIAL DERBY: 1, Bert Hinkler gets away on the Avro Baby. 2, F. P. Raynham taking off on his Martinsyde F.6. 3, J. H. James leaving on the Gloucestershire Aircraft Co. Mars I. 4, Flight-Lieut. Longton crossing the line on one of the A.D.C. S.E.5a's. 5, L. L. Carter crosses the finishing line as first man home and winner of the Derby Handicap.

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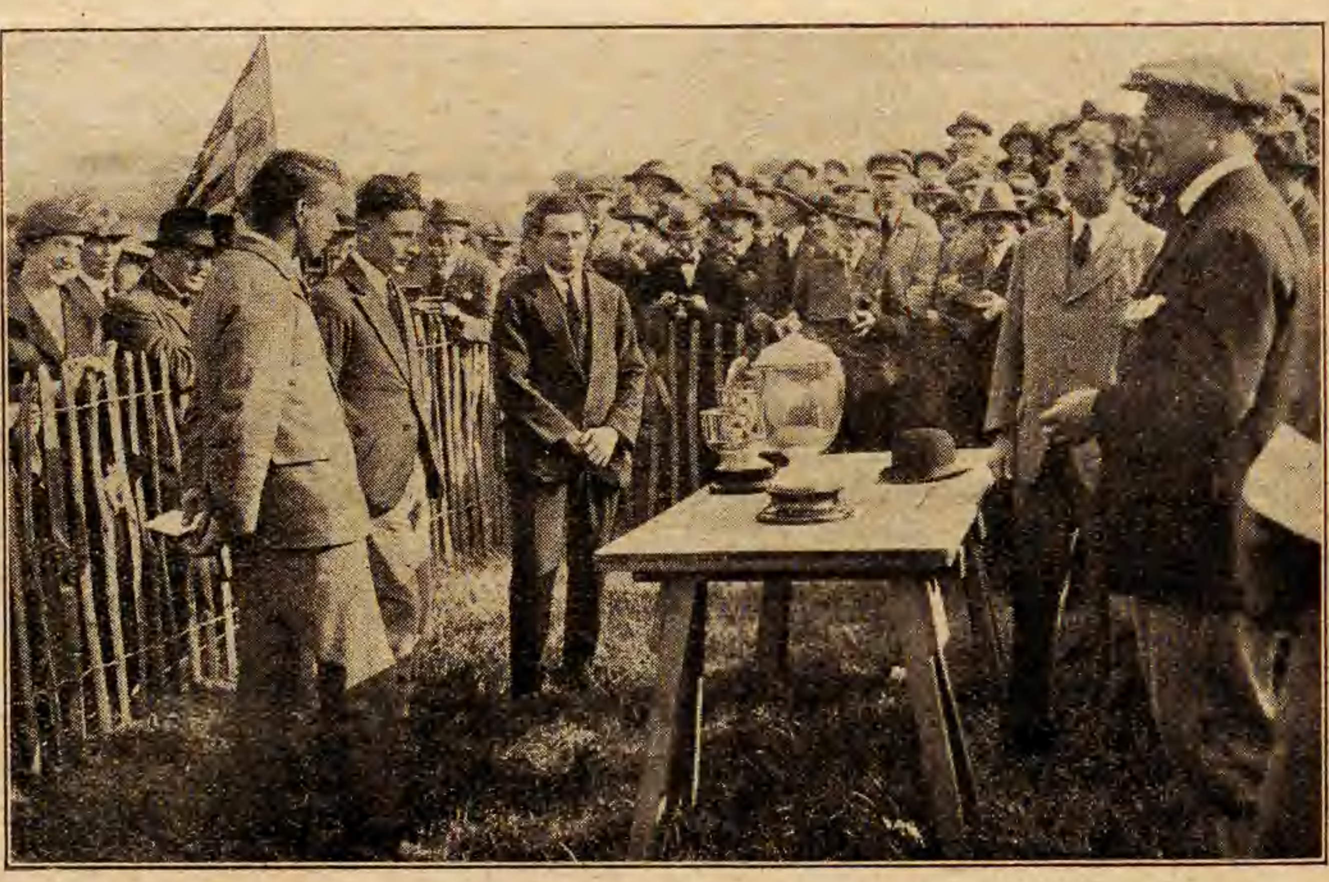
AIR LEAGUE CHALLENGE CUP

The Kenley team: (left to right) Flight-Lieuts. Luxmoore, Robb and Chappell.

The Uxbridge team: (left to right) Sqdn.-Ldr. Robinson, Flight Officer Gibbons and Flight-Lieut. Longton. Owing to the crash of an Avro the relay race between these two teams could not be flown, and the Cup remains for the time being with the present holders (Kenley).

really beautiful loops, spins, rolls and corkscrew twists, concluding with an example of fast and slow flying past the enclosures. It may be mentioned that this particular Nighthawk was built by the Gloucestershire Aircraft Co., Ltd., who have the building rights for this machine.

Immediately after this three of the Derby machines were seen approaching, one some way to the south, and the excitement was intense, as it was apparent that there was every likelihood of a good finish. As they drew near we could distinguish them more clearly, but as they were coming in from different directions it was extremely puzzling to follow what actually happened at the finish. Carter on the Bristol mono. crossed the line first, thus winning the handicap, then Haig on the "Bullet" made for the line in the opposite direction, making a sharp turn to the left in order to cross it according to rules. At the same time James, flying parallel to the line, made a wide sweep round and crossed but a fraction of a second behind the "Bullet." However, it was obvious that he had won the "fastest time," and a roar of greeting went up accordingly.



The Aerial Derby: Maj.-Gen. Sir Sefton Brancker, Director of Civil Aviation, presenting the Cups. From left to right: A. de H. Haig, who was second in the Handicap; L. L. Carter, winner of the Handicap, and J. H. James, winner of the Derby and third in the Handicap.

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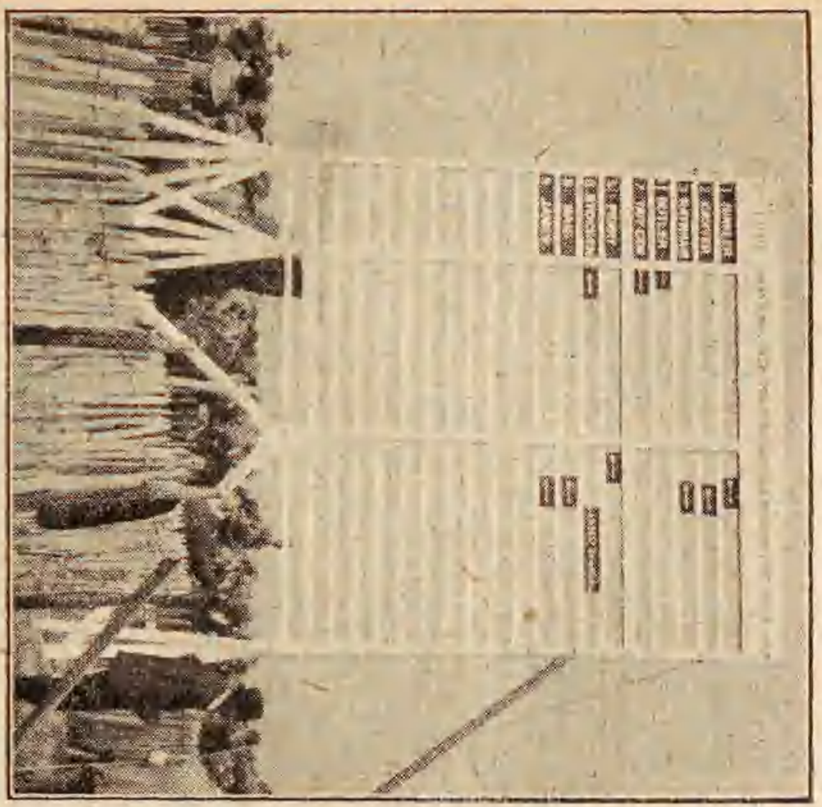
We then directed our attention to the landing of the two fast machines—always a matter for some anxiety—and it was here that the one incident of the day which remained impressed on our mind occurred. Haig had effected a safe and neat landing, and had come to rest at the end of the enclosures. James came in to land shortly after, and it was noticed that he was going somewhat faster as he touched ground than was expected, with the result that the machine ran along some considerable distance, getting nearer and nearer the Bristol and a crowd of people who were standing on the aerodrome right in the way—where they certainly had no business to be. Had they not been there James would, no doubt, have had little difficulty in clearing the Bristol and pulling up along the "slipway" leading to Plough Lane. As it was, however, it looked pretty hopeless, but with marvellous skill and judgment he turned the machine carefully to the right just at the precise moment—a second sooner and he would have been over, and a second later he



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The Aerial Derby: The scoring board which showed the progress of the competitors.

would have been into the people. Thus he *just* missed the crowd, and all the damage resulting was a ripped tyre and a leaky radiator. However, all's well that ends well, and we congratulate "Jimmy" on the best "save" we have ever seen.

In the meanwhile Raynham arrived home, followed a little later by Hinkler on the Baby—an exceptionally fine performance in the case of the latter considering the weather conditions, and once again we express our admiration for the excellent combination of Hinkler-Avro-Baby-Green.

A start was then made for the Relay Race for the Air League Challenge Cup between teams from R.A.F., Kenley, and R.A.F., Uxbridge (the former being the holders of the Cup). The teams were made up as follows:—Kenley: Flight-Lieut. J. M. Robb (S.E.5a), Flight-Lieut. R. W. Chappell (Avro), and Flight-Lieut. F. L. Luxmoore (S.E.5a). Uxbridge: Flight-Lieut. W. H. Longton (S.E.5a), Flying Officer F. G. Gibbons (Avro) and Sqdn.-Ldr. F. L. Robinson (S.E.5a). The two respective S.E.5a's started off first, Longton getting a little way ahead of Robb, but at the end of the first lap of 8 miles the latter made a splendid landing close behind his team's Avro, which got away with little delay; the other Avro (Kenley) failed to get started. As Chappell approached the enclosure, however, his engine spluttered and then gave out, and matters looked very black, but with great presence of mind the pilot steered his 'bus towards the machine park alongside Plough Lane, and managed to land on the other side of the fence without hurt to the spectators or himself. Undercarriage, one, Avro, for the use of. Prop. do. This little incident caused a postponement of the Relay Race, but two of the S.E.5a's had a friendly two-lap race, in which Uxbridge (Longton?) romped home well ahead.

After this Maj.-Gen. Sir Sefton Brancker presented the prizes to the Derby winners, and just as he concluded the clouds rolled aside and Air Vice-Corpl. Bill Stickers wrote "Castrol" very prettily in the blue patch—and the clouds rolled back!

Shortly before six o'clock the last event on the programme was flown off, this being the August Open Handicap of 16 miles (two laps); first prize £30, second prize £10. Six machines lined up for this event as follows:—B. Hinkler (Avro Baby), 4 mins. 49 secs.; Maj. C. Draper (110 Le Rhone Avro), 4 mins. 24 secs.; A. S. Butler (D.H.37), 1 min. 9 secs.; Flight-Lieut. Robb and Flight-Lieut. Longton (both on S.E.5a's), 32 secs.; R. H. Stocken (Martinsyde F.4), scratch.

On completing his first lap Hinkler came down and retired, and as Draper's Avro did not start, this left four machines in the race. Longton was leading at the end of the first lap, Butler being next, with Robb close behind, but Stocken was some distance behind. Robb overhauled Butler towards the finish, but did not pass Longton; the order of finishing was thus Longton, Robb, Butler and Stocken.

The Mars I is doped with the "Titanine" blue and white racing scheme.

RESULTS OF SEVENTH AERIAL DERBY, AUGUST 7, 1922

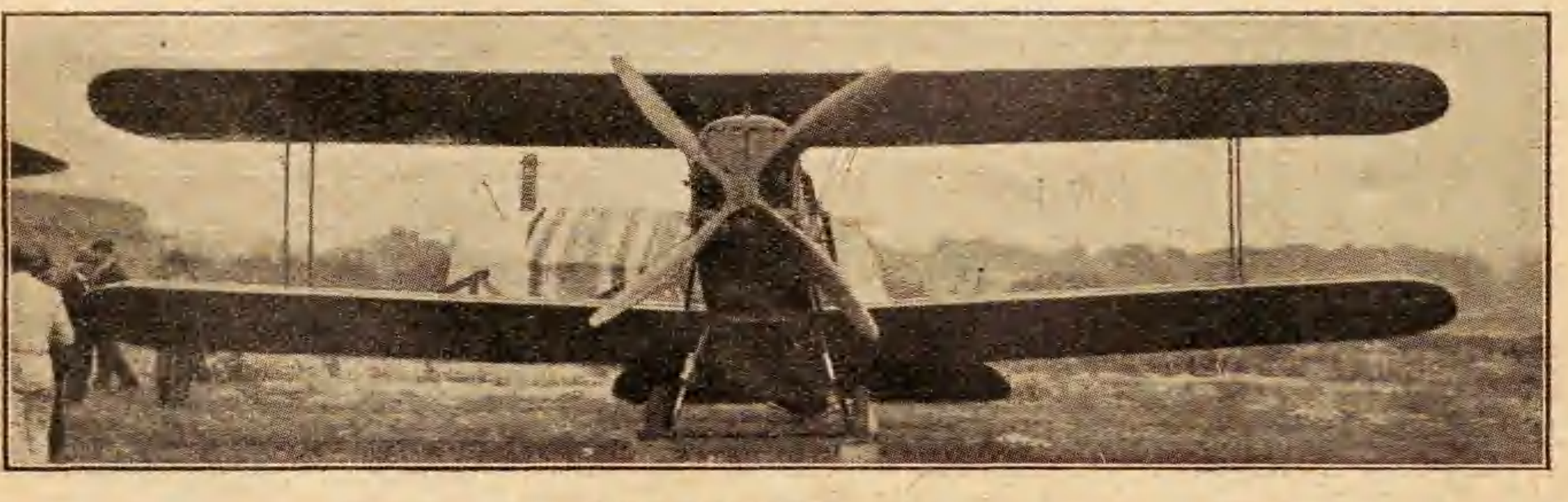
No.	Pilot.	Machine.	Engine.	Handicap Allowance.	Time of Starting.	First Lap (99 miles).		Second Lap (99 miles).		Total Time.	Speed.	Position.	
						Flying Time and Position.	Speed.	Flying Time.	Speed.			Fastest Time.	Handcap.
				h. m. s.	h. m. s.	h. m s.	m.p.h.	h. m. s.	m.p.h.	h. m. s.	m.p.h.		
1	Hinkler ..	Avro "Baby" ..	35 Green ..	1 22 34	1 52 26	1 17 $28\frac{4}{5}$ (1)	76.7	1 17 $35\frac{1}{5}$	76.5	2 35 4	76.6	5	—
2	Carter ..	Bristol Monoplane ..	100 B. Lucifer ..	0 47 9	2 27 51	0 55 $18\frac{3}{5}$ (2)	107	0 54 $42\frac{1}{5}$	108.7	1 50 $0\frac{4}{5}$	107.85	4	1
3	Raynham ..	Martinsyde F.6 ..	200 W.V. ..	0 39 35	2 35 28	0 54 57 (3)	108	0 53 25	111.2	1 48 12	109.6	3	—
4	Butler ..	D.H. 37 ..	275 R.-R. ..	0 34 34	2 40 26 (late)	0 54 55 (8)	108.1	Retired		—	—	—	—
7	Tait-Cox ..	Mars III ..	200 B.R. 2 ..	0 31 53	2 43 7	0 57 37 (5)	103.2	Retired		—	—	—	—
5	Per y ..	S.E. 5A ..	200 W.V. ..	0 31 34	2 43 26	1 0 54 (6)	97.5	—	—	—	—	—	—
6	Stocken ..	Martinsyde F.4 ..	300 H.S. ..	0 28 38	2 46 22		Landed Hounslow, engine trouble.						
8	Haig ..	Bristol Bullet ..	400 B.J. ..	0 18 43	2 56 17	0 39 32 (4)	150	0 42 25	140	1 21 57	145	2	2
9	James ..	Mars I ..	450 N.L. ..	0 3 29	3 11 31	0 33 34 (7)	177	0 33 $14\frac{3}{5}$	178.7	1 6 $48\frac{2}{5}$	177.85	1	3

B.=Bristol; W.V.=Wolseley Viper; R.R.=Rolls-Royce; H.S.=Hispano-Suiza; B.J.=Bristol Jupiter; N.L.=Napier "Lion."

THE D.H.37

275 H.P. Rolls-Royce "Falcon" Engine

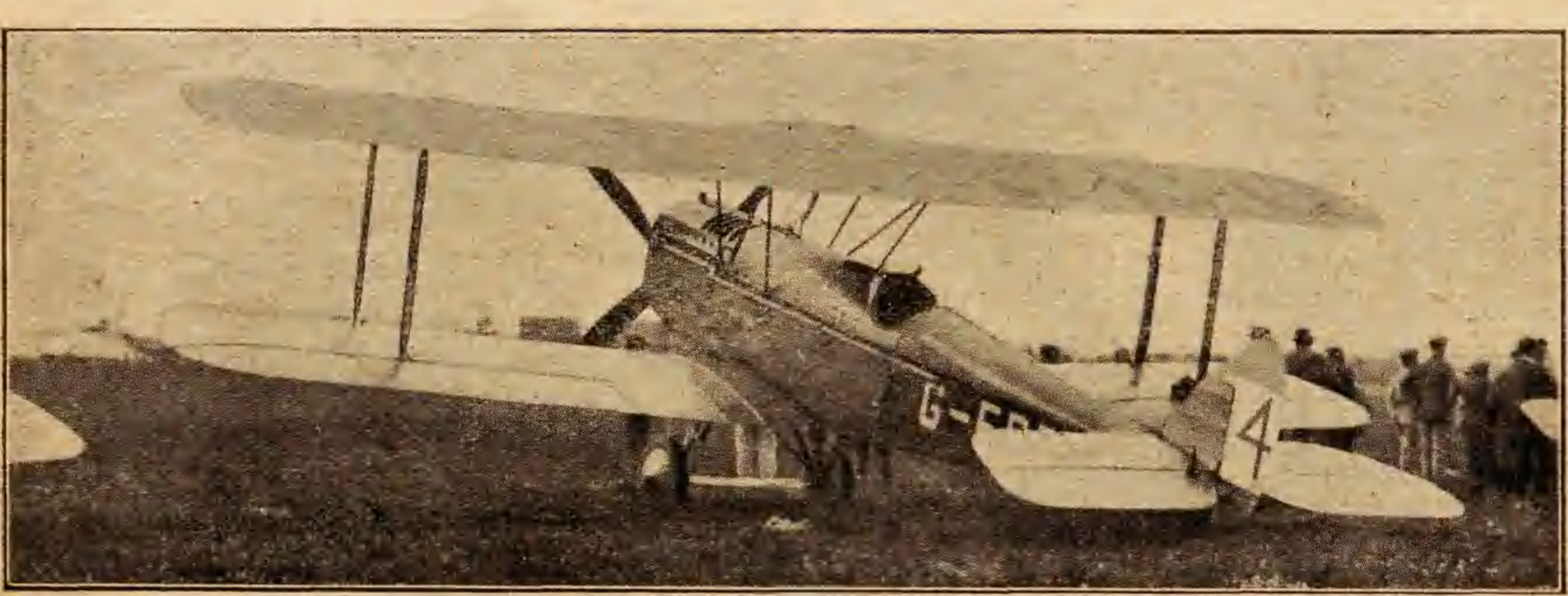
To the casual observer the new de Havilland 37, built for Mr. A. S. Butler as a fast sporting and touring machine, might appear to be just a common, straightforward tractor biplane without any very pronounced novel features and offering no field for speculation as to the merits or otherwise of its peculiar points; and from his point of view the casual observer would be correct. The 37 is a very straightforward design on orthodox lines, showing neither metal construction, cantilever wings, variable lift devices, nor semi-Diesel power plant, to mention but a few of the problems which are so prominently to the front at the present time. Nor is the machine a helicopter (although its climb is distinctly good). While thus the uninitiated might pass it by with but a cursory glance, except for its rather pleasing lines, there is much of interest to be found by those who like to look below the surface, as it were, in order to discover the ideas which were in the designer's mind, the objects at which he aimed and the methods adopted for attaining them. Viewed from this angle the new D.H.37 assumes a different aspect, and it is in this light that we propose to review its features.



THE D.H.37 : Front view.

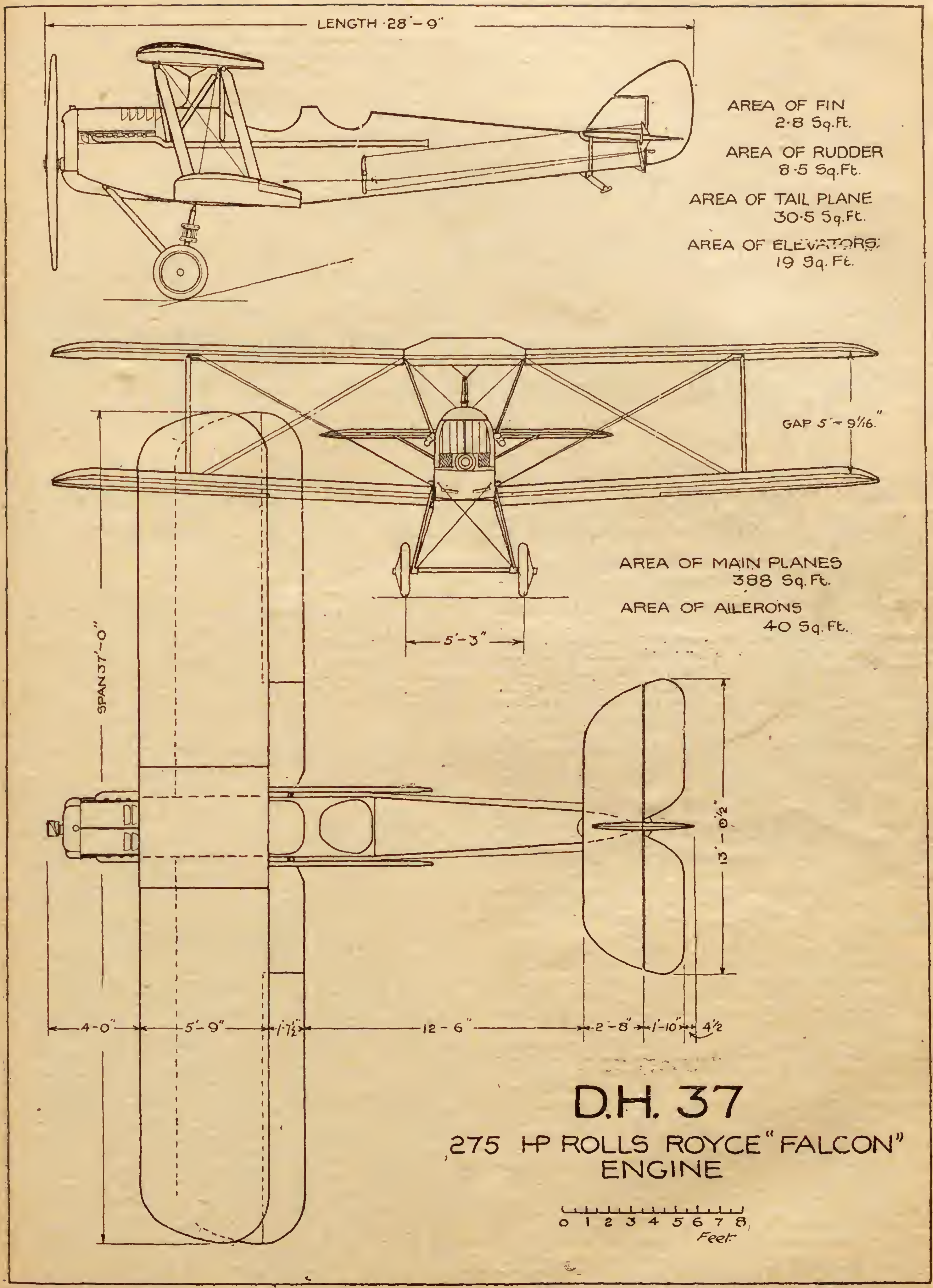
Designed in the first place as a machine on which the owner can go touring and take with him one or two friends, the 37 has accommodation for two passengers in addition to the pilot. As the owner may occasionally wish to take part in races, the machine must have a fairly good performance when flown light. In view of the fact that flights of considerable duration may occasionally be undertaken, the tankage must be generous. As duration is largely determined by the size of power plant, not to mention the effect on running costs of the size of engine, the smallest engine which will give the desired performance must be installed. And finally, the whole outfit must be as simple as possible so as to be easy to maintain and with a minimum of parts likely to get out of order. These were, briefly, the considerations with which the designers were faced when starting the design. Let us, next, examine their solution of the problems, as exemplified in the finished machine.

An inspection of the accompanying scale drawings and photographs will reveal the fact that the D.H.37 is of very pleasing outline and of very clean design, and that it represents, perhaps, the maximum of refinement that is possible with a flat-sided fuselage and braced wings. Simplicity of construction was, as has already been pointed out, one of the desiderata, and the flat-sided, ply-wood covered body is considered to give this simplicity to the maximum extent. It might be pointed out that a similar construction is used in the D.H.34's, one of which has just completed close upon 60,000 miles during three months' flying, so that as regards robustness and hard-wearing qualities the ply-wood covered body appears to be entirely suitable. The absence of wire bracing (with the exception of the engine bays, where cable bracing is used in the bottom panels) avoids the necessity for keeping the body trued up after prolonged use, while there is no fabric to become slack or torn.



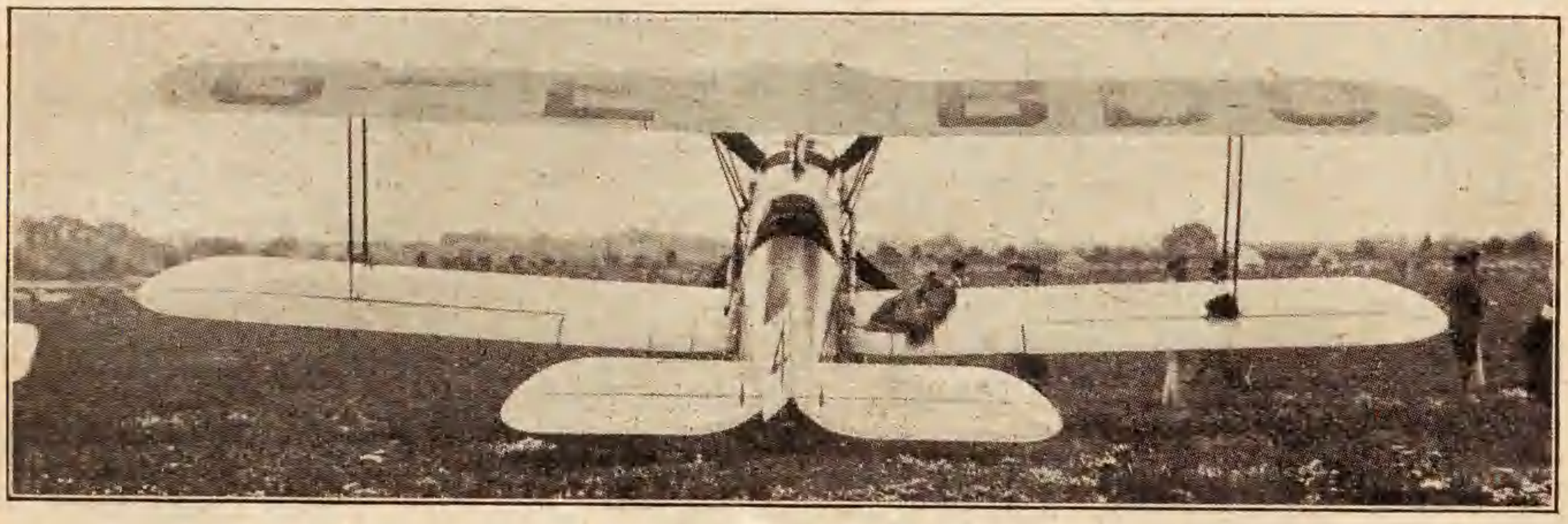
THE D.H.37 : Three-quarter rear view.

The simplicity of the wing bracing is attained by using a fairly thick wing section, which allows of using but one pair


LENGTH 28'-9"
AREA OF FIN 2·8 Sq.Ft.
AREA OF RUDDER 8·5 Sq.Ft.
AREA OF TAIL PLANE 30·5 Sq.Ft.
AREA OF ELEVATORS: 19 Sq. Ft.
GAP 5'-9 1/16"
AREA OF MAIN PLANES 388 Sq. Ft.
AREA OF AILERONS 40 Sq. Ft.
5'-3"
SPAN 37'-0"
13'-0½"
4-0"
5'-9"
1'-7½"
12-6"
2'-8"
1'-10"
4½
D.H. 37
275 HP ROLLS ROYCE "FALCON" ENGINE
0 1 2 3 4 5 6 7 8
Feet

THE DE HAVILLAND 37 : General Arrangement drawings.

of interplane struts on each side. This section—which is, we believe, similar to that used on the D.H.34—is one of the air-screw sections, with flat lower surface giving good spar depth. Constructionally the wings are of standard D.H. type, with spruce spars (laminated) and ribs. The two halves of the top plane are secured to the centre section by vertical bolts and external fish-plates, while the lower wings attach to the sides of the fuselage by built-up sheet-steel forked plates. The top centre section is carried on raked steel struts of N formation, the sloping member of the N having threaded ends for adjustment.



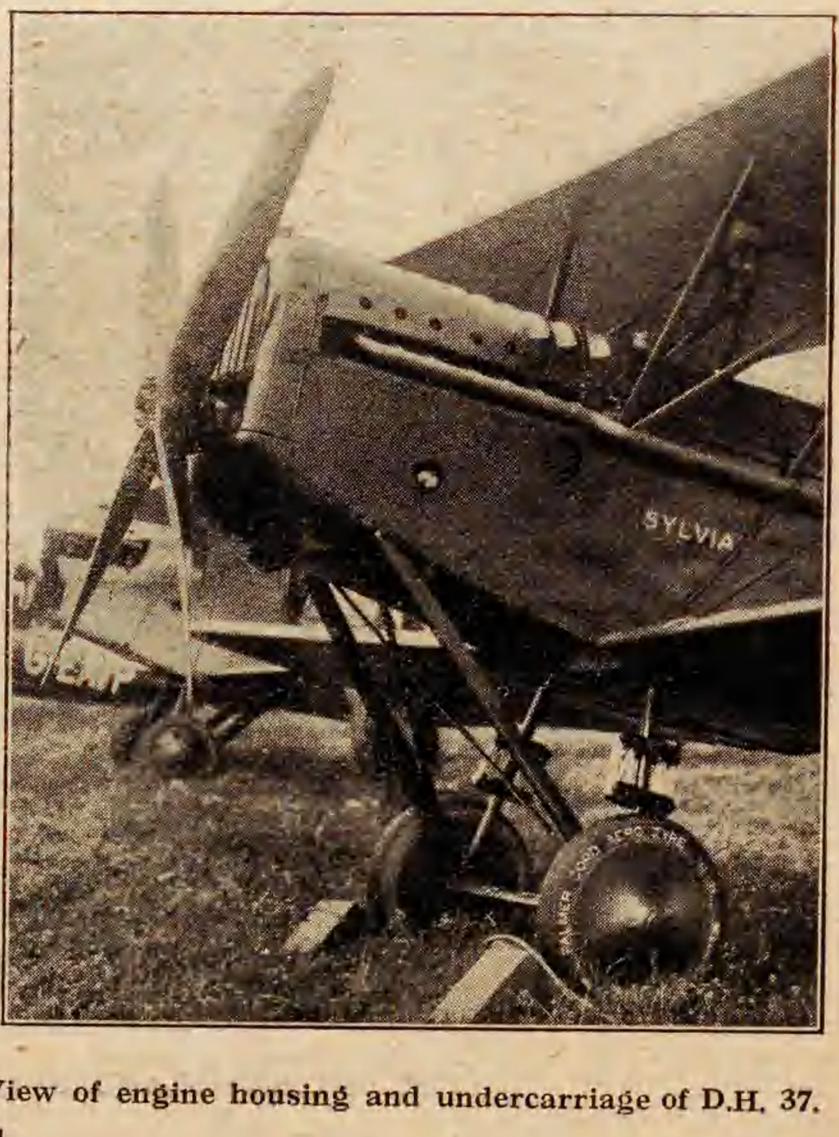
THE D.H.37 : Rear view.

A peculiarity of the 37 as compared with previous de Havilland designs is that ailerons are fitted to the bottom plane only. This results in considerable simplification of the controls, as well as leaving the top plane solid, and if sufficient lateral control can be maintained with two large ailerons on the lower plane, the system has much to recommend it. One reason for expecting that two ailerons will suffice is that the differential movement of the ailerons, which was first tried, with success, in the D.H.29 monoplane, has been incorporated. It will be recalled that with this system of lateral control the cranks are so arranged that one aileron moves through a greater angle in going up than does the opposite one in going down. The result is that one aileron acts as a balance for the other, rendering the load on the control column small even when a large aileron angle is obtained for a small angle of control column movement. This is one advantage. Another is that with this system a spin is less likely to be precipitated when using the ailerons at large angles of incidence, *i.e.*, near the stalling speed of the machine. The fitting of straight control cables and ball bearings in the controls further tend to give easy working of the controls.

The controls are so arranged that the aileron cables pass straight from the fuselage to chains over sprockets in the lower wings, no pulleys being used anywhere. Small cranks on these sprockets are so set in relation to one another as to give the differential movement to the ailerons. The elevator control incorporates a transverse shaft behind the pilot, from external cranks on which cables run straight to the elevator king posts, no fairleads being required. The transverse shaft is carried on external ball-bearings, the latter being covered by streamline casings of aluminium. In the case of the rudder cables a slight change of angle is necessary, and a length of rod of ample diameter, working in a guide on the outside of the fuselage, is therefore incorporated in the cable. With regard to the rudder, it is of interest to note that the king post is not, as in the majority of machines, passed through the rudder and secured to the leading edge by an elaborate fitting, but is in two halves, bolted to a stout block of wood screwed and glued to the leading edge of the rudder. Thus when storing spare rudders the king posts can easily be removed without interfering with the fabric covering, and not only is less space then taken up by the rudder, but there is no risk of bending the king posts or puncturing with them the fabric of another rudder packed in the same case or stored in an adjacent rack, as frequently happens when the king posts are left *in situ* on the rudders. It may be thought that such points as these are of minor importance, but in practice they amount to a good deal, and in the 37 it is by close attention to such "minor" points that the chief merit of the design lies.

While on the subject of control surfaces it might be mentioned that the ailerons are of somewhat unusual construction, especially as regards their leading edges. Fundamentally these consist of the usual channel section spruce spars, with their flat, closed side facing the rear spars. In order to obtain greater torsional stiffness this channel section has been reinforced by a horizontal U screwed and glued to the aileron leading edge. As the three-ply strip used is quite thin (only about $\frac{1}{16}$ in.), the reinforcement adds but very little to the weight of the aileron, but the increase in torsional stiffness is extraordinarily great. The aileron ribs are, of course, shaped at the front to fit the curve of the three-ply strip.

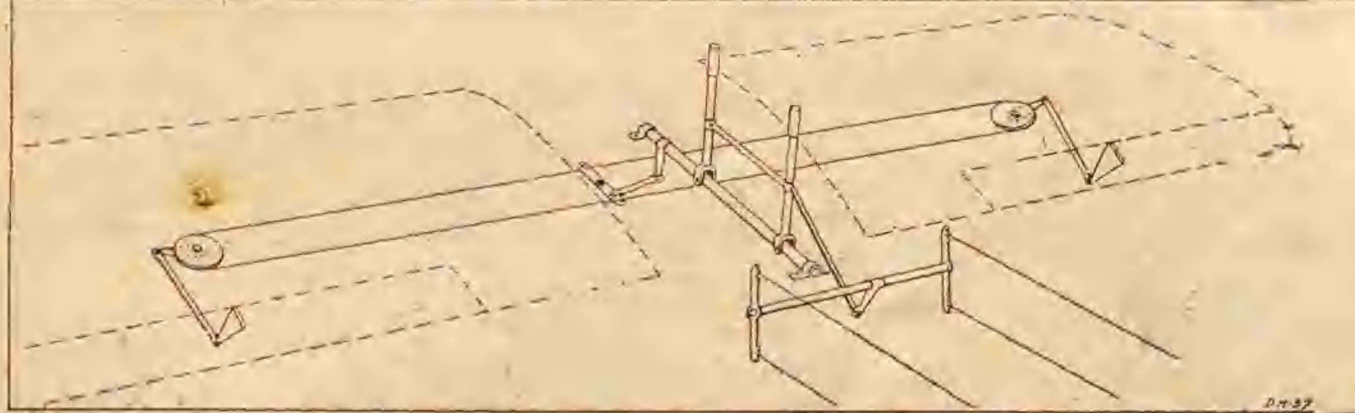
Reference has already been made to the fact that the D.H.37 has accommodation for two passengers in addition to the pilot. The latter occupies the aft cockpit, well clear of the wings, where his view is but very slightly obstructed. Just in front of him is the passengers' cockpit, which is somewhat longer, the passengers sitting tandem fashion. Dual controls are provided, but the control tube in the front cockpit can be removed by pulling it out of its socket. Both



View of engine housing and undercarriage of D.H. 37.

foot bars are provided with adjustable pedals, so as to enable adjustment to be made for pilots of different height. A very complete instrument board is placed in front of the pilot, and we noticed that the outfit included one of the Vickers-Reid turn indicators. It might be added that, although not actually fitted up with wireless, the machine has all the wiring necessary for its installation, should the owner desire to fit a set later on.

The petrol system is interesting inasmuch as it combines direct gravity feed with ample tankage. The ideal would, of course, be to have all the petrol in the top centre section, but in order to do so it would be necessary to make the centre section very deep and unsightly, and, probably, bad aerodynamically. As the owner wished to have large tankage it was necessary to compromise, and consequently the top centre section has been built up as a gravity tank holding 40 gallons of petrol, while another tank of similar capacity is housed under the deck fairing of the fuselage, in front of the passengers' cockpit. Normally the machine is flown on the gravity tank, but if the supply is beginning to run low, as shown by the petrol indicator, a pump driven by the engine supplies pressure to the fuselage tank, and petrol is forced up into the gravity tank. The main objection to the pressure petrol system is that, with large main tanks and a very small header tank, the pumps have to be in operation almost continuously. With the present system this is not so, and there appears to be no reason to expect that any trouble will arise in connection with the fuel supply, the gravity tank being as large as it is. Thus, while departing from the theoretical ideal, the petrol supply of the D.H.37 will probably be found in practice as reliable as the pure gravity system. It might be mentioned incidentally that all the petrol leads are in the form of "Petroflex" tubing, which combines flexibility with imperviousness to the action of petrol.



The D.H.37: Diagrammatic perspective sketch of the aileron and elevator controls. All controls work in ball bearings.

The engine mounting for the Rolls-Royce "Falcon" engine is very simple, the two tubular engine bearers resting on brackets bolted to the vertical struts of the fuselage, and being braced diagonally by short tubes of smaller diameter. The oil tanks are slung, one on each side of the lower portion of the crank-case, below the engine. The radiator, placed in the nose, straddles the reduction gear of the engine, and is remarkable for the fact that it is built up as a unit with its header tank and side frames. The ordinary practice of having a separate cowling is apt to give trouble, and by making the side frames and top of slightly thicker metal the whole unit is made very rigid, there is nothing loose to come adrift, and altogether a lot of trouble is avoided. The radiator itself is slung from the nose of the fuselage on trunnions, so that vibrations are not likely to affect it, while at the same time the removal of the radiator by undoing the trunnion bolts is a very quick operation.

The undercarriage is of similar type to that used so successfully on the D.H.34, *i.e.*, a combination of rubber shock absorbers and oleo gear mounted on the rear legs of two Vees. The undercarriage is high, so as to give a quick get-off and, especially, rapid pulling up on landing. A feature of this undercarriage, apart from the combination of rubber and oleo gear, is that if the machine is landed with a slight side drift on and the wheel on the side towards which the machine is drifting touches before the other, the axle, hinged as it is by radius rods formed by the front members of the Vees, travels in such a way as to tend to direct the wheels along the path travelled by the machine. Thus the tendency to turn over on to a wing tip is reduced. Another advantage of this type of undercarriage is, of course, that a very much longer travel, and therefore better shock-absorbing quality, is provided.

The main characteristics of the D.H.37 are as follows, the weights stated being estimated, as are also the figures relating to performance :—Length over all, 28 ft. 9 ins.; span, 37 ft.; chord, 5 ft. 9 ins.; gap, 5 ft. 9 ins.; wing area, 388 sq. ft.; weight of machine empty, 2,118 lbs.; petrol and oil, 330 lbs.; pilot, 170 lbs.; disposable load, 700 lbs.; weight fully loaded, 3,318 lbs.; wing loading, 8.55 lbs./sq. ft.; power loading (based upon 275 h.p.), 12 lbs./h.p.; speed at 10,000 ft., 122 m.p.h.; climb to 10,000 ft. in 11 minutes; service ceiling, 21,000 ft. In the Derby the D.H. 37 did not get a chance, the start being delayed by ignition trouble.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JULY 30 AND AUGUST 5, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h m.		
Croydon–Paris	56	192	21	43	52	2 40	D.H. 34 G-EBBS (1h. 56m.)	B. (4), D.H. 18 (1), D.H. 34 (5), G. (9), H.P. W.8B (3), Sp. (4).
Paris–Croydon	56	134	10	32	54	2 55	D.H. 34 G-EBBS (2h. 5m.)	B. (5), D.H. 18 (1), D.H. 34 (5), G. (9), H.P. W.8B (3), Sp. (4), Vu. (1).
Croydon–Brussels ...	12	65	7	10	12	2 35	D.H. 34 G-EBBR (2h. 6m.)	D.H. 34 (3), Vi. (1), Vu. (1), W. (1)-
Brussels–Croydon ...	11	43	—	3	10	2 38	D.H. 34 G-EBBR (2h. 13m.)	D.H. 34 (3), Vi. (1), Vu. (2), W. (1).
Croydon–Rotterdam–Amsterdam.	11	11	11	11	11	2 27	Fokker H-NABM (1h. 58m.)	F. (7).
Amsterdam–Rotterdam–Croydon.	11	11	11	11	11	2 40	Fokker H-NABS (2h. 2m.)	F. (7).
Totals for week. ...	157	456	60	110	150			

Incidental Flying.—During the week the De Havilland Co. maintained their daily service between Lympne–Ostend, with three trips a day each way, and using one D.H. 16 and two D.H. 9's. The Surrey Flying Service Avro also made a return trip (2 pass.) between Croydon–Ostend.

THE NEW AVELINE AUTOMATIC PILOT

SINCE our description in FLIGHT for February 3, 1921, of the Aveline Automatic Pilot considerable progress has been made with this extremely ingenious and successful instrument, and Auto Controls of 10, Heddon Street, W. 1, have just produced a new model, which is a considerable improvement on the original type.

It is not, at the present moment, our intention to give a detailed description of this instrument, as the article referred to above provides all the necessary information on this point. We will, however, just briefly outline the fundamental principle on which the Automatic Pilot is based.

Primarily the Automatic Pilot is composed of three principal components: (1) A windmill air compressor, with air reservoir, pressure gauge and safety valve. (2) Compressed air-operated cylinders containing pistons operating the *aileron* or elevator control. (3) The brim of the instrument, comprising what is practically a mercury inclinometer which, through the medium of electric relay and electromagnetic circuits, brings into operation the power cylinders and pistons operating the controls when the attitude of the machine calls for correction. It may be added that, as the machine inclines, and, therefore, the semi-circular tube containing the mercury, the latter establishes electrical contact on the side to which inclination takes place and the corresponding coil of the relay is energised.

The latest model of the Automatic Pilot is suitable not only for large machines, such as the Handley Page, or Farman Goliath, but, owing to its reduced weight, can also be used on smaller three or four-seater machines.

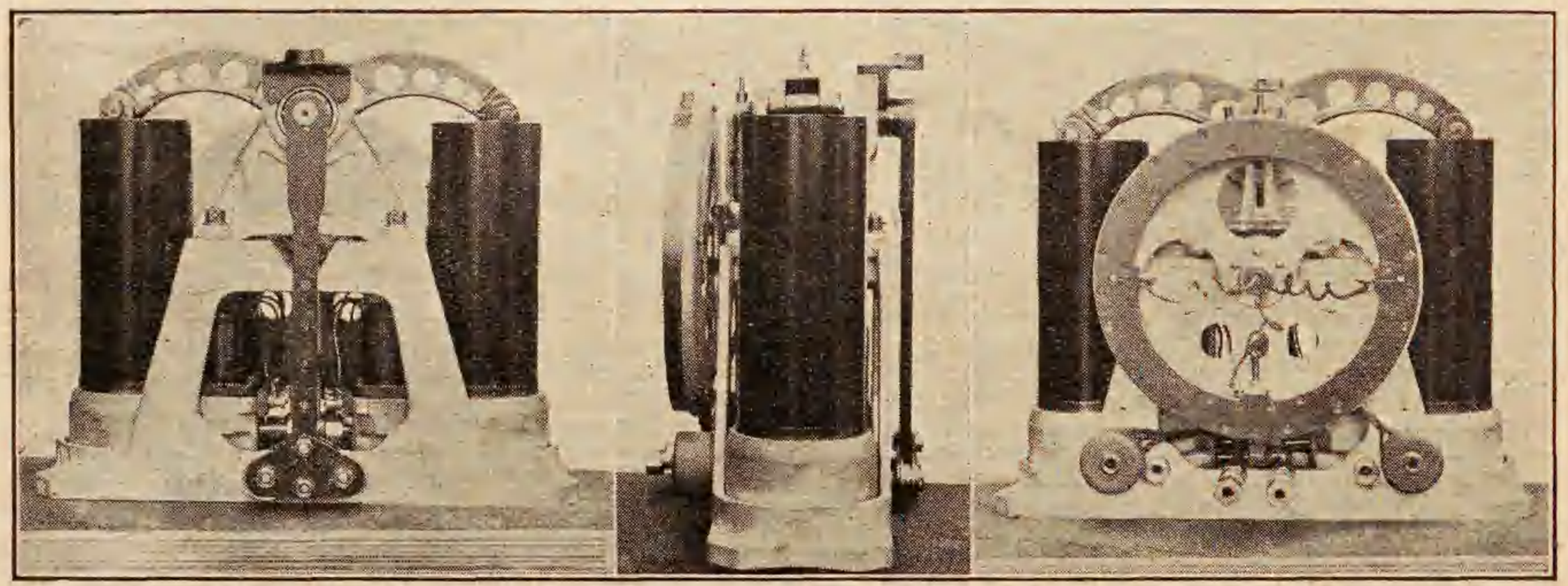
The weight of the main unit is 25 lbs., as against 43 lbs. for the large size, and a single installation, with all the necessary equipment, including air tank and air pump, weighs approximately 50 lbs. A complete set comprising lateral and longitudinal stabilisers comes out at about 88 lbs., as against 145 lbs. in the case of the larger type.

Besides numerous minor improvements and adjustments which simplify its operation by the pilot, all electrical mechanism, wiring and tubing are easily get-at-able, and at the same time are out of the way, so that they are not liable to be damaged in the aeroplane.

The following comparative overall dimensions of the large and small types may be of interest: Length, large, 2 ft. 2¾ ins.; small, 1 ft. 1¾ ins. Width, large, 3¾ ins.; small, 6½ ins. Height, large, 7¾ ins.; small, 11½ ins.

This new model has satisfactorily stood a very severe bench test, and the one fitted to a Vickers "Vimy" with which the Air Ministry are carrying out tests has so far proved satisfactory.

That the Automatic Pilot is a thoroughly practical invention is borne out when it is stated that the earliest models made under the Aveline patents were tested by the British Government during a period of two years, and the Air Ministry then bought twelve stabilisers for further trials, now being conducted on different types of aircraft. The official reports describe the stabiliser as satisfactory for the purpose for which it was designed, and as the best appliance of its kind now available. Furthermore, Automatic Pilots for trial in military aviation have been bought by the French, Japanese, and U.S. Governments, whilst it has been satisfactorily applied to large commercial aeroplanes, both in England and France. The Farman Goliath which recently made a night trip between Paris and London was fitted with an Aveline Automatic Pilot.



THE AVELINE AUTOMATIC PILOT. Three views of the latest model, which is about half the weight of the earlier and larger type.

APRIL-JUNE AIR TRAFFIC RETURNS

THE returns of air traffic on the cross-Channel routes to Paris, Brussels and Amsterdam, during the three months April–June, are now available from the Air Ministry.

During this quarter 764 machines departed from the London Terminal Aerodrome, Croydon, and 768 machines arrived, the total number using the aerodrome on Continental services being 1,532. This is a considerable increase on the figures for the same period last year, when 506 machines departed and 495 arrived.

The majority of machines were of British nationality, belonging to the Handley Page Transport, Ltd., the Instone Air Line, and Daimler Hire, Ltd. The figures by nationality are:—British, 915; French, 228; and Dutch, 189. Last year British machines numbered only 246 out of a total of 1,001 machines using the aerodrome.

The total number of passengers carried during the period was 3,128, and is a slight decline on the total of 3,565 carried a year ago. The proportion carried by British companies has, however, greatly increased, 2,402 travelling in British machines against 1,653 in the same period last year. British traffic therefore amounted to 76.8 per cent. of the total, whereas last year it was only 46.4 per cent.

The total weight of goods carried by aircraft to and from Croydon was 144 tons, which is a large increase on last year, when the figure was 56.9 tons. Half of this total was carried by French machines, but the British share of the traffic shows the largest proportionate increase, 53.6 tons having been transported by British machines against 4.9 tons a year ago.

The efficiency of British air services continues to be of a high standard. In April the efficiency of flights made and completed within four hours by British machines on the London–Paris route was 92.3 per cent. For May the figure was the same, and for June it rose to 95.2 per cent. The figures for French machines during the same period on the same basis were:—April, 71.3 per cent.; May, 85 per cent.; and June, 79.1 per cent.

Notwithstanding these figures it has to be noted, however, as stated in the last half-yearly report on Civil Aviation, that a considerable increase in traffic is essential if Air Transport firms are to obtain a commercial basis of operation, the passenger accommodation occupied on British machines being only 37 per cent. in April, 30 per cent. in May, and 31 per cent. in June, and the useful cargo capacity used only 44 per cent. in April, 44 per cent. in May, and 40 per cent. in June.

LONDON TERMINAL AERODROME

Monday evening, August 7, 1922.

THERE was a big influx of passengers during the week-end, both to and from the Continent. On Saturday 135 people were carried by the various companies, and the Sunday services were filled to capacity.

Handley Page Transport were in the unfortunate position on Sunday of having a full load for their service to Paris, and, owing to a last-minute breakdown, they had no machine to carry them. The Daimler Airway obligingly came to the rescue, and put an extra D.H.34 on the service to carry the Handley Page passengers.

Mr. Courtney has now got his Boulton and Paul "air taxi" at the air-station, and will, he hopes, be in a position to accept special bookings early this week. He is, for the moment, being held up by the customary A.I.D. formalities. This machine is a general-purpose craft. It is fitted with an R.A.F. engine, and is equipped with dual-control for tuition work. As an air taxi it seats two, and there is ample room for baggage in the fairing behind the back seat.

Handley Page Transport schedule a 4 p.m. service to and from Paris as from Friday last. It has been found that the general run of American tourists, who still form the bulk of the passengers, would rather travel in the afternoon. In sharp contrast to this is the experience which is now being gained with the early morning newspaper services. The Daimler Airway are finding that there is an appreciable demand for seats on this service, but that the people travelling by it are business men who are really in a hurry, and who appreciate the value of getting to Paris before 8 a.m. and yet being able to be in London at a late hour the night before, and, in addition, to have a good night's rest. This fact was, incidentally, borne out by the experience of the K.L.M. when they were running the early morning newspaper machine to the Hague Conference, Capt. Leverton having quite a number of people who travelled on this machine ringing up to book tickets for another journey and being quite disappointed when they found the early morning service was not now running.

The additions to the control-tower which are being made to accommodate the sound-ranging apparatus are now nearly complete, and the tower is beginning to look an imposing structure. In the past it has been a disappointment to many who saw it for the first time, but now there is some justification for the use of the word "tower."

Rumours of Subsidy Changes

RUMOUR has been busy during the week with a statement that the Air Ministry are considering an alteration in the rules governing the subsidy. It is suggested that, with the commencement of the next flying season, the arrangements whereby there are three British firms running on the London–Paris route will be modified, and that each of these three firms will be allocated a separate route, one being London–Paris, another London–Brussels, and the other London-Cologne—with an extension to Berlin. This last-mentioned route would appear to be merely an extension of the London–Brussels line, which leaves one firm with nowhere to go. Also, naturally, each one will want to be running London–Paris as the established route upon which it is known there are enough passengers for one company. Apart from this, however, the scheme has much to recommend it, and I am able to say that there is some foundation for the rumour, although no definite decision has, as yet, been arrived at.

London to Marseilles by Air

TODAY saw the opening of the London–Marseilles service by the Messageries Aériennes. From now onwards machines will leave the air-station at 8 a.m. each Monday and Friday, and are scheduled to reach Marseilles at 5.10 p.m. There will be halts at Paris and Lyons—the actual flying time being 7½ hours. The return journey will be started at 9 a.m. on Tuesdays and Saturdays, London being reached at 6.30 p.m. Both Hispano "Spads" and "Goliaths" are to be used on this service, which will be run in three stages—London–Paris, Paris–Lyons, Lyons–Marseilles.

On Monday last Mr. Fokker, the famous Dutch aeroplane designer and constructor, visited the aerodrome to inspect the Daimler "express," G-EBBS, which has now completed 60,000 miles, and also to inspect the new Daimler Airway engine-testing plant. He was distinctly impressed by both, and was busily picking up hints from the Daimler organisation to use on his projected services in America next spring.

The weather is persistently against the Surrey Flying Services, and this week-end was no exception to this rule. In spite of this, however, they had a good number of joy-riders on Saturday, but Sunday was distinctly poor. Monday, of course, was entirely spoilt from their point of view, as the public were excluded from the aerodrome. This is one of the minor tragedies of holding race meetings at Croydon.

Seaplane Flight Round the World

CAPT. R. H. MACINTOSH, a Handley Page pilot, is to make an attempt, in company with another pilot and a navigator, to fly round the world in a seaplane. His companions will be Capt. MacCloughrey, D.S.O., and Capt. Tymms, M.C., of the Air Ministry, who will act as navigator. The seaplane is being built specially at the Fairey Aviation Company's works, and will be fitted with a 600 h.p. Rolls-Royce "Condor" engine.

An interesting visitor arrived at the aerodrome on Thursday in the person of little five-years-old George Risser, the son of one of the pilots of the Grands Express "Goliaths." He has already flown upwards of 5,000 miles, visiting by air Strassburg, Prague, Vienna, Warsaw and Bucharest, while during the week-end he flew with his father to Lausanne.

The Instone Air Line have now repaired the Vickers "Vimy," and one of the "Vulcans," which met with misfortune last week, and the Daimler Airways have received G-EBBU back from Stag Lane, where she has been rebuilt following the smash-up between the two D.H.34's in May. During the week the Instone Air Line carried an ecclesiastical load, consisting of one bishop and three clergymen, to Paris, and it is now suggested at the aerodrome that this will have broken their run of ill-luck.

The Messageries Aériennes are making determined efforts to capture the entire goods service between London and Paris and beyond. They have a goods collection and delivery service which is far ahead of anything previously attempted in air transport. A special van does nothing but run backwards and forwards between the aerodrome and London, picking up outward goods at the C.M.A. office in the Haymarket, and leaving all inward goods there. A fleet of motor-vans is constantly touring round the various agencies in London, and to customers, picking up and delivering the goods, the Haymarket office acting as a general clearing house.

Air Cadetships

THE following are declared by the Civil Service Commissioners to be the successful candidates at the competitive examinations held last June for admission to the R.A.F. Cadet College, but their admission is conditional on their having passed the medical examination. A table of marks will be sent to each candidate as soon as possible.

Name.	Marks.	Name.	Marks.
*Elias, A. W.	8,595	Woode, C. S. M.	6,177
Don, J. C.	8,504	*Waghorn, H. R. D.	6,017
*Brookes, H. H.	8,332	*Tillard, L. R. W.	5,371
Amers, J. H.	8,143	*Selwyn, F. E. J.	5,344
Bowles, J. E. W.	7,640	*Soames, T.	5,200
*Showers, L. J. G.	7,377	Macleod, H. G.	5,072
*Boyle, D. A.	7,083	Terry, P. McK.	5.037
Bonham-Carter, J. H.	6,742	Blackett, C. D.	4,823
*Montgomery, A. H.	6,655	Matthews, G. S. C.	4,814
Honorary King's Cadets who have qualified			
*Atcherley, D. F. W.	6,122	*Atcherley, R. Ll. R.	4,791

* These candidates have received marks for military efficiency.

Gordon Shephard Memorial Prize Essays, 1922

THE following subjects for essays have been selected for this year's competition for the Gordon Shephard Memorial Prize :—

(1) The use and employment of aircraft in open, as opposed to trench, warfare against a similarly equipped enemy.

(2) The employment of aircraft before and during a Fleet action.

Separate prizes will be awarded for each of the two essays. The competition is open to all Royal Air Force officers, N.C.Os. and men.

Gordon-Bennett Balloon Race

NINETEEN balloons started, on August 6, from Geneva for the Gordon-Bennett Balloon Race. One of the British competitors, the balloon which was to have been piloted by Lt.-Col. Dunville, did not start. Mr. Griffith Brewer is reported to have landed at 1 a.m. on August 7 at a point between Affoltern-am-Albis and Hedingen, near Zurich, while Mr. Ernest Allen alighted at 8.45 a.m. near Kühback in Bavaria.

THE SEAPLANE FLIGHT AROUND THE WORLD

Fairey Seaplane with Rolls-Royce "Condor" to be Used

As an up-to-date method of "showing the flag," a flight around the world should do much to uphold the prestige of British aviation. It is, therefore, with satisfaction that we learn of the proposed attempt, under the auspices of the Air League of the British Empire, by three young British aviators to circle the globe. The machine which it is proposed to use is a Fairey seaplane of the twin-float type, and the machine will be driven by a 600 h.p. Rolls-Royce "Condor" engine. The three aviators who are to make the attempt are Capt. Macintosh, who has for so long been associated with the Handley Page London-Paris air services; Capt. Tymms, of the Air Ministry Navigation Department; and Capt. McCloughry, of the Australian Flying Corps. All three men selected for the flight appear to have been well chosen. Certainly Capt. Macintosh has had unique experience of flying under all sorts of weather conditions, and he has on several occasions succeeded in bringing Handley Page machines across the Channel in weather which kept the Channel steamers in port. We do not know how much experience Capt. Macintosh has had of seaplane flying, but as the machine to be used is a twin-float seaplane, its handling should not be so very different from that of a land machine.

Regarding the machine itself, but little information is available at the moment; but it will probably follow fairly closely upon the lines of the long-distance machine on which the Portuguese aviators Cabral and Coutinho started out on their trans-Atlantic flight from Lisbon. Thus the type has been thoroughly tried out, and the lessons learned with the first machine should enable the constructors to incorporate any improvements which experience with the first machine may have suggested. We understand that the twin-float seaplane has been chosen mainly because in case of damage it is easier to repair or replace a float than it is to repair the hull of a flying boat. We do not know if it is the intention of the aviators to fit a land undercarriage for some of the stages of the flight, but it would appear that to do so would be a fairly simple procedure, and, in a measure, the effect would be similar to that of using an amphibian machine, but with the difference that the amphibian gear would not have to be carried on board. Needless to say, the machine will be very fully equipped with all modern instruments, and a wireless set of good range will be carried.

The Rolls-Royce "Condor" is, at the moment, not so thoroughly tested out as is the famous "Eagle," which has the trans-Atlantic flights, the Cairo-Cape flight, and the London-Australia flight to its credit. As it is, except for size, designed very much on the lines of the "Eagle," there is no reason to think that it will not worthily uphold Rolls-Royce traditions, especially as, we understand, for most of the stages it will not be necessary to run it at anything like its full power. The most difficult parts of the journey will be from Kamchatka to Canada, and from America to Europe; and for the first part of these stages it is possible that the engine may have to be run nearly all out, until some of the fuel has been consumed. As, however, the "Condor" is very sturdily built it should be able to do this safely for the required length of time. At present the engine is, it will be remembered, being tried out in the Avro "Aldershot," which made its first public appearance at the Pageant at Hendon.

The route to be followed has not yet definitely been decided upon, but it will be from west to east. The Air Ministry has promised all possible assistance in the way of meteorological and wireless assistance, and it is, we believe, intended to send a spare engine out to Japan. Otherwise it is hoped to be able to complete the whole flight on the same machine. No doubt a few spares will be judiciously distributed along the route.

The actual date of starting has not yet been decided upon, but it appears probable that a start will be made early next year, possibly in January or February, and it is hoped to complete the tour of the world in about three months. We hope to be able to supplement these brief notes with further details later on.

IN PARLIAMENT

R.A.F. Reserve Annual Training

Viscount Curzon, on August 1, asked the Secretary of State for Air what is the proposed period of annual training which it is proposed to lay down for a pilot and an observer, respectively, in the Air Force Reserve; whether they will, during their training, have an opportunity of actually working with the Fleet; and whether Parliament will have an opportunity of considering the conditions of training, service, and Regulations for this new force before it is brought into existence?

Captain Guest: The answer to the first question is that 12 hour's flying in all, on up-to-date war-type machines, will have to be completed in each year, in periods of not less than two nor more than six days in each quarter; to the second, that reserve officers who have served with the Fleet will be given practice in flying on and off aircraft carriers, and, further, that advantage will be taken of any opportunities that may arise for practising them in actual work with the Fleet; to the last, that, as pointed out to my noble and gallant friend on July 27, the reserve is not a new force and that the conditions of service and general Regulations were laid before Parliament on February 7 last.

Pilots

Viscount Curzon asked what is considered to be the flying life of a pilot in the Royal Air Force; whether any difference exists between the flying life of a pilot working with the Royal Navy, the Royal Air Force, and the Army; and how long is required to train a pilot to work from an aircraft carrier?

Captain Guest: The answer to the first question is that no statistics are available to enable an exact statement to be made as to the flying life of a pilot, and to attempt to strike an average would be very misleading owing to the wide variations that are met with. There is no reason, however, why an officer of the Royal Air Force should not continue flying throughout his service; many of the senior officers of the Royal Air Force are flying regularly today.

As regards the second question, so fas as experience has gone at present, there is no reason to suppose that there is any difference in the flying life of a pilot whether working with the Royal Navy, the Army, or the Royal Air Force.

The answer to the last question is three months on an average.

The Hawkinge Accident

Sir W. Joynson-Hicks asked the Secretary of State for Air whether his attention has been called to the death of a Royal Air Force pilot at Hawkinge on the 25th instant; and whether the aeroplane which crashed was fitted with a parachute?

Captain Guest: I am aware of the circumstances of the accident to which my hon. friend refers, so far as they have been revealed up to the present. The aeroplane, which was of a fighting type known as the Snipe, is normally used as a single-seater, but was, in this case, one of those adapted as a dual control aeroplane for instructional purposes, thereby further reducing the surplus space available. The aeroplane was not fitted with parachutes, and no satisfactory type of parachute has been evolved for this small high-speed type of aeroplane, although considerable progress is being made. I would refer my hon. friend to my reply to his question of May 17, in which I informed him that no fighting aeroplanes are, at present, fitted with parachutes, and would add for his information that, as a result of the service trials referred to therein, parachutes for Avro aeroplanes are now being modified.

World Flight in 1923

Lieut.-Col. Moore-Brabazon, on Aug. 2, asked the Secretary of State for Air whether an attempt is being made by an all-English seaplane to fly round the world; and whether, if he be satisfied as to the genuineness of the attempt, assistance will be given by the Air Ministry?

Capt. Guest: I understand that a proposal is on foot to carry out next year a world flight, as mentioned. The participators in the enterprise have approached the Air Ministry, and we have satisfied ourselves that their proposed scheme is sound and has a reasonable chance of success. The Air Ministry will assist the scheme so far as is possible when the time comes. I understand that the Air League of the British Empire is also going to help.

Air Unit

Viscount Curzon asked the Parliamentary Secretary to the Admiralty if there is any other country in the world in which the Air Force unit working with the Navy is under the control of a separate Air Ministry?

Mr. Amery: The answer is in the negative.

Capt. Wedgwood Benn: Was there any other country which, under a united Air Ministry like ours, did so well as we did in the War?

Mr. Amery: I cannot answer that question.

Establishments Abroad (Aircraft Defences)

Viscount Curzon asked whether there are any aircraft defences to any of our dockyards, fuelling stations, or naval establishments abroad other than Malta?

Mr. Amery: As regards anti-aircraft defences, I would suggest that my noble and gallant friend should put a question to my right hon. friend the Secretary of State for War. I am informed by the Air Ministry that aircraft are available, if required, for the defence of Port Said, Suez and Aden.

Viscount Curzon: Is that in addition to Malta?

Mr. Amery: There are aircraft there.

Lieut.-Commander Kenworthy: Does that mean that there are no aircraft defences at Singapore or Hong Kong?

Mr. Amery: Yes, it does.

Lieut.-Commander Kenworthy: It is disgraceful then.

Civil Aviation

Capt. Wedgwood Benn on August 3 asked the Secretary of State for Air what will be the effect of the redistribution of duties of the Air Council on the Department of Civil Aviation?

Capt. Guest: So far as Civil Aviation is concerned, the recent Order in Council redistributing the duties of the Air Council merely confirms the arrangement forecasted by me when introducing the Air Estimates, and actually in force for some months past. This is that Civil Aviation business is conducted by a Director of Civil Aviation, who is responsible to the Parliamentary Under-Secretary of State. The Under-Secretary of State is, of course, like other members of the Air Council, generally responsible to me, but, as a Minister of the Crown, he can deal authoritatively with matters of Civil Aviation policy with the advice and executive assistance of the Director of Civil Aviation and his staff.

Capt. Viscount Curzon: May I ask whether this means that something is really going to be done for Civil Aviation, and to save this industry for the country?

Capt. Guest: The industries of the country do not depend——

Viscount Curzon: I did not say "industries," but "to save this industry for the country."

Capt. Benn: Can the hon. and gallant gentleman say whether previously Civil Aviation was directly represented by its Chief on the Air Council?

Capt. Guest: Yes, Sir, that is so. The appointment of the late Controller-General of Civil Aviation was peculiar to himself about three and a half years ago, and was not necessarily regarded as a precedent.

THE ROYAL AIR FORCE

London Gazette, August 1, 1922

Air Vice-Marshal O. Swann, C.B., C.B.E., is appointed a Member of the Air Council as Air Member for Personnel; Aug. 1. Group Capt. R. P. Mills, M.C., A.F.C., is appointed Deputy Director of Organisation, Air Ministry; Aug. 1.

General Duties Branch

Flying Offr. J. Edelsten resigns his permanent commn., and is permitted to retain the rank of Lt.; July 21.

The following Flying Offrs. are transferred to the Reserve, Class B:—J. M. Bell; Aug. 1. C. P. Murchie; Aug. 2.

Flt. Lt. W. B. Higgins relinquishes the rank of Flt. Lt. at his own request, and is appointed to the rank of Flying Offr., with seny. of April 18; July 10.

Stores Branch

H. A. Lotherington is granted a short service commn. as a Flying Offr. on probation, with effect from, and with seny. of, July 19.

Medical Service

B. C. W. Pasco is granted a short service commn. as a Flying Offr. (Hon. Flt. Lt.), with effect from, and with seny. of, July 17. H. A. Tillman, M.D. (temp. Capt., R.A.M.C.), is granted a temporary commn. as a Flt. Lt., with effect from, and with seny. of, July 18.

London Gazette, August 4, 1922

General Duties Branch

The follg. offrs. cease to be secd. for duty with the Canadian Air Board, with effect from the follg. dates, and not as *Gazette*, June 13.—Sqdrn.-Ldr. R. Leckie, D.S.O., D.S.C., D.F.C.; June 1. Flight Lieut. J. A. Glen, D.S.C.; July 16. Pilot Offr. on probation C. B. Horsfield is confirmed in rank; May 1. Flight Lieut. R. Halley, D.F.C., A.F.C., is placed on half pay scale B; Aug. 1.

Memorandum

Sec. Lieut. (temp. Lieut.) E. A. Tottle to be Lieut., Tech. Grade B; June 8, 1918 (since granted permanent commn.).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Group Captains.—I. M. Bonham-Carter, O.B.E., from Headquarters, R.A.F., Ireland, to Command R.A.F. Depôt, Inland Area. 1.8.22. R. P. Mills, M.C., A.F.C., from Headquarters, R.A.F., India, to Air Ministry (Director of Personnel), on appointment as Deputy Director of Organisation. 1.8.22.

Wing Commanders.—C. R. S. Bradley, O.B.E., from No. 10 Group Headquarters (Coastal Area), to Half-pay List. 16.7.22. G. P. Grenfell, D.S.O., from Instrument Design Establishment (Inland Area) to R.A.F. Depôt (Inland Area). 19.7.22. Note.—The previous posting of this officer from Instrument Design Establishment, to No. 1 Flying Training School, notified on 17.7.22, is cancelled. J. T. Babington, D.S.O., from R.A.F. Depôt (Inland Area) to No. 7 Group Headquarters (Inland Area). 1.8.22. A. V. Bettington, C.M.G., from No. 12 Wing Headquarters (Ireland), to Command R.A.F., Ireland. 1.8.22. V. O. Rees, O.B.E., from R.A.F. Depôt (Inland Area), to Inland Area Aircraft Depôt (Inland Area). 27.8.22.

Squadron Leaders.—F. W. H. Lerwill, O.B.E., from School of Technical Training (Men) (Inland Area), to R.A.F. Depôt (Inland Area), as Officer in Charge of Central Trade Test Board. 24.7.22. R. H. Kershaw, from No. 10 Group Headquarters (Coastal Area), to School of Technical Training (Men) (Inland Area). 15.7.22. R. E. Bell, M.B. Note.—The previous notification wherein this officer was posted from R.A.F. Depôt to Half-pay List with effect from 27.7.22 is cancelled. A. J. Miley, O.B.E., from No. 4 Flying Training School (Middle East), to Aircraft Depôt, Egypt (Middle East). 30.6.22. A. Corbett-Wilson, from Aircraft Depôt, Egypt, (Middle East) to Command Engine Repair Depôt (Middle East). 19.6.22. A. G. R. Garrod, M.C., D.F.C., from R.A.F. Depôt (Inland Area), to School of Army Co-operation (Inland Area), on completion of course at Royal Naval Staff College. 21.7.22. A. R. Arnold, D.S.C., D.F.C., from R.A.F. Cadet College (Flying Wing), Cranwell, to Headquarters (Inland Area). 21.7.22. W. Sowrey, A.F.C., from R.A.F. Depôt (Inland Area), to No. 207 Squadron (Inland Area). 1.9.22. D. S. K. Crosbie, O.B.E., from R.A.F. Depôt (Inland Area), to School of Army Co-operation (Inland Area). 1.9.22. C. S. Wynne-Eyton, D.S.O., from R.A.F. Depôt (Inland Area), to No. 5 Flying Training School (Inland Area). 27.7.22. J. T. Whittaker, M.C., from No. 28 Squadron (India), to R.A.F. Depôt (Inland Area). (Supernumerary.) 24.6.22. P. J. Wiseman from Inland Area Aircraft Depôt (Inland Area), to Aircraft Depôt (Iraq). 18.7.22. L. C. Keeble, from R.A.F. Base, Leuchars (No. 205 Squadron) (Coastal Area), to Marine and Armament Experimental Establishment (Coastal Area). 1.8.22. G. B. Dacre, D.S.O., from Marine and Armament Experimental Establishment (Coastal Area), to R.A.F. Depôt (Inland Area) (Supernumerary). Whilst attending R.N. Staff course. 25.9.22. A. W. Tedder from No. 207 Squadron (Inland Area), to R.A.F. Depôt (Inland Area). (Supernumerary.) Whilst attending R.N. Staff course. 25.9.22.

Flight Lieutenants.—O. G. Gregson, from R.A.F. Depôt (Inland Area), to No. 10 Group Headquarters (Coastal Area). 11.7.22. A. W. Fletcher, D.F.C., A.F.C., from R.A.F. Base, Leuchars (No. 3 Squadron) (Coastal Area), to H.M.S. "Argus." 7.1.22. R. F. S. Leslie, D.S.C., D.F.C., A.F.C., from Headquarters, R.A.F., India, to Headquarters (Coastal Area). 30.4.22. J. A. Glen, D.S.C., from R.A.F. Depôt (Inland Area), to No. 39 Squadron (Inland Area). 1.8.22. A. C. Sanderson, D.F.C., from No. 39 Squadron (Inland Area), to No. 100 Squadron (Inland Area). 1.8.22. P. H. Cummings, D.F.C., from R.A.F. Depôt (Inland Area), to No. 207 Squadron (Inland Area). 1.8.22.

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R.A.F. MEMORIAL FUND

At the meeting of the Executive Committee of the Fund on July 26 the hon. treasurer made a general statement as to the financial position of the Fund.

Regarding the War Memorial it was reported the bronze eagle and memorial generally would be ready for unveiling about the end of this year.

At the request of the Vicar of St. Mark's Church, South Farnborough, a memorial tablet is to be fixed in a Memorial Chapel of that Church, in view of the fact that the R.F.C. came into being at South Farnborough on May 13, 1912. It is hoped that this tablet will be fixed and ready for unveiling about the end of September next, and is of a very short and simple design. The Committee, while in no wise prepared to finance memorial tablets in other parts of the country, feel that as South Farnborough was the birthplace of the R.F.C. it was appropriate that a small sum should be granted for this purpose.

Air Vice-Marshal Sir Geoffrey Salmond, K.C.M.G., has been elected by the Vanbrugh Castle School Sub-Committee as Chairman in succession to his brother, Sir John Salmond; and Mr. W. S. Field was at the same time elected Deputy Chairman of that Sub-Committee.

It was reported to the Executive Committee that, in accordance with L.C.C. requirements, a fire staircase will shortly be completed at the Vanbrugh Castle School, on which the Committee are prepared to entertain a further 10 boys, making 25 in all, and, with a view to securing the boys at an early age, the minimum age for admission has been reduced from 7 to 5 years.

Air Vice-Marshal J. F. A. Higgins, C.B., A.O.C., Inland Area, R.A.F., was unanimously elected a member of the Executive Committee.

The Hon. Treasurer, Sir Charles McLeod, reported to the meeting the steps he had taken in consultation with Major A. M. A. Struben towards the creation of the "Struben Trust," which concerns a sum of money generously handed over to the trustees of this Fund by Major Struben, with a view to providing an annual income for the education of the children of officers who have served with No. 25 Squadron, R.A.F., and who meet with death or injury whilst engaged in flying with that squadron. The "Trust" is in memory of Major Struben's son, the late Flying Officer H. M. Struben, who met his death as the result of a flying accident. The trustees of the Fund, and the Executive Committee, have very gladly taken over the administration of this "Trust."

The Secretary, Lieut.-Col. W. E. S. Burch, drew the attention of the Committee to the R.A.F. Cricket Week, to be held between September 20 and 26 next at the Saffron's Cricket Ground, Eastbourne, under the patronage of H.R.H. The Duke of York. The Committee of this Cricket Week have very kindly written to say that the R.A.F. Memorial Fund shall benefit from any profits that may be made.

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PERSONALS

Married

STUART MCDONALD, R.A., attached R.A.F., only son of Mr. and Mrs. J. A. S. Watson, of Ellangowan, Willingdon, Eastbourne, was married on July 24 at the Church of Our Lady of Ransom, Eastbourne, to SHEILA EDYTHE HILARY, daughter of the late Mr. and Mrs. T. P. CROWLEY, of Allahabad, India.

To be Married

The engagement is announced between Flight-Lieut. EDWARD REGINALD OPENSHAW, R.A.F., late 1/4th Somerset L.I., only son of the late Lieut.-Col. E. Hyde Openshaw and Mrs. Openshaw, of Cheddar, Somerset, and HELENA LOUISE, eldest daughter of Mr. and Mrs. CHARLES M. HAYDON, of Lynnfield, Kirkwall, Orkney.

A marriage is arranged, and will shortly take place quietly between Sqdn.-Ldr. RYAN, R.A.F., only son of Nicholas Ryan, of Melbourne, Australia, and IRENE, widow of Maj. ERNEST JOHNSTON, D.S.O., Seaforth Highlanders, and daughter of Sandford Storey.

MR. PATRICK ALEXANDER

IN the *London Gazette* of August 1 appears the following notice under "Receiving Orders in Bankruptcy": "Alexander, Patrick Young, Flat 54, Whitehall Court, Gentleman."

Anything more surprising and pathetic than this brief announcement it would be difficult to find in the world of aeronautics. At first glance, it was almost unbelievable, but following a visit from Mr. Alexander himself, no possibility of mistake remained. Mr. Patrick Alexander had himself quietly done the deed, as he had in the past years quietly made so many generous gifts towards the encouragement and progress of aviation. That it should have become necessary for Mr. Alexander to go through such a procedure must come as a terrible shock to those who know him and who have been witness to his open-handed and repeated generosity in the past towards so many pressing needs of aeronautical matters in their struggling days of birth.

It goes without saying that steps will be taken to relieve such a position for Mr. Alexander, and it behoves those who have, in many ways, directly benefited from the effect of the past gifts of this momentarily embarrassed patron of the great science to come forward and see that, without delay, a second notice in the *Gazette* is possible announcing the annulment of the original order. The amount is not very serious, we understand, and we hope, therefore, to hear that steps are being taken to handle the unfortunate position.

For the benefit of those who are not intimately acquainted with the early history of flying, it may be well to recall briefly some of the past good work of Mr. Alexander. Always a great traveller, Mr. Patrick Alexander met practically all the early pioneers of flying, those working on lighter-than-air problems as well as the advocates of heavier-than-air machines. Quite early he took up ballooning, and as long ago as 1894 he made a parachute descent from a hot-air balloon. He followed closely the work of such early experimenters as Lilienthal and the Wright brothers, Octave Chanute, Sir Hiram Maxim, Herring, Graham Bell and Langley, with all of whom he was personally acquainted.

In 1897, Mr. Alexander visited Count Zeppelin at Friedrichshafen, and later he became acquainted with M. Santos Dumont in France. Mr. Alexander was ever a believer in the large airship, and in the very early days; before an airship had ever flown more than a very few miles, he expressed the opinion that the day would come when we should regard airship travel as a regular means of transport.

In 1911, Mr. Patrick Alexander offered a £1,000 prize for an aero engine. This competition was won by the Green engine, but certain Government stipulations as regards the conditions resulted in a postponement. When the competition was held later, the Green engine was again victorious.

Clearly realising the importance of education to the future of the growing generation, Mr. Patrick Alexander has always been a keen supporter of schools and colleges, and in 1915 he handed to the Headmaster of Imperial Services College, Windsor, a magnificent gift in the form of a cheque for £10,000 "for the training of character and development of knowledge" among the boys of the school. He had previously given the College an aero-laboratory, fully equipped with wind tunnel and accessories.

We might go on enumerating and reminding our readers of good deeds done by Mr. Alexander, but ample has been said to indicate the irony of fate which has now led to the announcement in the *Gazette*. If ever a man deserved to be helped out of an embarrassing situation, Mr Patrick Alexander does.

* * *

CORRESPONDENCE

[*The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.*]

BRITISH AIRWAY EFFICIENCY

[2059] With reference to the article entitled "British Airway Efficiency," on page 422 of FLIGHT for July 27, 1922, we should like to point out that their method of calculating efficiency on flights attempted as against flights completed is extremely misleading. By this method any firm with reasonably efficient machines could easily obtain 100 per cent. efficiency by refusing to fly in doubtful weather.

On the above basis the Royal Dutch Air Service has an efficiency record of 99 per cent. for June, one flight not having been completed owing to bad weather. Moreover, this includes the only two completed flights made between Terminal Aerodrome and Terminal Aerodrome made by any machines on the day of the great gale.

A much fairer standard is to be found in a table of efficiency where flights advertised are compared with flights made, in *The Times* of Friday, July 14, 1922.

If the record of the Royal Dutch Air Service for flights advertised as against flights completed were added to this table, it would read as follows:—

	Flights Advertised.	Flights Made.	Percentage.
Royal Dutch Air Service ..	103	91	88.35
Daimler Airways	104	84	80.77
Instone Air Line	108	69	63.89
Handley Page	104	66	63.46

It is therefore not unnatural that we object to the inference in the concluding paragraph of the article in FLIGHT referred to above, which, after mentioning one French firm, lumps "all other companies" together with an efficiency of 76.2 per cent.

ROYAL DUTCH AIR SERVICE.
H. SPRY-LEVERTON,
Aerodrome Manager.

Waddon, July 31.

* * *

Foreign Honours

THE following decoration has been conferred in recognition of valuable services rendered:—

Order of the Sacred Treasure (Japan), Third Class.—Lieut.-Col. C. H. Meares, late R.A.F. (for aviation services in Japan).

R.A.F. Boy Mechanics

THE Civil Service Commissioners give notice that an open competitive examination of candidates for entry as boy mechanics to the Royal Air Force will be held in London, Edinburgh, Birmingham, Chatham, Plymouth and Portsmouth on November 10. No person will be admitted to compete from whom the Secretary of the Civil Service Commission has not received, on or before September 28, an application, in the handwriting of the candidate, on a prescribed form, which may be obtained from the Secretary at once.

* * *

PUBLICATIONS RECEIVED

Reports and Memoranda, Aeronautical Research Committee:—

Report No. 131. *Aerial Navigation and Navigating Instruments.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 140. *Pressure Distribution over the Rudder and Fin of an Airplane in Flight.* By F. H. Norton and W. G. Brown. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 147. *Standard Atmosphere.* By W. R. Gregg. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

* * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: **cyl. = cylinder; I.C. = internal combustion; m. = motors**
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published August 10, 1922

1,161. ZEPPELIN-WERK LINDAU GES. and C. DORNIER. Flying Boat. (157,267.)

1,163. ZEPPELIN-WERKE GES. and A. ROHRBACH. Monoplane flying-machines. (157,269.)

14,541. L. E. BAYNES. Variable-pitch propeller. (183,011.)

16,213. H M. FRANZEN. Aeroplanes. (183,023.)

30,034. DEUTA-WERKE VORM. DEUTSCHE TACHOMETERWERKE GES. Securing means for indicators to instrument-boards. (175,601.)

31,042. BLACKBURN AEROPLANE AND MOTOR CO., LTD., A. C. THORNTON and G. E. PETTY. Maintaining the contents of reservoirs, etc., carried by aircraft, at a required temperature. (183,085.)

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(Continued from p. xx.)

INSTRUMENTS (Speed), Watches, &c.—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Goldsmiths & Silversmiths Co., 112, Regent Street, W. 1. Gerrard 9091 (3 lines).

Smith, S., & Sons (M.A.), Ltd., Cricklewood Works, N.W. 2. Willesden 2235 (7 lines).

INSULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C.1. City 3115; "Vanduara," Cent. London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2. Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Monk Engineering Co., Ltd., Coventry. Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry. Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Monk Engineering Co., High Street, Coventry. Coventry 807; "Assistance," Coventry.

Rubery, Owen & Co., Darlaston. Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5. Dalston 1893.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.

PROPELLERS—

Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds. Roundhay 601 (5 lines); "Propellers," Leeds.

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.

Lang Propeller, Ltd., Weybridge, Surrey. 520-521, Weybridge; "Aerosticks," Weybridge.

PUTTEES—

Fox Bros. & Co., Ltd. (Dept. R), Wellington, Somerset.

RADIATORS AND RADIATOR REPAIRS—

Serck Radiators, Ltd., Warwick Road, Greet, Birmingham. Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—

Rubery, Owen & Co., Darlaston. Darlaston 87; "Roofs," Darlaston.

SPARKING PLUGS—

Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15. Putney 2132, 2133. "Kaalgee," Phone, London.

SPRAYING PLANT—

Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1. Holborn 2041; "Aerography," London.

STABILIZERS—

Auto Controls, Ltd., 19, Regent Street, Piccadilly Circus, London, S.W. 1. Regent 3649.

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MacLennan, John, & Co., 115, Newgate St., E.C. 1. City 3115; "Vanduara," Cent. London.

TIMBER—

Owen, Joseph, & Son, Boro' High Street, S.E. Hop 3811; "Bucheron," London.

TUBES, ALUMINIUM—

British Aluminium Co., Ltd., The, 109, Queen Victoria St., London. City 2676; "Cryolite," Cent. London.

TYRES AND WHEELS—

Palmer Tyre, Ltd., Shaftesbury Avenue, W.C. 2. Gerrard 1214; "Tyricord," Westcent, London.

WELDINGS, REPAIRS—

Barimar, Ltd., 10, Poland Street, London, W. 1. Gerrard 8173; "Bariquamar," Reg. London.

WIND SHIELDS—

Auster, Ltd., 133, Long Acre, W.C. 2.

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British Air Ministry Type Test, September, 1921.

The Jupiter engine was the first air-cooled engine to pass this test, which comprised 50 hours' endurance test at 90 per cent. full power, one hour high speed, one hour high power, runs for power curve, etc. At the conclusion of these tests one hour was run at full throttle at 1,775 r.p.m., averaging 442 B.H.P., and one hour at 1,840 r.p.m., averaging 450 B.H.P.

French Air Ministry Type Test, June, 1922.

The tests carried out at Gennevilliers included five non-stop runs of 10 hours each duration, the first half-hour of each period at full power, 9½ hours at 90 per cent. full power, with 2 minutes at full power at the close of each period. The average power recorded at the beginning of the periods was 413 B.H.P., and at the end 420 B.H.P.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Aug. 6–20	**French Gliding Competition at Clermont-Ferrand**
Sept. 2–17....	**International Concours Aviatique, Rotterdam**
Sept. 8–10....	**1,000 Miles Race round Britain for the King's Trophy**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 22	**Coupe Deutsch (300 kil.)**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

Lord Northcliffe.

WITH the passing of Lord Northcliffe, progress and advocacy for the million have lost a noble friend, whilst aviation in particular must for many years mourn the loss of this great enthusiast and far-seeing genius. It was to Lord Northcliffe's generous and timely support with prizes and journalistic publicity in the early days of aviation that the general public were in a measure led to understand the possibilities of the conquest of the air, and his sympathetic help in buoying up the efforts and hopes of those who at the time were struggling to create a real air industry, will be long remembered by many early workers. Speaking personally, from time to time, spontaneous communications from Lord Northcliffe of encouragement to continue the missionary aviation work which we had undertaken in the founding of FLIGHT (originally born ten years previously in our sister journal the AUTO., founded in 1896, the same year as the birth of the *Daily Mail*) in 1908 (the same year that *The Times* was acquired by him), were helpful in strengthening our sanguine views. In these various communications and interviews, the one thing that emerged conspicuously was the remarkable grasp which he had, not only in the abstract, but in detail of the subjects he discussed. Had Lord Northcliffe accepted the office of Air Minister in 1917, when it was offered him, there would have been a vastly different tale to tell long ere this, as to the position of aviation, both Service and Civil. But love of free expression and his political convictions at the time would not permit him to join himself to the Government and thereby fetter his patriotic journalistic campaigns, upon which he deemed it necessary to embark. That Lord Northcliffe should have closed his brilliant career at the early age of 57 is but an aggravation of the sorrow and sympathy that one and all must feel for the loss to the nation of so remarkable a fighter for, and champion of, the people. We submit the sincere and respectful sympathy to his widow and family of one who, with broken intervals, knew Alfred Harmsworth from the earliest days of *Answers*.

The C.A.A.B Report. In this issue of FLIGHT we publish a *résumé* of the first report of the Civil Aviation Advisory Board, the formation of which was first announced by the Secretary of State for Air, Capt. Guest, at the Air Conference held last spring. It will be remembered that the first task which was set the newly-formed Board was to go into the question of the cost and practicability of an Imperial Air Mail Service. This the Board have been doing, and this first report deals with the subject in considerable detail. Generally speaking, the findings of the Board are what might have been expected, although to us it appears that the estimates are somewhat pessimistic as regards the possible income that could be earned. Also the figures of cost appear on the heavy side, especially those relating to weekly services. It appears quite evident, however, that no very great reduction in these figures are to be looked for in the near future if the weekly service is adopted. As pointed out in the report, many of the expenses, such as those of ground organisation, etc., are more or less independent of the frequency of the service and the number of machines flying over the route. This, of course, increases the cost per trip, or per machine mile, enormously, and the only way of reducing the figure seems to be to adopt a more frequent service.

To do so, however, would be of little avail unless a much greater volume of traffic than that estimated could be obtained. How this is to be attained is open to discussion. To us it certainly appears that to charge 1s. for an ounce letter is not likely to lead to an increase over and above the 500 lbs. weekly estimated by the Post Office. On the other hand, a reduction, unless very drastic, is probably not likely to increase the number of letters to such an extent as to make up for the lower fee charged. It would appear that here, as in other cases where air mails have been suggested, the only way of making the undertaking come within sight of paying its way is to make it compulsory that all first-class mail must go by air. If that were done, assuming as correct the Post Office statement that 500 lbs. of letters weekly is about 5 per cent. of the total mail, and taking 25 letters to the lb., there would be available 250,000 letters per week, or 10,000 lbs. of mail. Seven machines, or, in other words, a daily service, would just about carry this amount, and, as the cost estimated for a daily service is about £1,000 per trip, a fee of 6*d*. would just make the service pay.

This is one way in which the service might reasonably be expected to become self-supporting in time. Looking at the problem from another point of view, it appears that the overhead charges given in the estimates are certainly on the heavy side, and apparently Mr. G. Holt Thomas is of the same opinion, as he has signed the report with the very suggestive reservation "that the laying out and equipment of aerodromes should, on the score of economy and efficiency, be in the hands of the operating company, always provided that such work is done under efficient Government control, and that the Government has full power to take over aerodromes in case of Imperial emergency." In that way there is little doubt that many of the items relating to the ground organisation would be very materially reduced—a fact which would be felt instantly in the cost per trip.

Then there is the question of running costs. With the figures estimated by the Board we are not inclined to quarrel, but it should be kept in mind that, by the time any air mail scheme matures, the figures given, which, quite rightly, refer to present machines, engines, fuel, etc., will probably have been materially reduced, and that it is thus permissible to expect that running costs, depreciation, etc., will become lower.

In any case, as pointed out in the report, the saving in time, although important, is not the only, nor, indeed, the most significant, reason for the establishment of such an air mail service. Personnel would be kept employed, designing staffs would be retained at work, and progress generally would follow, apart from any immediate benefits which quicker communications would confer upon the Empire. We therefore trust that the Government may find it possible to act upon the recommendations of the C.A.A.B., and that steps may be taken at once to give effect to, at any rate, part of the scheme, even if the entire route from London to India cannot be included from the start. Incidentally, it would be interesting to know how much the air mail service between Cairo and Baghdad is costing the country as operated by the R.A.F.

◆ ◆ ◆

The British Victory. It is with the greatest satisfaction that we are able to record, elsewhere in this issue, the winning by Captain Biard of the Schneider Cup race at Naples. To us the victory is the more gratifying as we are, as has been repeatedly stated in these columns, firm believers in the possibilities of the seaplane. The bringing, next year, of the race to this country cannot fail to stimulate interest in the seaplane, and we offer our heartiest congratulations to Captain Biard, the Supermarine Aviation Works, and Napiers on the splendid performance, expressing at the same time the hope that, when the Schneider race comes to be flown in this country next year, there will be at least three British machines ready to defend the Cup.

◆ ◆ ◆ ◆

Inspector of Accidents

MAJOR J. P. C. COOPER, O.B.E., M.C., has been appointed Inspector of Accidents at the Air Ministry under the Air Navigation (Investigation of Accidents) Regulations, 1922.

R. M. Groves Aeronautical Research Prize—Award for 1921.

THE R. M. Groves Aeronautical Research Prize for the year 1921 has been awarded to Sqdn.-Ldr. Roderic M. Hill, M.C., A.F.C., Officer-in-Charge of the Experimental Flying Department of the Royal Aircraft Establishment.

This prize is awarded annually to the officer, non-commissioned officer or man who, in the opinion of the Air Council, has done most during the preceding year to advance aeronautical science on the technical and research side.

A Monument to Latham

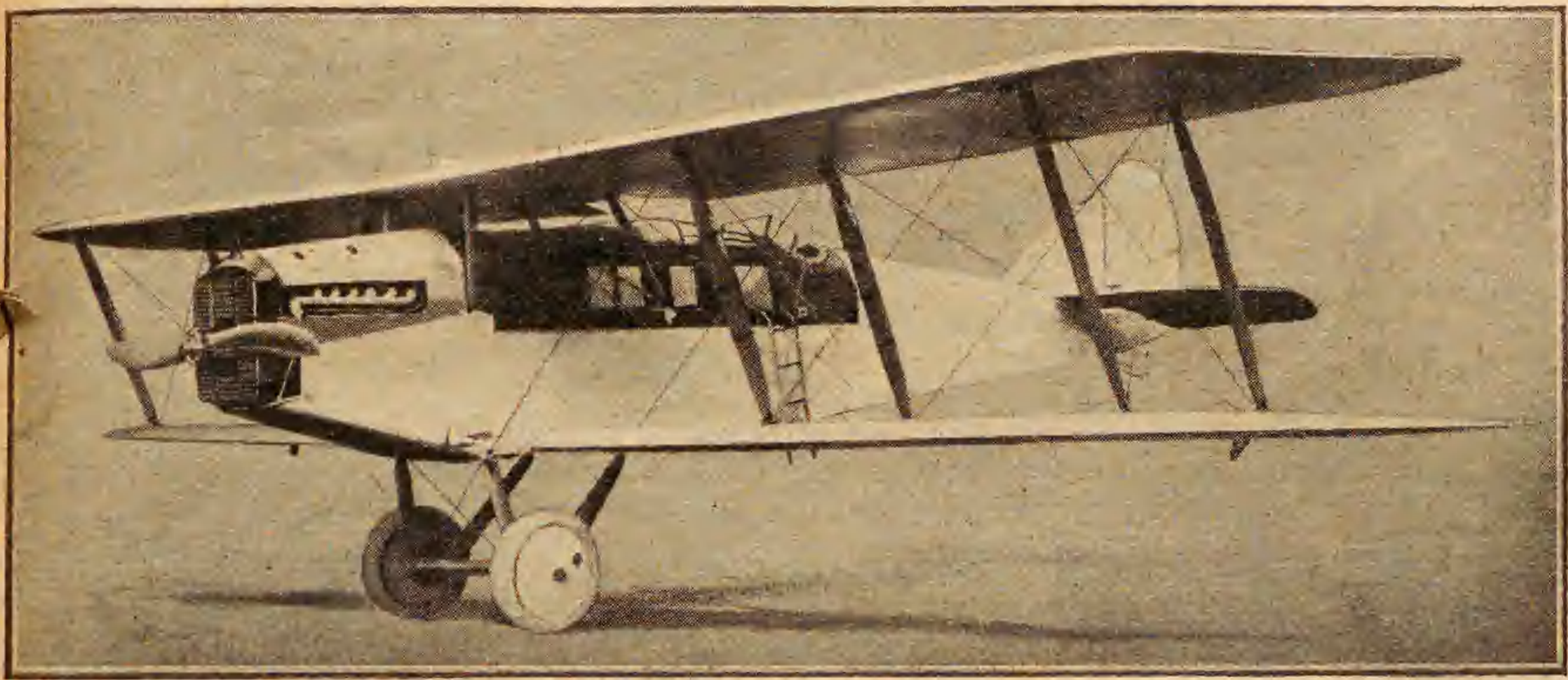
ON August 13 M. Fortaut, French Director-General of Aeronautics, M. Blériot, etc., were present when Comte de la Vaulx unveiled the monument at Cap Blanc Nez which has been erected to the memory of Hubert Latham, who will be remembered for his flying in England in the early days, and who made two attempts before M. Blériot to fly the Channel. In this he failed, and when rescued from the water on the second occasion, July 27, 1909, was calmly seated on his machine smoking a cigarette. Mr. Latham was killed in French Congo in 1912 whilst wild buffalo hunting.

A MARTINSYDE FOR NEWFOUNDLAND

The Type A, Mark II, Sold to the Aerial Survey Co.

At the last Olympia Aero Show there was, it may be remembered, exhibited, among other machines, a commercial aeroplane with seating accommodation for four passengers, in addition to the pilot. This machine was known as the type A, Mark II, and had a 275 h.p. Rolls-Royce "Falcon" engine. Recently, this machine has been purchased by the Aerial Survey Co., of Duckworth Street, St. John's, Newfoundland, for use in spotting for seals. During the last year or two, it will be remembered, Mr. F. S. Cotton and Mr. A. S. Butler, the latter of whom is now a director of the De Havilland Aircraft Co., have been doing some extremely useful work in Newfoundland, surveying, spotting for seals etc., the machines used being de Havillands and Westlands. The "stable" will now be increased by the Martinsyde type A, Mark II, which has been specially fitted out for the purpose. Last week, through the courtesy of Mr. Tilghman Richards, of Martinsydes, we had an opportunity of examining the machine at the Woking works of that firm when the accompanying illustrations were obtained.

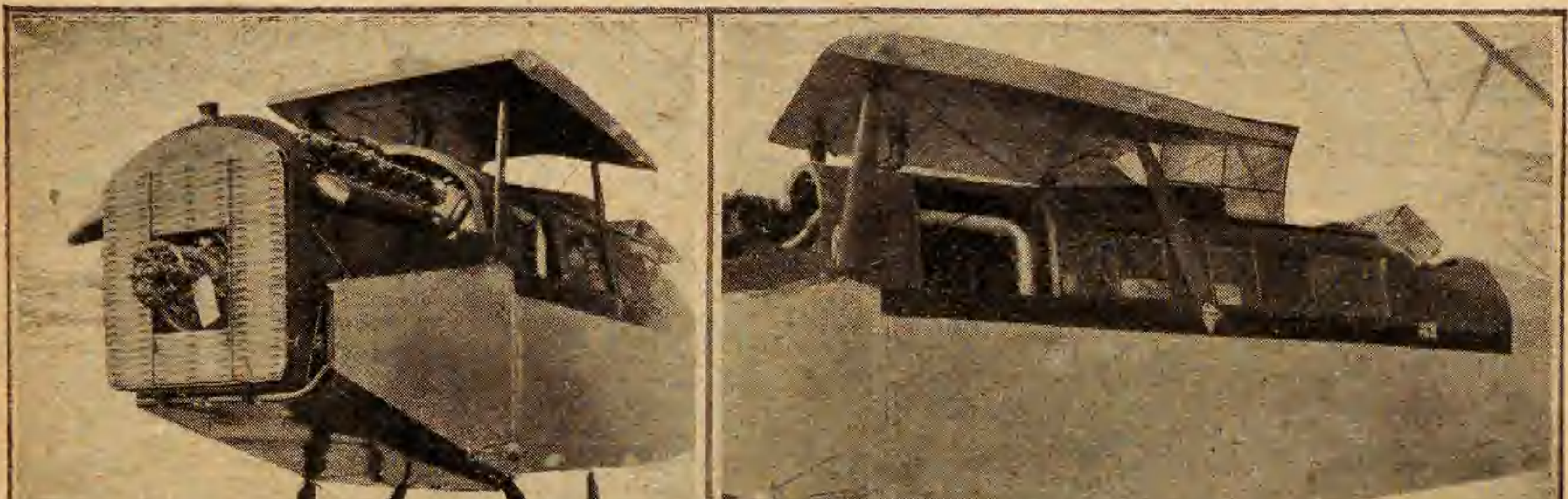
The Martinsyde A, Mark II, or A.II for brevity, is a tractor biplane resembling in general lines the well-known Martinsyde F.4, which is one of the most beautiful aeroplanes ever designed. The A.II, however, has a high coaming forming the cabin top, which is provided with windows in the sides, and has a gauze cover, to combine top lighting with ventilation. The general arrangement of the machine will be gathered from the accompanying scale drawings.



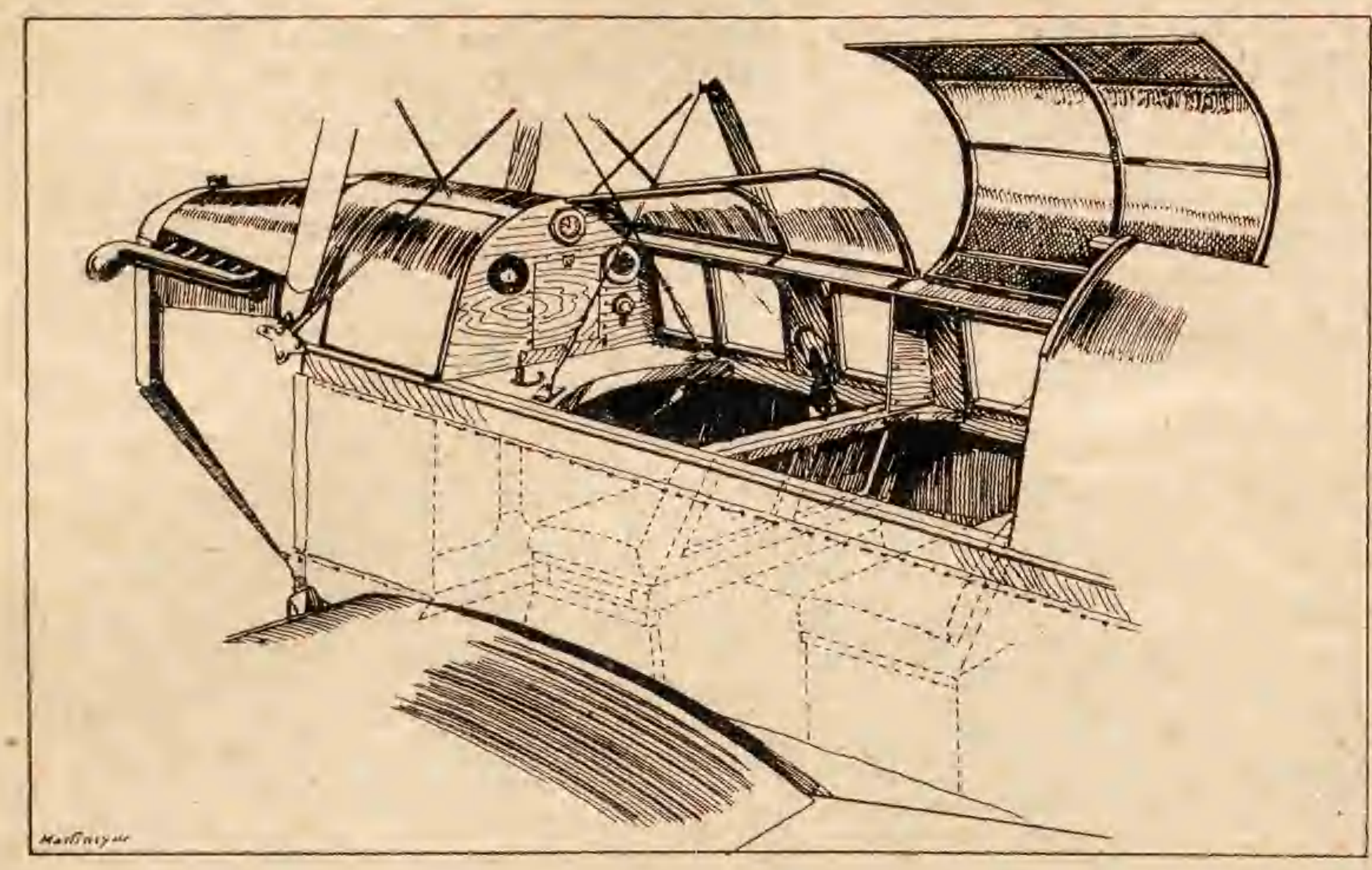
THE MARTINSYDE TYPE A, MARK II : Three-quarter front view.

The *fuselage* is a girder structure braced by tie rods except in the front bay, behind the engine housing, where bracing as well as covering is effected by "Consuta" ply-wood. The covering of the rear portion is fabric, doped with "Cellon" aluminium dope. The sides of the cabin top are of mahogany, and slope slightly inwards so as to bring the centre-section bracing outside the cabin. The space inside the cabin is divided into two by the seating arrangement, which consists of two pairs of side-by-side seats, the front one of which is reached by stepping over the back rest. In order to facilitate this somewhat acrobatic feat the roof of the cabin is hinged, as regards the rear portion, so as to lift up, while the front portion runs on guide rails and can be pushed forward out of the way while the passengers are getting in or out. These movable portions of the cabin roof are, as already mentioned, covered with a fine gauze, which not only helps to light the cabin, but has been found to give excellent ventilation without draught.

The pilot's cockpit is aft of the cabin, and a special windscreen has been fitted, at the request of Mr. Cotton, we believe, so as to shelter as much as possible the pilot against the icy winds met with in Newfoundland. The controls are of the usual Martinsyde type, but the instrument board is rather more completely equipped than on standard machines. This is, of course, a result of the special work for which the machine is intended. Among the instruments is found, as indicated on one of the accompanying sketches, a Vickers-Reid



THE MARTINSYDE TYPE A, MARK II : On the left the engine housing, and on the right the cabin, pilot's cockpit, etc. The front compartment contains the wireless set. The pipe which can be seen inside this compartment is a hot air pipe from the engine housing, carrying heated air to the cabin.



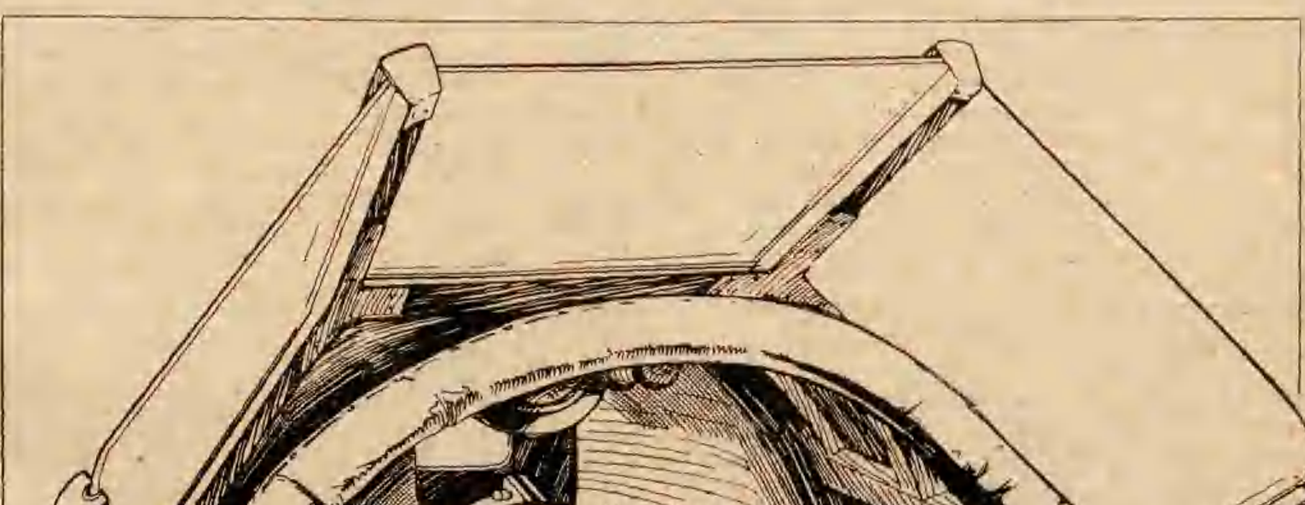
The Martinsyde Type A, Mark II: Diagrammatic perspective view of the cabin, which has seating accommodation for four passengers. The deck fairing in front of the forward compartment contains the wireless outfit, and in the floor of the compartment is a mounting for an aerial camera. The hinged cabin roof is covered with gauze to ensure ventilation.

gyro turn indicator, an instrument which is rapidly becoming popular on all civil aircraft, enabling as it does the pilot to know at all times, even in the dark or in clouds, what his machine is doing.

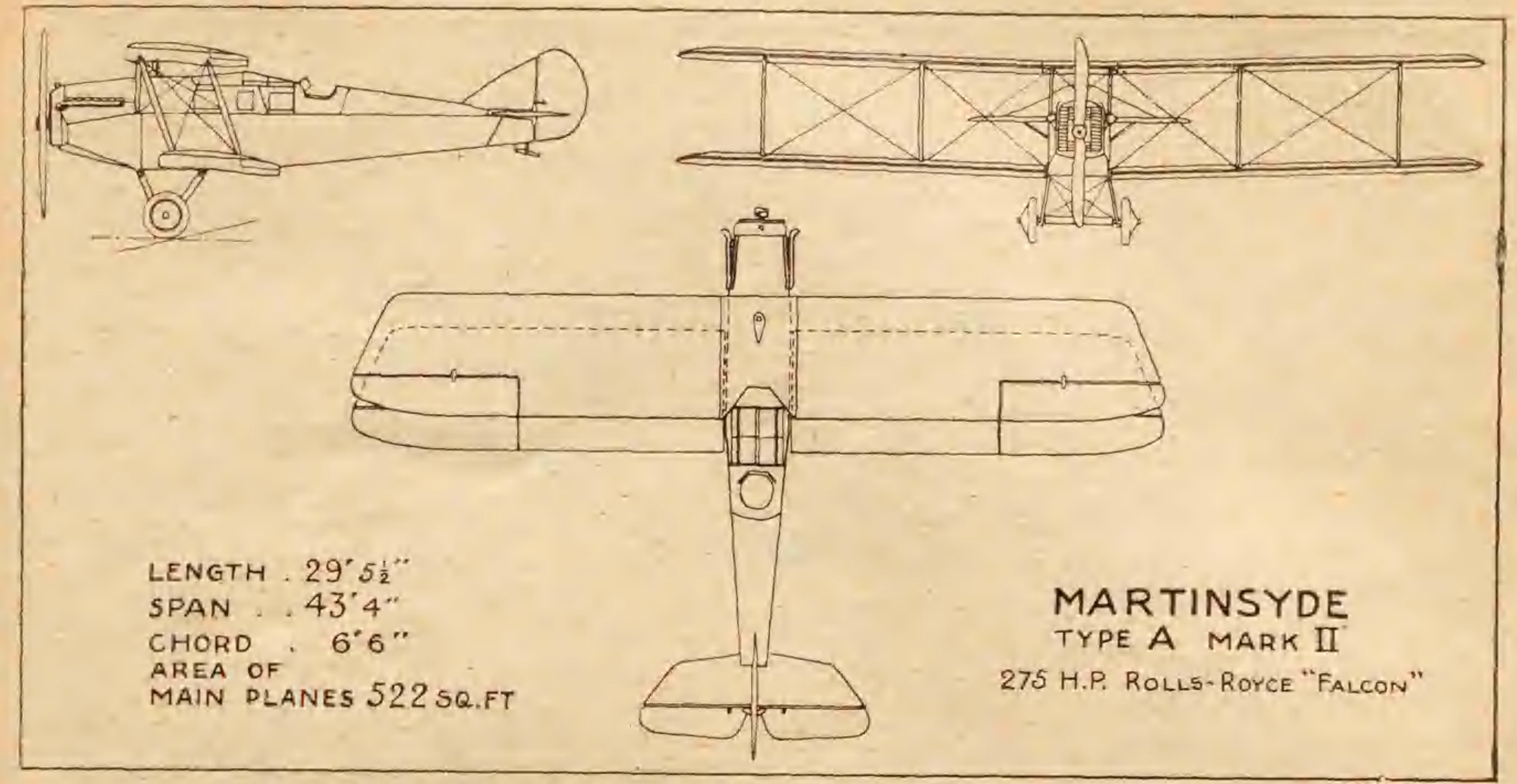
A wireless outfit is installed in the upper forward compartment, above the main petrol tank, and a hinged partition enables the operator to get at his instruments, while a removable panel in the side also gives access to the wireless compartment when the machine is on the ground. In the floor of the cabin, near the front wall, is an opening and mounting for an aerial camera, so that it will be possible for the machine to go out, locate the herds of seals, wireless the position to the base, and finally photograph the herds and bring back to the base pictures showing the exact nature of the herds and their numbers. Thus, when the sealing fleet puts to sea, it should do so with a maximum of advance information, instead of having to waste, perhaps, many days or even weeks locating the herds.

As the machine will be used at all times of the year, the question of heating assumes some importance. In the Martinsyde A.II an attempt has been made to solve the problem by running a pipe of some 2 ins. diameter from the engine housing to the cabin. At its front end, which rests immediately behind the radiator, this pipe has a large funnel almost touching the radiator. Thus, the air which enters the pipe has already been slightly heated by passing through the radiator, while it is further heated by lying close to the exhaust pipes of the port cylinders. By means of a small lever, working in a semi-circular groove in the cabin "table" (shown in one of the sketches), the passengers are able to regulate the amount of hot air entering the cabin.

In view of the fact that the Martinsyde will be used



The Martinsyde Type A, Mark II: Sketch of the pilot's cockpit, showing instrument board. In the centre of the board may be seen the tell-tale lights of the Vickers-Reid gyro turn indicator.



THE MARTINSYDE TYPE A, MARK II: **General arrangement drawings.**

extensively over the sea, a pair of floats are being provided, which, by being fitted in place of the wheels, turn the machine into a seaplane. These floats are designed to be fitted with a minimum of trouble, and the change can be effected in a very short time.

The Rolls-Royce "Falcon" engine is carried on tubular engine bearers, and a fireproof bulkhead separates it from the cabin. The main petrol tank is placed in the lower portion of the *fuselage*, behind the engine bulkhead, and a small gravity tank is mounted in the centre-section of the top plane. A nose radiator, provided with shutters, is fitted in front of the engine.

The machine is being crated for shipment, and within a few weeks it should be at work in Newfoundland, when, if the fates are kind, we hope to be able to record some of its doings.

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THE BRITISH VICTORY AT NAPLES

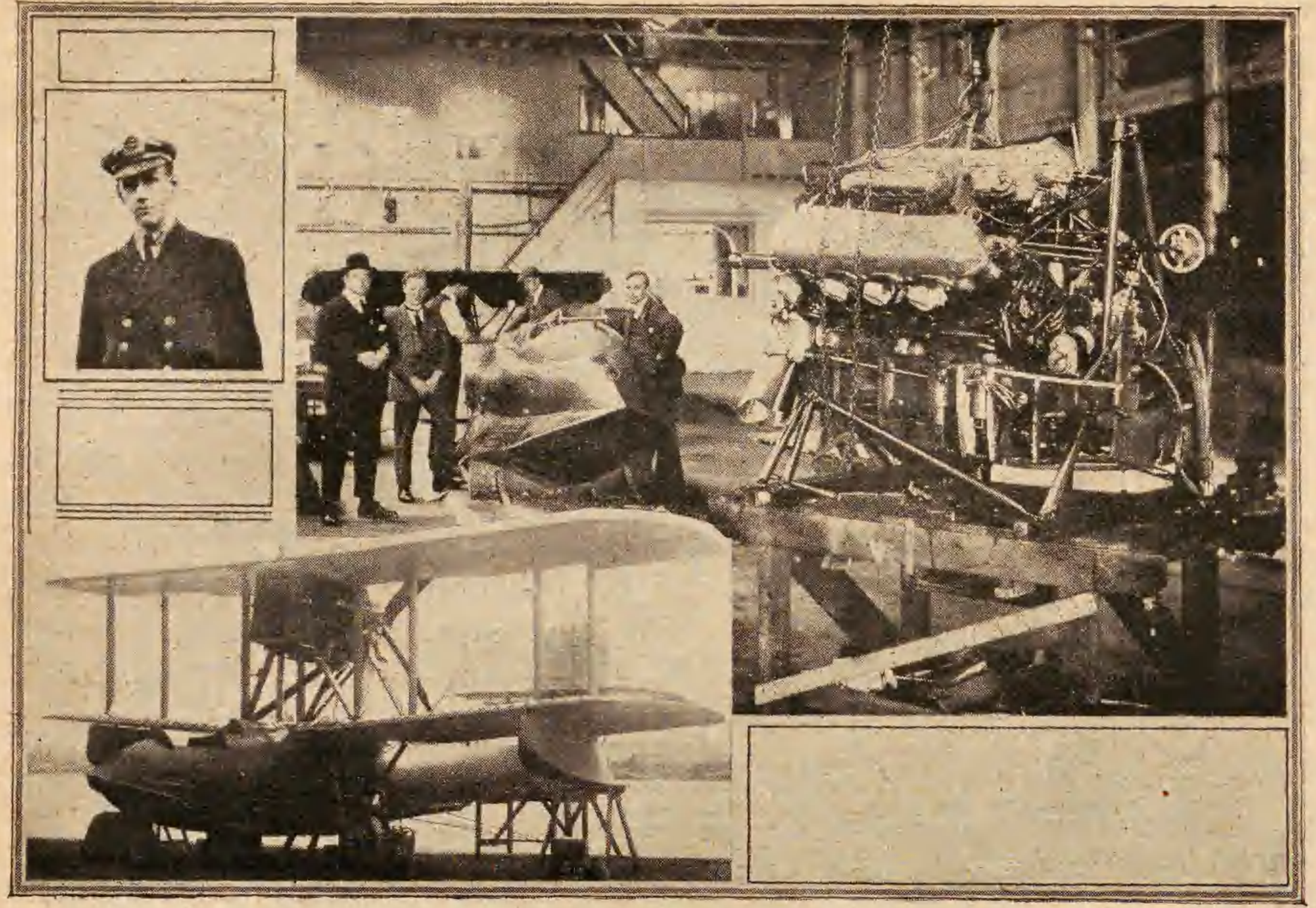
Supermarine Wins the Schneider Cup Race

British aviation owes a great deal to the Supermarine Aviation Works and to Napiers for entering a flying-boat in this year's race for the Coupe Schneider. Whether successful or not, the will to make the attempt was greatly appreciated, and the fact that this machine did win the race is all the more a matter for congratulation, as in case of the Italians winning the Cup for the third time, it would have remained in Italy as their property, and there would have been no more Schneider races. As a result of the British victory, the race will, presumably, be flown somewhere in this country next year, a fact of the utmost importance to British aviation, inasmuch as it cannot fail greatly to stimulate interest in, and development of, the seaplane type of machine. This, as we have repeatedly pointed out in this journal, is a vital necessity to the Empire, separated as its parts are by leagues of ocean, and it is to be hoped that the winning of the Schneider Cup at Naples, on August 12, may mark the turning point in British maritime aviation. The seaplane has, for some obscure reason, been very step-motherly treated, largely, no doubt, owing to a general lack of understanding of its capabilities and appreciation of the very great services which this type of machine has to offer.

Looked upon purely as a sporting effort, the winning by Capt. Biard of the Schneider race cannot fail materially to increase the prestige of British aircraft abroad. Already the very fine performances put up by Mr. James on the Mars I of the Gloucestershire Aircraft Co have drawn the attention of the world to the quality of British land aircraft, when such quality is turned in the direction of speed, and now the establishment of a world's record for speed over a triangular course by a British seaplane has demonstrated to the world that in this branch also we are certainly not behind other nations. The quality is there, has been all along, but a lack of financial support has prevented British constructors from demonstrating, by taking part in international contests, on a large scale what we can do. The Schneider race of this year will have done much to remedy this state of affairs, and we sincerely trust that for the future no opportunity will be lost of showing British aircraft at all important events. We fully realise that this is an expensive undertaking, but we are quite sure that in the long run the prestige thus established more than makes up for the outlay involved.

Regarding the actual race, but little information is available at present. In addition to Great Britain, France and Italy were represented. The French representatives this year did not include Sadi Lecointe, whose machine last year, it will be remembered, suffered damage to its floats, which put Sadi out of the running. The two machines that were to have represented France on Saturday last, were constructed at the *Chantiers Aero-Maritimes de la Seine*, usually abbreviated to C.A.M.S., but, unfortunately, they could not be got ready in time, and it appears that they were not finished by the time the preliminary tests of navigating on the sea, and mooring for six hours, were to be carried out. This lost them their chance of entering in the race, and the competition was reduced to a fight between the Italian representatives and the Supermarine. The two French pilots who were to have flown the "Cams" were Vroman and Teste.

It appears that in the race itself only two Italian pilots took part. Of these, Passaleva was flying a Macchi flying boat with 300 h.p. engine, and Zanetti piloted a Savoia 19 with 450 h.p. Ansaldo San Giorgio engine. The course was a triangular one, totalling 200 nautical miles, and was covered by Captain Biard on the Supermarine in 1 hour 34 minutes $51\frac{3}{5}$ seconds. Altogether thirteen laps of the course had to be made, so that a very great number of turns were involved, which, of course, reduced the speed of the competing machines very considerably. Over the course the speed of the Supermarine works out at approximately 127 knots, but, as a matter of fact, its actual speed in a straight line is probably not far short of 150 knots. Passaleva was second, in 1 hour 36 minutes 22 seconds, and Zanetti third in 1 hour 38 minutes 45 seconds.



THE BRITISH SEAPLANE VICTORY: Matched against the fastest seaplanes in the world, the Supermarine, with Napier Lion engine, piloted by Mr. Biard, has beaten its competitors, and won this year's Schneider race at Naples. As a result, next year's race will be flown in this country. Our photographs show the hull of the Supermarine flying boat and the Napier Lion ready for installation at the Supermarine works, Southampton, and, on the left, the complete machine on the slipways. Inset is a portrait of Mr. Biard, chief pilot of the Supermarine Aviation Works.

With regard to the machine, this was described in detail in our issue of April 20, 1922, in its original form of an amphibian flying boat, with 300 h.p. Hispano-Suiza engine. By removing the amphibian gear the weight was reduced, and the substitution of a Napier Lion did not add greatly to the total weight, while, of course, greatly increasing the speed. We believe that the wing area was also reduced so as to gain a further increase in speed, and certainly the machine must have been very fast to have beaten such formidable competitors as the Macchi and Savoia boats, which are, or were, until the arrival of the Supermarine, probably the fastest flying boats in the world.

A feature of the original Supermarine "Sea King, Mark II," was that it trimmed equally well at all flying speeds, and with engine on or off. That feature has, we believe, been retained in the racing version, the "Sea Lion," and makes the machine exceptionally nice to handle. It is a feature difficult to attain in a machine of the flying boat type, but the Supermarine designers have succeeded in doing so in spite of the difficulties. It is of interest to note that the "Sea Lion" was doped with "Cellon," and that Smiths instruments were fitted.

A feature for which the Supermarine boats have always been noted is their exceptional seaworthiness. It will be remembered that on one occasion one of these boats was deliberately stalled from a height of about 30 feet, and yet no damage was done to the hull. The mooring tests and navigation tests of the Schneider contest did not, therefore, present difficulties, and the main problem was whether or not the machine was fast enough. This she proved to be, and Mr. Scott-Paine and Commander Bird are to be congratulated upon a very fine design, Capt. Biard on his excellent piloting, and last, but by no means least, Napiers on the production of the engine which made the performance possible. The Schneider race has added yet another success to the long list already to the credit of the Napier Lion. It is now up to us to see to it that we are strongly represented for next year's Schneider Cup. One representative is certainly not sufficient, and it is to be hoped that so many machines may be forthcoming that eliminating trials will be necessary.

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Anti-Aircraft Brigades

LIEUT.-Col. D. H. GILL, C.M.G., D.S.O., has been appointed Commander of the 2nd Anti-Aircraft Brigade (Territorial Army), and Col. H. S. de Brett, C.B., C.M.G., D.S.O., Commander of the 3rd Anti-Aircraft Brigade (Territorial Army). These are the two brigades which are to be formed in London.

Death of De Pischoff

IT is with deep regret that we have to announce this week the death of M. Alfred de Pischoff as a result of an aeroplane accident. It appears that M. de Pischoff was flying one of his small, low-powered machines at an altitude of about 1,500 ft. when the machine suddenly dipped violently and M. de Pischoff was thrown out.

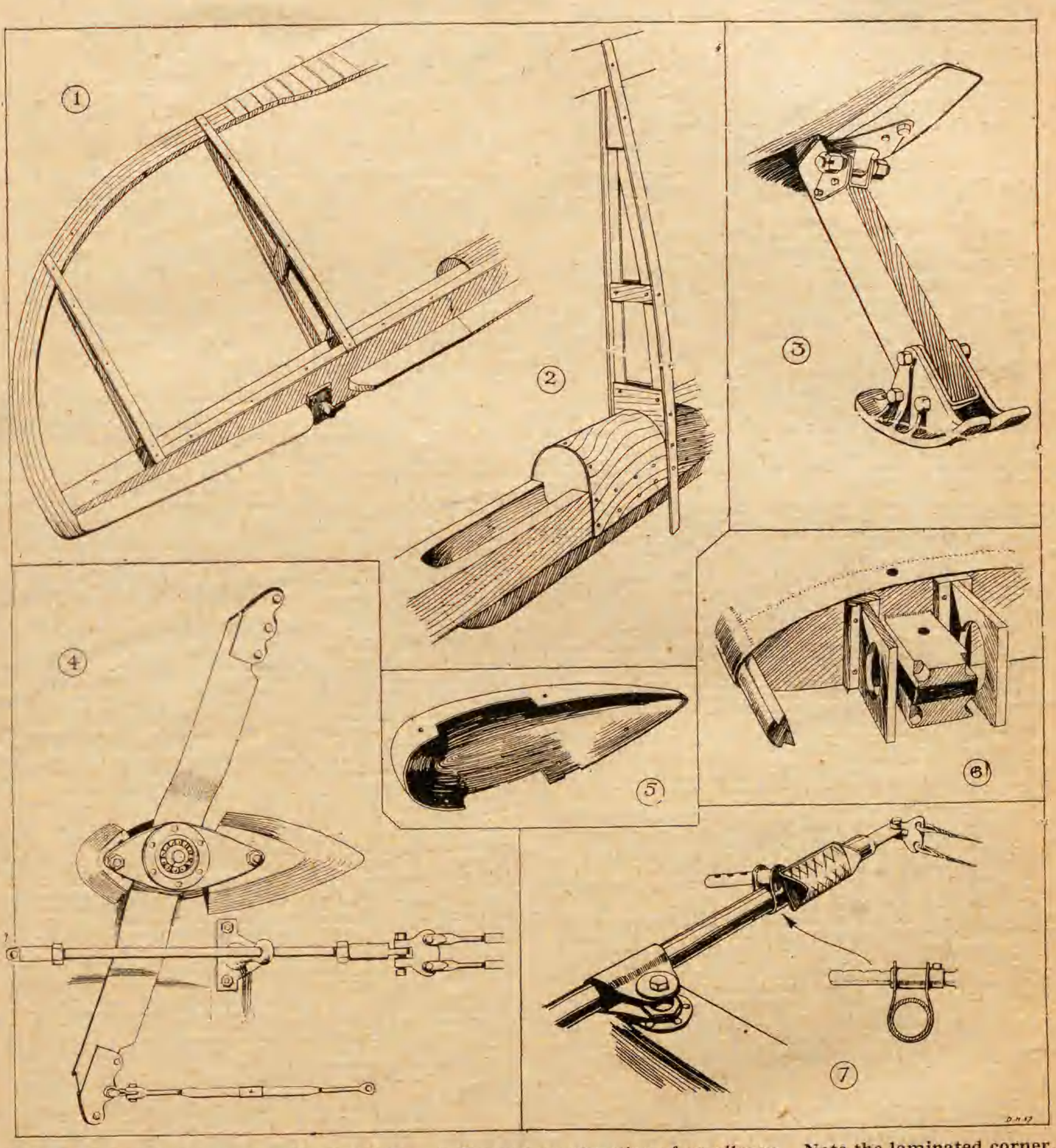
An Austrian by birth, Alfred de Pischoff had worked all his life in France, and he was among the early aviation pioneers of flying, having as collaborator M. Archdeacon. In 1910 he built a small monoplane with E.N.V. engine, which was remarkable for its originality. The fuselage was very similar to the body of a motor-car, and the engine, placed in front, behind a nose radiator, drove a pusher screw, *via* a chain. A clutch was incorporated, and the engine was started with an ordinary starting handle; having got his engine going, the pilot got into his seat, let in his clutch, and away he went.

Early in the War de Pischoff went to Russia, where he joined the Army. When the revolution came he returned to France. Since the War he had been working on the production of small, low-powered sporting aeroplanes, and a couple of years ago he produced a small biplane, which flew very well with a two-cylinder Clerget engine of 16 h.p.

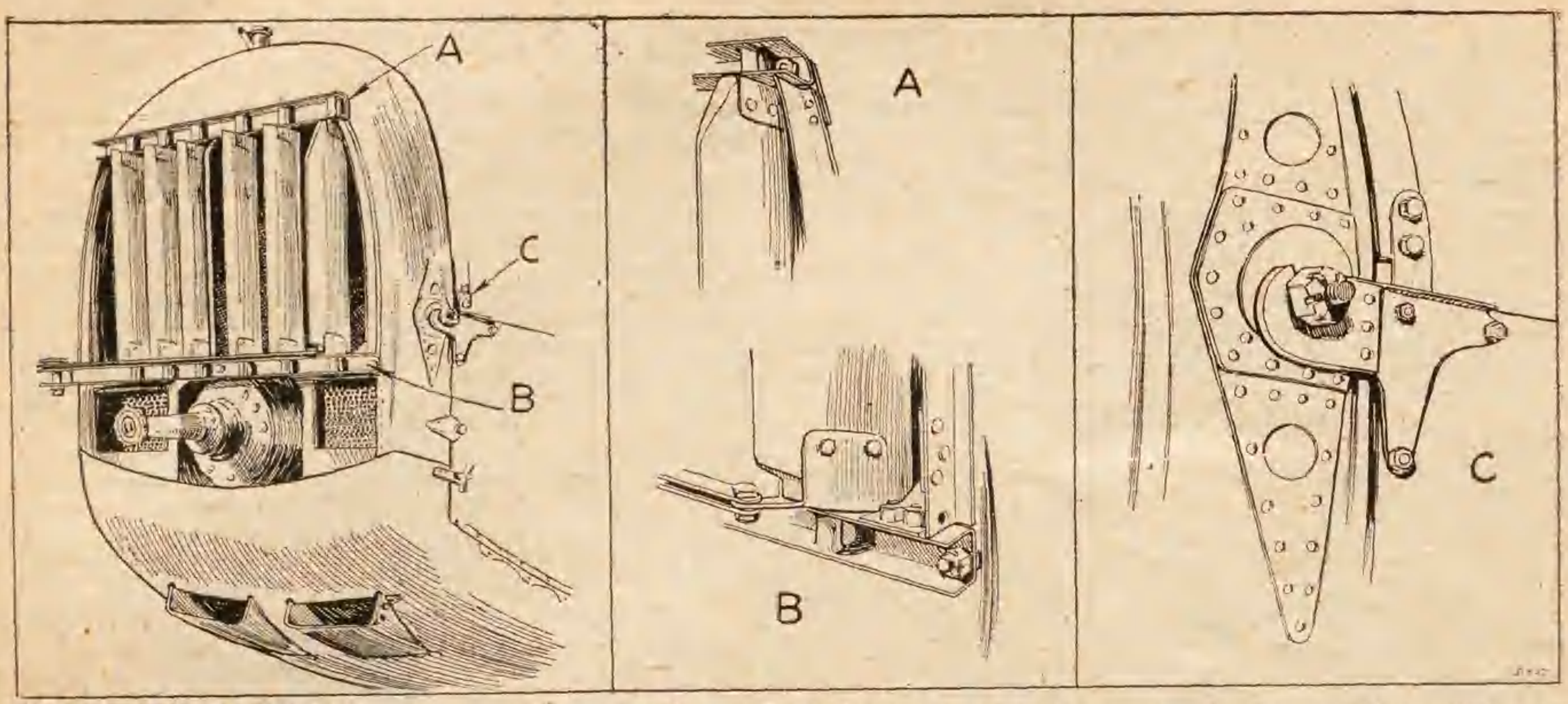
THE DE HAVILLAND 37

Owing to extreme pressure on our columns in last week's issue of Flight, caused by the very full illustrated account of the Aerial Derby and Waddon Meeting, two sets of sketches illustrating constructional details of the interesting De Havilland 37 were, unfortunately, crowded out of the description of this machine. Several photographs, scale drawings and a control diagram were published, and these we supplement this week by printing below a number of sketches illustrating some of the more interesting features of the machine. It was most unfortunate that engine trouble developing just at the moment of the start should have prevented Mr. Butler from taking part in the race. He very sportingly made a start about a quarter of an hour after his official starting time, and completed one lap of the course, but, after the long delay, he would have stood no chance whatever in the handicap. It should also be pointed out that the time made by Mr. Butler in the lap which he completed does not by any means represent the actual speed of the machine. With the engine far from being up to concert pitch, and various little adjustments still having to be made before the machine is considered thoroughly tuned up, the speed over the Derby course must have been close on 20 m.p.h. below that of which the machine will ultimately be capable.

With regard to the constructional details, these will in



THE D.H. 37 : Some constructional details. 1, General construction of an aileron. Note the laminated corner. 2, Detail of aileron, showing how spar is stiffened against torsion by horizontal U of thin three-ply. 3, The very substantial tail skid, for which large bearing area is provided. Note detachable metal shoe. 4, Elevator crank lever with its ball bearing. The horizontal rod below is incorporated in the rudder control cable. 5, is the aluminium streamline casing which covers the elevator ball bearing. 6, Details of the lower plane spar root which is carried in a fitting on the side of the fuselage. 7, Details of the adjustable pedal on the foot bar.



THE DE HAVILLAND 37 : Some radiator details. A and B, details of the shutter. C, the trunnion mounting which supports the radiator.

most instances be clear from the accompanying sketches. The majority of the features illustrated were referred to in the description published last week (pp. 452–455), and to that we would refer readers desiring further information than that which can be gained from an inspection of the accompanying drawings.

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IN PARLIAMENT

Imperial Air Defence Decisions

Viscount Curzon on Aug. 3 asked the Prime Minister whether the Government have yet been able to consider the question of the control and provision for the air arm of the Royal Navy; whether the Government are satisfied that adequate provision is being made to meet the Admiralty requirements for fighting, reconnaissance, and spotting 'planes; and whether better provision in these respects and actual economies can be made if a reorganisation of the branch of the Royal Air Force operating with the Royal Navy is carried out and the Royal Navy made responsible for and be given control of its air arm?

Sir Harry Brittain asked whether the Imperial Defence Committee has reached any decision which will enable production orders to be given forthwith to the recognised British aircraft and aero-engine firms, so that they may find it possible to keep their works going and their experienced staffs together until the House reassembles in November?

Capt. W. Benn asked whether the Imperial Defence Committee has decided that the Navy will be permitted to supply and control aircraft of its own?

The Prime Minister: The Government, as the result of an enquiry by the Committee of Imperial Defence, have decided to adopt a scheme submitted by the Air Ministry providing a force of 500 machines for home defence at an increased cost of £2,000,000 per annum. £900,000 out of the total of £2,000,000 will be found by economies in the Estimates of the Air Ministry.

The enquiries of the Cabinet Committee on Economy in the Fighting Services have advanced sufficiently far to enable me to state that the addition to the Air Estimates will not prevent a reduction in the total estimates of the three fighting services for the year 1923-24.

Considerable orders in execution of this programme will be placed with private firms in the current calendar year.

The foregoing decisions will not prejudice a further expansion of the Royal Air Force if later on this is found necessary to our national security. This question will be considered in the light of the financial situation next year and of the air policy adopted by other Powers.

The enquiry into the system of naval and air co-operation, and as to the best method of securing that the Air Force should render to the Navy the aid it may require, has not yet been completed.

Lieut.-Col. Fremantle: Will the right hon. gentleman reply to Sir Harry Brittain's question, and as regards the subsidiary services?

The Prime Minister: That is a matter regarding which the enquiry is still proceeding.

Lieut.-Col. Fremantle: Will the reports be published?

Col. Wedgwood: Is the enormous increase in the expenditure on the Air Force due to the enormous development of the Air Service in France?

The Prime Minister: Well, we have to take all the circumstances into account.

Sir W. Joynson-Hicks: Is the answer of the right hon. gentleman in lieu of the proposed statement that we understood the Prime Minister would make tomorrow; will he make no further statement?

The Prime Minister: No.

Sir W. Joynson-Hicks: Then the matter cannot be debated?

The Prime Minister: That is a matter for Mr. Speaker, and not for me, but I should have thought it could have been discussed on the Adjournment Motion.

Gratuity

Mr. Raper asked the Secretary of State for Air why it has been decided to treat service as a technical officer of the Air Board as service in civilian employment for the computation of gratuity in the case of officers of the Royal Naval Air Service and of the Royal Naval Volunteer Reserve who were ordered to such service, not only without notice that their status as naval officers was in any way affected, but, in some cases, with a definite assurance from the Admiralty that that status was maintained?

Capt. Guest: The decision to exclude the service in question from the computation of gratuity was in accordance with the Admiralty Order which governed these officers' gratuities, the principle being that service on other than naval rates of pay was not gratuity-bearing.

Flying Boats

Viscount Curzon asked the Parliamentary Secretary to the Admiralty whether the flying warship now under construction on Southampton Water is being constructed according to Admiralty requirements and specifications; and, if not, are the Admiralty in complete touch with all details as to its construction and fittings?

Capt. Guest: I have been asked to reply. By the term flying warship, I assume that my noble and gallant friend has in mind the flying boat referred to in his question of July 27, in answer to which I informed him that it was only a flying boat hull that was under construction. The construction of this hull is simply one stage in the gradual development of the policy which has been frequently thought out and discussed with the Admiralty of producing flying boats which can carry out a prolonged cruise. It is the duty of the Air Ministry to arrange for the construction of such experimental boats as are necessary for this development, and it is for this purpose that the hull referred to has been produced. There is no lack of co-operation with the Admiralty in the matter.

Naval Wing (Officers)

Viscount Curzon asked the Parliamentary Secretary to the Admiralty whether, when the Admiralty asked for volunteers to be seconded to the Royal Air Force, they were to be paid the pay of the Royal Air Force, to be allowed to wear their naval uniform, and to hold the same relative rank; if not, on what grounds; whether any naval officers now are attached, lent, or seconded to the Royal Air Force; whether they are paid at Royal Air Force rates of pay, hold their relative rank, and wear their uniform; and whether they volunteered for service with the Royal Air Force?

Mr. Amery: I assume that my noble and gallant friend refers to the scheme of attachment to the Royal Air Force promulgated in Admiralty Fleet Order 2011 (*a*) of 1920, and not to the short courses of training as observers which are now in operation. Under the former scheme, officers were graded as flying officers on joining, but if they held rank in the Royal Navy higher than sub-lieutenant, they were granted honorary rank in the Royal Air Force equivalent to their naval rank. During their service in the Royal Air Force, however, they carry the rank, pay, and authority of their substantive Air Force grading for all Air Force purposes. They are eligible for substantive promotion to flight-lieutenant, by selection in vacancies, after qualifying as pilots. The uniform worn is, in the case of Service uniform, that of their substantive Royal Air Force rank, or of the honorary rank if held, and, in the case of full dress and mess-dress, naval uniform. I may add that these conditions were those considered necessary by the Air Ministry, who attached considerable importance to the officers wearing the Service dress of the Royal Air Force, even if they wore the mess-dress and full dress of their parent Service. Seven officers, who volunteered for service with the Royal Air Force under this scheme, were attached in September, 1920, for a period of three years. As I explained in my reply of July 25 to the hon. and gallant member for Maidstone (Commander Bellairs), proposals were discussed for attaching a further number of officers in 1921, but the scheme fell through on account of the revised conditions, which the Admiralty thought were necessary to make any voluntary scheme a success, not being acceptable to the Air Ministry. No other officers are now attached, lent, or seconded, as, although officers undergoing courses as observers carry out the greater part of their training with the Royal Air Force, they remain under naval conditions throughout.

Air Defence

Mr. L'Estrange Malone, on August 3, asked the Prime Minister if he can make a statement in regard to the decision of the Cabinet on the position of the Royal Air Force and the question of granting further support for civil aviation; and whether His Majesty's Government still intend to proceed with the construction of the two new battleships, seeing that this money can more profitably be expended, partly on air development and partly on social services?

Mr. Chamberlain (Leader of the House): I would refer the hon. member to the statement made by my right hon. friend on this subject yesterday.

Mr. Malone: In regard to the second part of the question concerning the two new battleships, the right hon. gentleman has not dealt with that?

Mr. Chamberlain: It is proposed to proceed with the two new battleships.

IMPERIAL AIR MAIL SERVICES

First Report of Civil Aviation Advisory Board

AT the Air Conference, held last spring, Capt. Guest announced the appointment of a Civil Aviation Advisory Board, "to advise generally on the development of Civil Aviation, and to report upon any specific point which may from time to time be referred to the Board by the Secretary of State for Air," and stated that the first subject upon which the Board had been asked to give its recommendations was the question of the cost and practicability of an Imperial Air Mail Service. The C.A.A.B. has now issued its first report, which takes the form of a White Paper (Command No. 1739, price 1s. net), published by H.M. Stationery Office. The report is divided into two parts, of which the first deals with general considerations, while the second refers in detail to an air mail service to India. Estimates of costs, revenue, etc., are contained in nine appendices giving the detailed estimates upon which the figures of totals in the body of the report were based.

General

The report states that when the Board started their deliberations it was understood that an airship scheme had been submitted by Commander Burney, and that accordingly they confined their attention to the operation of an air mail service by heavier-than-air craft. The Board state that they have been impressed with the complexity of the problems, and also that they are unanimously convinced that considerations of a national and Imperial character must outweigh in importance any purely commercial considerations. Whatever the military air reserve may be, the Board hold that the machines, pilots and personnel generally employed on Imperial air mail services will form an additional reserve from which assistance could be drawn in case of war, while the production of passenger and goods aircraft, in addition to service aircraft, will keep factories and designing staffs employed and capable of more rapid expansion in case of need. The progress and development in civil aviation that has taken place abroad have not been overlooked by the Board, and the report states that the Board are of the opinion that "if civil undertakings are making an efficient attempt to keep open the civil airways of the Empire by means of rapid and direct air communications, they can fairly claim a considerable measure of financial assistance from the Government until they have been able to establish themselves on a sound financial basis."

It is pointed out that the estimates given in the report are based on information gained with existing types of machines, and that they should not be taken as referring to equipment specially constructed to meet local conditions. The Board think that the most suitable type of machine may vary along the route, and that while certain sections may be operated with land 'planes, other portions may more economically and safely be equipped with seaplanes, flying boats or amphibians. In order to discover the most suitable types of machines and engines, the Board recommend that the technical and scientific aspects of the problems should be referred to the Aeronautical Research Committee, with the suggestion that they should be submitted to a sub-committee and that special funds should be allocated for the purpose. The terms of reference of the Aeronautical Research Committee which the Board suggest are as follows:—

"To consider the scientific and technical aspects of Civil Aviation problems connected with the establishment of an Imperial Air Mail Service, and to decide upon and supervise the conduct of such experimental work and construction (including both model and full scale) as in their opinion is required for the purpose, with particular attention to such matters as—

"(1) The dimensions, speed, power and material of the aeroplanes to be employed, having regard to the useful load to be carried and to the most economical length of stage.

"(2) The other desirable characteristics of the machine, *e.g.*, the relation between its maximum and minimum speeds, safety in alighting, stability and controllability at all speeds, freedom from undue vibration and noise.

"(3) The most economical length of stage, especially in its relation to (*a*) the pilot's power of endurance; (*b*) the characteristics of the machine; (*c*) the nature of the ground traversed.

"(4) The engine and its mounting on the machine: questions of power, weight, fuel and oil consumption, size of machine, length of stage and useful load.

"(5) Questions of safety, strength and load factor; risk of fire.

"(6) Questions relating to navigation and meteorology; the most desirable instruments for the machine; the height at which to fly and the general characteristics of air flow as affecting civil air transport;

"And generally such other scientific and technical matters as may arise."

The report states that the Board have studied with attention the report presented by Lord Weir's Committee of 1919, and endorse the opinion therein expressed that the organisation of a commercial air mail service by private enterprise, supported and encouraged by financial and other assistance from the State, is, in accordance with British traditions, the most natural and suitable form of organisation. It is, the report points out, in selecting the actual form of Government assistance that difficulties are met, and some of these are set forth in the report. Thus it is clear that the capital outlay will be large, and that if the Government were to guarantee an interest of 5 or 6 per cent., much of the incentive to economical and efficient operation would be removed. On the other hand, it is realised that investors will not be forthcoming if the probabilities of eventually earning a larger rate of interest are too speculative, and any form of assistance is too indefinite unless it secures a certain income in return for a regular service. In the opinion of the Board any system of State subsidy should comply with the four following conditions:—

"(1) It should assure a return on the capital invested by the operating company. (2) It should give the operating company a sufficient inducement to effect economies in management and operating charges. (3) There should be a definite maximum limit to the liability assumed by the State. (4) In case of imperial emergency the Government should have the call upon all the aircraft, equipment, pilots and personnel of the operating company."

It is pointed out that there are obviously a number of alternative methods which would ensure this result, and one such method is outlined in an appendix, from which we quote:—

"I. The Government to guarantee (*a*) a low rate of interest on the capital invested; and (*b*) the amount of the working expenses, agreed between the Government and the contractors.

"II. The contractors to retain (*a*) the whole of the earnings of the service; and (*b*) a percentage of any reduction effected in the agreed sum for working expenses.

"III. Any balance left after the payment of a dividend at an agreed rate per cent. on the capital to be divided equally between the Government and the contractors.

The Board consider that the magnitude of the undertaking makes it evident that the enterprise can only be entrusted to a company, created, if necessary, for the purpose, of outstanding Imperial distinction as regards its directorate. It is contemplated that the actual route to be followed would be selected after discussion and agreement with the R.A.F., and that the aerodromes, if not already in the possession of the State, would be acquired by the State, the plant and shed accommodation, etc., being rented to the operating company. The company, however, should be responsible for the management of the aerodromes, the Government to have the right to take over the aerodromes and ground organisation in case of Imperial necessity.

With a view to securing the best offers the Board recommend that, when the route has been selected, an open tender should be advertised asking for terms and conditions on which tenderers would be prepared to maintain a service for the carriage of mails daily, bi-weekly and weekly, as might be decided upon, assuming a load of 500, 1,000 or 2,000 lbs. of mails per week. In this way it is considered that a wider range of alternative methods would be forthcoming than if such tenders were confined to offers in accordance with terms dictated beforehand.

Air Mail Service to India

Having made these observations on the general problems, the Board turn their attention, in Part II, to the question of an air mail service to India. It is stated that the Board started their deliberations by collecting information concerning the fortnightly service which has been in operation by the R.A.F. for a little over a year between Cairo and Baghdad, and it is pointed out that by the use of this service the time for mails is reduced from 27–30 days to about eight days, and that for this remarkable advantage a surcharge of only 6*d*. per ounce is charged. About 10 per cent., it is stated, of the total mail is now air borne over this route.

There are, the report states, three main routes that might be followed for the carriage of mails by air to India, *i.e.*, *via* Egypt, *via* Constantinople, and *via* Alexandretta. The route *via* Egypt would make use of the existing R.A.F. route from Cairo to Baghdad, and is therefore capable of more immediate operation by a commercial undertaking. This route is as follows:—Cairo, Ramleh, Amman, Ramadi, Baghdad—a total distance of 833 miles.

The route *via* Constantinople gives the most rapid line, the report states, but it is pointed out that, apart from physical difficulties, in the present unsettled state of portions of Turkey in Asia it must be some time before such a route can be regarded as a practical proposition. An outline of such a route is given in the report, with the reservation that it should be understood that whether or not this route is practicable still has to be determined. The route outlined is as follows:—Constantinople, Eskisher, Konia, Adana, Aintab, Urfa, Mardin, Mosul, Tekrit, Samara, Baghdad, a total distance of 1,145 miles.

The third route, *via* Alexandretta, will come into prominence if the French proposed service from Paris *via* Italy and Greece to Alexandretta matures. The British route from there would link up with the route outlined above either at Adana or at Aintab.

Whichever route is chosen, the Baghdad-Karachi section is a necessary link in the chain, but the report points out that the actual route to be followed and the types of aircraft to be employed involve special considerations. On the one hand, the Persian postal authorities have obtained permission to use the R.A.F. service from Cairo to Baghdad, and the Persian Government has formally adhered to the International Convention for Air Navigation, so that no difficulty will arise in connection with the operation of civil aircraft registered in Great Britain, India, or any of the Dominions. On the other hand, the R.A.F. are interested in the maintenance of a strategic route to India, which, it is thought, this route on the northern, or Persian, coast of the Gulf might not provide. It is understood that consideration is being given to a possible alternative route along the Arabian shore of the Persian Gulf, but it is stated that this route is unlikely to be opened for service purposes in the near future. The route down the Persian side of the Gulf would probably be: Baghdad, Basra, Bushire, Bundar Abbas, Chahbar, Karachi, a total distance of 1,650 miles.

Karachi–Bombay.—The Board record their conviction that, although this first report deals only with the section of an Imperial Air Mail service to India, Karachi can never be the real main terminus for India, but that the main Imperial Air Route should extend from Karachi to Calcutta and beyond. They also state that they have been assured by the General Post Office that, unless the air route is extended beyond Karachi, one day of the gain would be lost on approximately 70 per cent. of the total mail to India. The Board have therefore assumed provisionally that a feeder line must be established from Karachi to Bombay. This route, which would be operated by flying boats or seaplanes, would probably be as follows: Karachi, Bajkote, Bombay—a total distance of 550 miles.

London–Constantinople or London–Alexandria?—The report calls attention to the fact that an "all-red" air route cannot yet be mapped out from England to India; but, it is stated, it is anticipated that soon this will be nearly, if not entirely, achieved by the production of a machine which can make the trip from London to Malta, *via* Paris and Marseilles, a distance of 1,330 miles, in one flight. In the meantime there are several routes through Europe that could be organised. For instance, it is pointed out that British machines could carry mails from London to Constantinople or Cairo, or mails could be carried by British machines to Paris, and thence by the Compagnie Franco-Roumaine on French machines to Constantinople, if the times of arrival and departure were satisfactorily arranged. Three possible routes have been considered:—(*a*) For operation by landplanes over the London–Constantinople route; (*b*) landplanes from London to Brindisi and seaplanes from Brindisi to Alexandria by seaplanes or flying boats; and (*c*) a seaplane route from Southampton *via* Cherbourg, Bordeaux, across the south-west of France, Sardinia, Malta and Crete to Alexandria. The last-mentioned route measures about 2,650 miles, and is considered too long for practical comparison with the other routes suggested.

Route (*a*)—overland to Constantinople—would be as follows:—Brussels 200 miles, Frankfort 200 miles, Nuremberg 110 miles, Vienna 270 miles, Budapest 150 miles, Bucharest 390 miles, Constantinople 280 miles; total, 1,600 miles. Route (*b*) is divided into two sections, the first of which to be covered by aeroplanes, the second by seaplanes or flying boats. For the first section the stages are as follows: Paris 200 miles, Lyons 245 miles, Marseilles 170 miles, St. Raphael 70 miles, Pisa 185 miles, Naples 285 miles and Brindisi 200 miles—a total of 1,355 miles. The second section, over the sea, would be: Brindisi to Patras Harbour, Greece, 270 miles, Suda Bay, Crete, 260, and Alexandria 480 miles—a total of 1,010 miles, and a total distance from London to Alexandria of 2,365 miles.

Frequency of Service.—The Board, it is stated, started by enquiring into the cost of a bi-weekly service between Baghdad and Karachi, on the assumption that machines would be flown in pairs. Owing to the estimate of maximum load of mails made by the G.P.O., this was reduced to a weekly service in the initial stages, and finally the practicability of operating the route with machines flying singly, assuming certain improvements in the wireless organisation, was considered. The Board desire to call attention to the fact that the expense of the ground organisation is in some degree independent of the frequency of the service and of the number of machines actually flying, and that consequently the cost per trip decreases rapidly with an increase in the frequency of the service. It is therefore hoped that, although it may be necessary to start with a weekly service, it will be found possible at an early date to increase the frequency and thus reduce the cost per trip.

Time Saved by Air Mail

Although expressing the opinion that the saving in time by using the air mail is by no means the only, nor indeed the most significant, reason for establishing such a route, the Board make some estimates of the time which could be expected to be saved if the establishment of an air mail service from either Constantinople or Port Said to Baghdad, Karachi and Bombay were undertaken. At present the time taken by train and steamer from London to Port Said is given as 5½ days, and from London to Constantinople as 4½ days. If air services were established onward from either of these places, the time taken (assuming a weekly service flying by day only) would be: To Baghdad, 7 days instead of 27 to 30 days; to Karachi, 9 days instead of 16½ days; to Bombay, 10 days instead of 14½ days. When regular night flying has made a continuous service practicable, the time taken in air transit will, it is stated, be more than halved.

If the mails were carried by air from London to Constantinople or Egypt, the saving in time with a weekly service would, it is estimated, be further increased, and would be as follows:—

—	Rail and Steamer. Days.	Aircraft flying by day (100 m.p.h.). Days.	Saving. Days.
London to Constantinople	4½	2	2½
Port Said	5½	3	2½
Baghdad	27–30	5	22–25
Karachi	16½	7	9½
Bombay	14½	8	6½
(*Calcutta*	16½	9	7½)

Estimates of Cost.—In the estimates of costs published in the report the Board have used as a basis existing machines, and have consulted constructors and also companies operating on the London–Paris service. In the estimates relating to land routes, aeroplanes of the following characteristics have been assumed: Engine, 400/450 h.p.; petrol capacity, 3½ hrs.; load, 2,000 lbs., exclusive of pilot. Cruising speed at 5,000 ft., 100 m.p.h. Estimates contained in appendices to the report deal with weekly and daily services, those for the Cairo–Karachi and Constantinople–Karachi sections being summarised in the following table, in which the first column gives the stages, the second column the cost (sterling) per trip, and the third column the cost per machine mile (sterling):—

Weekly Service.	£	s.	d.
Cairo–Baghdad	675	15	0
Baghdad-Karachi	981	11	11
(1) Cairo–Karachi	1,656	13	0
Constantinople–Baghdad	946	15	9
Baghdad–Karachi	981	11	11
(2) Constantinople–Karachi	1,927	13	6
Daily Service.	£	s.	d.
Cairo–Baghdad	230	5	1
Baghdad–Karachi	395	4	9
(3) Cairo–Karachi	625	4	10
Constantinople–Baghdad	365	6	1
Baghdad–Karachi	395	4	9
Constantinople–Karachi	760	5	3

The Board have further considered that the section of the route from Baghdad, or rather from Basra, to Karachi might advantageously be operated by some type of marine aircraft or amphibians, and estimates have been prepared for a weekly and also for a daily service from Cairo to Basra with aeroplanes, and from Basra to Karachi with flying boats. The land machines considered are of the same type as that for the previous section, but the type of flying boat upon which the estimates were based has the following specification: Two 350/365 h.p. engines; cruising speed at 2,000 ft., 80 m.p.h.; petrol capacity, 500 miles; load, 2,000 lbs., exclusive of pilot. In tabular form, the columns having the same significance as before, this section of the service may be summarised as follows:—

Weekly Service.	£	s.	d.
Cairo–Basra	790	13	9
Basra–Karachi	1,294	19	1
Cairo–Karachi	2,084	16	8

Daily Service.	£	s.	d.
Cairo–Basra	318	5	6
Basra–Karachi	591	8	9
Cairo–Karachi	909	7	4

With regard to the feeder line from Karachi to Bombay the Board are in agreement that this section should be operated by other than landplanes, and amphibians of the following specification have been used as a basis for the estimates: Amphibian flying boat, 400/450 h.p. engine; load, 1,500 lbs., exclusive of pilot; petrol capacity, 3½ hrs.; cruising speed at 2,000 ft., 80 m.p.h. A weekly service is then estimated to cost £539 per trip for a weekly service, and £225 per trip for a daily service. The figures for machine miles are 17*s.* 11*d.* and 7*s.* 6*d.* respectively.

Estimates are also given for the London–Constantinople (landplanes) and London–Brindisi (landplanes) and Brindisi–Alexandria (flying boats) routes. The summarised figures of costs work out as follows:—

Weekly Service.	£	s.	d.
(1) London–Constantinople ..	650	8	1
(2) London–Brindisi–Alexandria	1,319	11	2

Daily Service.	£	s.	d.
(3) London–Constantinople ..	286	3	7
(4) London–Brindisi–Alexandria	574	4	10

It is pointed out in the report that these estimates differ from those prepared for routes in Asia, as aerodromes in most cases already exist. With regard to the available load on these European routes the report states that "it must be remembered that each of the countries would have the right to refuse permission to a British company to pick up and carry local traffic from one place to another within its own boundaries, and would probably exercise this right." The Board state as their opinion that the trans-European route, which could with existing machines be flown in little more than 16 daylight hours of actual flying time, will eventually prove to be the quickest route for the transport of mails from London to India and the Empire. For purposes of comparison the following table of costs for the operation of air services throughout from London to Karachi is of interest:—

COST.

—	Capital.	Per Annum.	Per Trip.	Per Flying Hour.	Per Mach. Mile.
Weekly Service. (One machine in each direction once a week) :—	£	£	£	£ s. d.	s. d.
(i) London–Constantinople (landplane).	55,000	67,573	650	40 12 2	8 1
Constantinople–Baghdad (landplane).	190,000	98,440	946	78 17 7	15 9
Baghdad–Karachi (landplane).	190,000	102,036	981	59 9 3	11 11
Totals	435,000	268,049	2,577	—	—
Weekly Service *continued* :—	£	£	£	£ s. d.	s. d.
(ii) London–Brindisi (landplane). Brindisi–Alexandria (flying boat).	155,500	137,245	1,319	50 15 2	11 2
Alexandria–Baghdad (landplane).	98,000	70,265	675	75 1 4	15 0
Baghdad–Karachi (landplane).	190,000	102,036	981	59 9 3	11 11
Totals	443,500	309,546	2,975	—	—
(iii) London–Brindisi (landplane). Brindisi–Alexandria (flying boat).	155,500	137,245	1,319	50 15 2	11 2
Alexandria–Basra (landplane).	109,000	82,142	790	68 13 7	13 9
Basra–Karachi (flying boat).	225,000	134,592	1,294	76 2 7	19 1
Totals	489,500	353,979	3,403	—	—
Daily Service (One machine in each direction daily) :—					
(i) London–Constantinople (landplane).	165,500	209,093	286	17 18 8	3 7
Constantinople–Baghdad (landplane).	370,000	266,810	365	30 9 2	6 1
Baghdad–Karachi (landplane).	370,000	288,284	395	23 18 10	4 9
Totals	905,500	764,187	1,046	—	—
(ii) London–Brindisi (landplane). Brindisi–Alexandria (flying boat).	388,000	419,069	574	22 1 7	4 10
Alexandria–Baghdad (landplane).	197,000	168,205	230	25 12 0	5 1
Baghdad–Karachi (landplane).	370,000	288,284	395	23 18 10	4 9
Totals	955,000	875,558	1,199	—	—
(iii) London–Brindisi (landplane). Brindisi–Alexandria (flying boat).	388,000	419,069	574	22 1 7	4 10
Alexandria–Basra (landplane).	263,500	232,139	318	27 13 1	5 6
Basra–Karachi (flying boat).	475,000	431,705	591	34 15 9	8 9
Totals ..	1,126,500	1,082,913	1,483	—	—

Estimates of Receipts

The report points out the difficulties of estimating receipts, and states that the Board have felt it to be unwise to proceed upon any basis except one of extremely conservative estimates, and the assumption has been made that an operating company could only look for an average maximum in each direction of 500 lbs. of mail per weekly trip. This is equivalent to 5 per cent. of the total mail, or in other words, at 25 letters to the pound, 12,500 letters per weekly trip. It is also expected that an average of four passengers each way per weekly trip could be counted upon at a fare of £50. The Post Office assumption of a maximum load of 500 lbs. a trip is based upon a regular service, and on an air fee of 1*s.* per ounce letter, and the Board think that, although the distance is shorter, the saving in time is greater to Baghdad, and suggest that the same letter surcharge of 1*s.* should be obtained for air-borne letters from Cairo or Constantinople to Baghdad as for those carried to Bombay. On this assumption of 500 lbs. of mail at 1*s.* per ounce letter and four passengers at £50 each, the receipts per weekly trip from Cairo or Constantinople to Bombay would be £825, and it is also estimated that the expenses per trip would be covered if the mails per trip at 1*s.* per ounce letter were increased to 1,757 lbs. in the case of the Cairo–Bombay route, and to 1,973 lbs. for the Constantinople–Bombay route. This assumes that no passengers were carried.

Recommendations

In conclusion the Board make the following recommendations :—

A.

(1) A technical and scientific investigation should be instituted to ascertain the most suitable type or types of aircraft and engines for a service to India, and the most economic length of the stages.

(2) A specially appointed Sub-Committee of the Aeronautical Research Committee should be made responsible for this enquiry with the terms of reference set forth in paragraph 12 of this report.

(3) A total sum of £200,000 spread over three years should be set aside for this purpose and for the purchase of experimental matériel.

(4) This investigation should not in any way interfere with the establishment and operation of an air mail service to India.

B.

(1) (*a*) The route from Baghdad to Karachi should be laid out and prepared for operation by civil machines, the necessary plant should be erected and the construction of the shed accommodation proceeded with. For this purpose we estimate that a total sum of £100,000 would be necessary, spread over three years. (*b*) Tenders should be invited for both a weekly and a daily service from Baghdad to Karachi and Calcutta with a branch line to Bombay.

(2) (*a*) The route from Cairo to Baghdad now operated by the Royal Air Force should be prepared for operation by civil machines. For this purpose we estimate that a total sum of £20,000 would be necessary. (*b*) Tenders should be invited for both a weekly and a daily service from Cairo (or Port Said) to Baghdad.

(3) The following financial assistance should be given to the Company whose tender is accepted :—(i) An annual payment for three or five years in consideration of the services rendered to the Empire ; the amount of this payment can only be settled after the tenders have been received and examined. (ii) A guarantee for five years of a small percentage on capital invested.

C.

As a further stage, when the conditions in Turkey in Asia make it possible—

(*a*) Tenders should be invited for both a weekly and a daily service (i) from Constantinople *via* Baghdad to India ; or (ii) from Alexandretta *via* Baghdad to India, if the French route to Alexandretta has been developed ; (iii) from London to Constantinople or Alexandretta.

(*b*) State assistance will be necessary for these extended routes.

D.

(1) The Indian Government should be asked as to the amount of financial and other assistance they would be prepared to give to a commercial undertaking operating an air mail service to India.

(2) The Colonial Office should also be asked as to the extent of the assistance that they could give in view of the advantages to Iraq.

Mr. G. Holt Thomas, in signing the report, makes the reservation that, in his opinion, the laying-out and equipment of the aerodromes should be in the hands of the operating company, provided the work is done under efficient Government control. Lieut.-Col. Sir Frederick Hall, representing Lloyd's, signs the report with the reservation that he sees no reduction in insurance premiums in sight at present. He suggests that the Government should grant a small sum annually for the assistance in compiling data regarding machines and their makers, and also full information regarding the flying personnel, so that insurance companies and underwriters may be in a position to judge more clearly the actual nature of each individual insurance.

Lieut.-Col. Mervyn O'Gorman, representing the Royal Aeronautical Society, in a lengthy appendix, deals with some of the scientific and technical aspects of the Imperial Air Mail Service. He points out that the problems relating to the establishment of such a service as that contemplated may be approached from two different points of view, both justifiable but leading to widely diverging procedures. The first of these is summed up in the statement that " the best way to start is simply to begin." The advantages of this procedure are that of getting in first, before other countries, keeping existing types going, and developing them on the service ; getting existing pilots work to do so that they will not drop out of flying ; and that much will be learnt, whether the attempt succeeds or fails, which could not otherwise be known, or if it were, would not be appreciated. The second method, Lieut.-Col. O'Gorman points out, takes the view that there is much which requires close scrutiny and scientific work. This view claims that the air mails are just as much an engineering and scentific enterprise as the Brooklyn Bridge, demanding the determination of a number of maxima and minima before success can be forecasted. Among the advantages offered by the second method are the urgency of economy in capital, economy in pilots, economy in non-paying load, and the urgency of getting first, before other countries, into possession of the premier technical position in the science of self-supporting aerial transport.

Lieut.-Col. O'Gorman then proceeds to give examples of the class of question that arises under each of the last four headings. Under economy in capital he points out if we assume 100 m.p.h. cruising speed and 500 lbs. of mails, the question arises what is the optimum length of stage and what the desirable aeroplane. By increasing the stage length from 3 hours to 3½ hours the number of aerodromes is decreased, and the aeroplane will not cost much more, while the service will be accelerated. Increasing the stage length results in a certain measure in economy in pilots, unless the stage is increased to a point where the pilot is due to be fatigued. In this connection the question of speed enters into the problem. Col. O'Gorman states that there is no magic in the figure chosen of 100 m.p.h. This is a sensible first estimate, but not necessarily the best figure. He points out that at 100 m.p.h. 60 h.p. is required for each 1,000 lbs. of gross weight, while at 120 m.p.h. this figure becomes 97 h.p., and at 140 m.p.h. it is as high as 140 h.p. The sacrifice of fuel for the extra 20 m.p.h. is large, although there is the big advantage that the 3½ hours' stage covers 420 miles instead of 350 miles, and the fatigue of pilots, he states, has been found to be based on a time factor, not on a speed factor. As much as 33 per cent. of loss of endurance is ascribed to the unsilenced engine, and then there is the mental fag due to persistent attention to compass course and ground tracks in the desert. Lieut.-Col. O'Gorman is of the opinion that all these difficulties can be removed if a determined assault is made on them. Thus he points out that flight by compass without continual attention is possible by azimuth gyro control of rudder, provided the necessary scientific work is pressed on. Thus the bill for pilots can be reduced, provided that scientific work is proceeded with, not as at present with an axe, but with the utmost energy.

Economy in fuel and oil and engine dead weight are susceptible of enormous improvement, in the opinion of Lieut.-Col. O'Gorman, provided the work is endowed. He also thinks that the stable aeroplane is wanted the more for air mails as the length of stage must be made as large as possible. Throughout the appendix by Lieut.-Col. O'Gorman, the need for research is emphasised, and he suggests that, as all the work will not be entirely extra to present research, £100,000 set aside for the purpose would suffice.

Moscow–Berlin Non-Stop

In connection with the splendid non-stop flight from Moscow to Berlin made by the German pilot, Joachim Styllbrock, some time ago, carrying the Russian representative in Berlin, M. Krestinski, and two Government officials, it is of interest to recall that this machine was fitted with a Rolls-Royce engine. The Fokker R4 covered the distance of 1,800 kilometres (1,115 miles) in 18 hours, or at an average speed of 62 m.p.h. The machine travelled over the towns of Vyasma, Smolensk, Vitebsk, Polotsk, Dunaberg, Kovno, Königsberg, and thence to Berlin. The opinion of the pilot as regards the Rolls-Royce engine is expressed as follows in the *Vossische Zeitung :* " I had the firm conviction that I should arrive safe and sound in Berlin the same evening, and now that I have succeeded in this I have to thank not least my smooth-working 360 h.p. Rolls-Royce engine, which, up to the present, has been running like a chronometer." (The pilot has so far made the trip between Königsberg and Moscow fourteen times behind a Rolls).

French Gliding Competition

Up to the present no very prolonged flights have been made at Clermont-Ferrand, the average durations obtained being from 1½ to 2 minutes. The weather has been unfavourable, and it is hoped that the next few days will show an improvement. There have been a few crashes, fortunately without serious consequences.

THE LARSON TENSIOMETER

A problem of considerable importance in aircraft construction is that arising from the tension of the wires and cables employed for bracing. The tension of these wires must, we need hardly point out, be of the correct magnitude in each particular case, otherwise—apart from mal-alignment—the initial stresses in the structure may be increased with a resulting lowering of the factor of safety. A faulty adjustment of a bracing wire has been known, on more than one occasion, to result in an accident, more or less serious. It is desirable, therefore, to find a means of ascertaining the amount of tension in any particular wire, and it is with this object in view that a very ingenious instrument has been produced in America, known as the Larson Tensiometer—a description of which appears in our American contemporary, *Aerial Age*.

This instrument consists of a frame about 10 ins. in length with two supports, a fixed distance apart, between which the wire is adjusted. Midway between the supports, and operated by hand levers or grips, is a plunger which deflects the wire from its normal position.

The action of deflecting the wire compresses a calibrated spring, and a dial indicator, called the load dial, measures this compression, and indicates the tension in the wire. A second dial indicates the deflection of the wire to the nearest ·001 of an inch.

The theory upon which the instrument is based is as follows :—If a wire, under tensile stress, is deflected from a straight line, a system of three concurrent forces, consisting of the tensions in the two segments of the wire on either side of the deflecting force and the lateral force, is formed. The system is in equilibrium, and if the forces and the magnitude of one are known, the magnitude of the other two can be found. In the operation of this instrument the wire is deflected a certain prescribed amount, hence the angles between the forces will be constant and the deflecting force will be proportional to the tension in the wire.

The instrument is made direct reading by graduating the load dial so as to read the tension in the wire instead of the compression in the plunger spring. The sensitiveness of the instrument depends upon that of the load and deflection dials. Operating with a deflection of 0·1 in., a direct reading may be obtained correct to 0·001 in., or 1 per cent., whilst the load dial reads directly to the nearest 10 lbs.

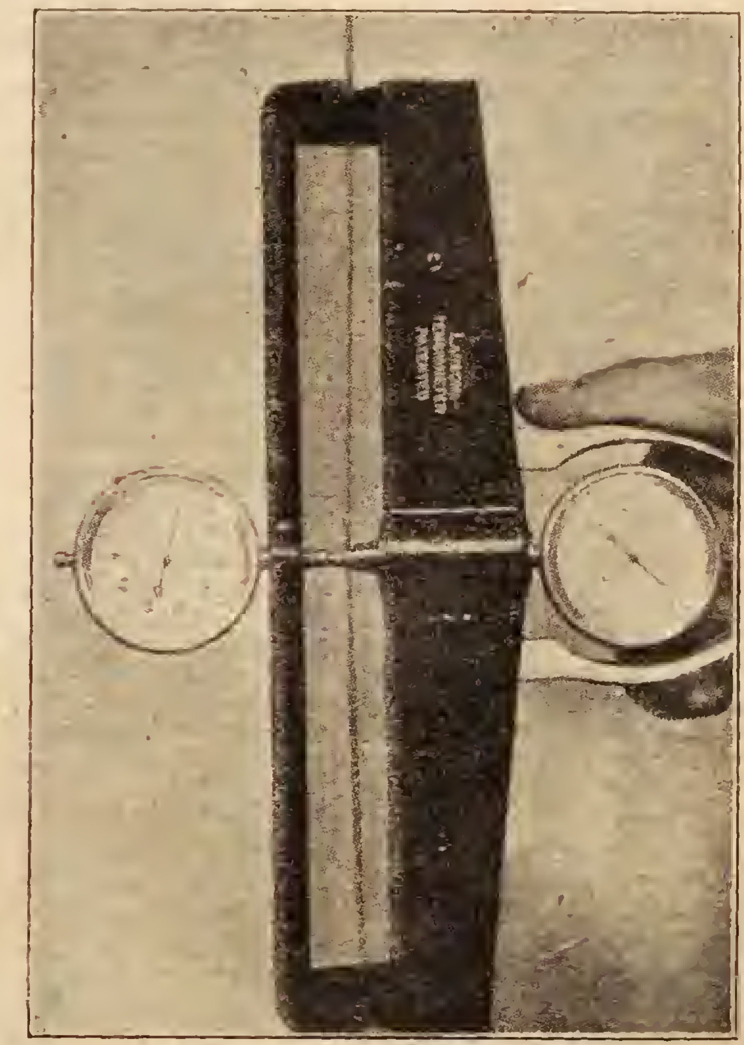
To obtain the highest degree of accuracy on some of the larger sizes of wire the readings must be corrected for two reasons. Firstly, the tension in the wire is slightly increased when it is deflected from a straight line; and secondly, the wire offers a resistance to deflection because of its stiffness as a beam. Both of these tend to make the indicated load too large, but the corrections are of such a nature that they can readily be made when constant deflection is used. The increase in stress due to deflecting the wire from a straight line depends upon the sectional area and the length of the wire, and upon the rigidity of the supports to which the wire is attached.

Using the standard deflection, and assuming the supports to be rigid, it may be expressed by the formula $p = \frac{60{,}000\,A}{L}$ in which p is the increase in total load (lbs.), A is the area of the wire (sq. in.) and L is the length of the wire. It will be seen that this increase is small for conditions met in practice. Furthermore this formula is based on the assumption that the ends are held in rigid supports. Any yielding of the structure to which the wire is attached will reduce the effect so that for aeroplane purposes this correction can generally be neglected.

The increase indicated load caused by the stiffness or beam action of the wire depends upon the amount of end restraint at the supports of the instrument and upon the section modulus of the wire. The end restraint depends upon the tensile load on the wire. With no load the wire acts as a simple beam, and as the tension of the wire increases, the action approaches that of a fixed ended beam. The section modulus of the flexible cables is an uncertain factor, hence a theoretical consideration of this problem is impracticable, and the only satisfactory method of determining the proper corrections is to calibrate the instrument on the various sizes of wire and cable upon which it is to be used. Calibration curves are available for most sizes of wire, both circular and streamline, and for all sizes of cable in use on aeroplanes.

As found from these curves, the corrections for all cables up to $\frac{1}{8}$-in. are negligible, and for cables from $\frac{5}{32}$ to $\frac{1}{4}$ in., and for all sizes of round solid wires, the corrections vary with the size of cable or wire, but not with the tension in the wire for loads above 200 lbs. For cables above $\frac{1}{4}$ in. the corrections vary slightly with the load as well as with the diameter of the wire, if the standard 10-in. instrument is used. A longer instrument on these large sizes of cable would materially reduce the corrections necessary.

Although corrections are required on a number of the sizes of wire and cable in use on aeroplanes, the instruments can be made direct reading by setting the load dial for the correction of the size of wire or cable upon which the observation is being made. The dial readings will then indicate the actual load on the wire near enough for all practical purposes. A plate giving the dial settings for the various sizes of wire is attached to the instrument.



The Larson Tensiometer, for measuring the tension in wires and cables

These instruments have also been used in connection with sand loading tests on 'planes and other research work, and for such work in which greater accuracy is desired, the calibration curves may be used to determine the load corresponding to any given reading.

In operation the instrument is never attached to the wire, but is simply placed in position, as shown in the accompanying illustration, and the hand grips brought together until the deflection dial makes one complete revolution (0·1). The reading on the load dial will then indicate the tension in the wire. When using the instrument on wires or cables for which corrections are required, the load dial is adjusted by turning the face to the proper zero for the particular size of wire. The actual tension in the wire is then read on the load dial in the same manner as if no correction were needed. The time required to take a reading is only a few seconds, so that a complete set of readings on a 'plane may be taken in a very short time.

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U.S. Government Machines in Pulitzer Race

In connection with the Pulitzer Race to be flown in October, the U.S. Army Air Service has placed orders for seven Pursuit machines with American firms, believing that the machine which is a good racer will also possess qualities desirable in a Pursuit type. Two machines have been ordered from the Curtiss firm, two from the Loening Corporation, and three from the Lawrence Sperry Company. The engines to be fitted are respectively: Curtiss C.D.12 (375 h.p.), Packard (600 h.p.) and Wright H.3 (390 h.p.). Although nothing definite is known at present, there is a possibility of the U.S. Navy also entering machines.

LONDON TERMINAL AERODROME

Monday evening, August 14.

PASSENGER traffic is now "booming" to such an extent that it is probable all records will be broken this week. Up to Sunday night between 500 and 600 air travellers had passed through the passport office on the aerodrome, and this number would have been larger still but for the inclement weather in northern France on Sunday. So large was the number of travellers wishing to fly from Paris to London on Sunday that the Daimler Airway despatched three machines from Croydon in the morning, instead of their usual one, in order to bring back passengers from Paris; while Handley Page Transport sent two machines for the same purpose.

The machines had to leave Croydon comparatively empty, as the tide of traffic now appears to have set in from the other side. Booking agencies attribute this to the bad weather, which they say has caused a general curtailment of holidays on the Continent, and made people hurry home sooner.

British Air Travellers Increasing

AN analysis of the passenger traffic shows that the number of British travellers is increasing steadily. A year ago the average of British to "aliens" was as small as 10 per cent., but last week quite 33 per cent. of the travellers were of British nationality. This is a most encouraging sign, as it is probable that, if the figures could be obtained, a large proportion of the British passengers would be found to be business people who realise the advantage of air transport.

The clergymen who were travellers by Instone last week do not appear to have had much effect on the luck of the Line in the way of forced-landings. Perhaps Major Greer's methods will be more effective.

On Saturday a Vickers "Vulcan," flying from Brussels to Croydon, piloted by Mr. Bradley, ran out of petrol when near Warlingham, and, as owing to the bad weather Mr. Bradley was flying about 100 feet from the ground, he had no time to choose his landing-ground and ran into a hedge, wrecking the machine. His four passengers were, however, uninjured, and Mr. Bradley escaped with nothing worse than a cut on the hand, which was so slight a bandage was unnecessary. On Sunday the new D.H. 34, G—EBBW, which the Instone Line took delivery of on Saturday, set off for Paris, but was compelled to descend at Marden owing to a broken oil-pipe. She flew back to Croydon later. The Instone sheds had an empty appearance on Sunday owing to the fact that all the machines which could be spared from the Brussels service were in Paris ready to bring back a record booking of passengers.

New Way of Ending a "Night Out"

AT 2 a.m. one morning during the week a motor-car arrived at the aerodrome containing four jovial spirits who demanded to fly to Paris immediately. They had been having a "night out" and had, on the spur of the moment, decided to end up with a night flight to Paris. They were informed that no night services were running, but that the first machine away would be the Daimler newspaper express at 5.30 a.m. They were nothing daunted by the wait, and settled down in their car for a nap, eventually embarking on the 5.30 a.m. machine. They returned on the 5.30 p.m. Daimler from Paris, very well pleased with their trip.

The Messageries Aériennes' service to Marseilles was to have started this week, and to run on Monday and Friday. As, however, there have been no bookings the London–Paris section has not been run, but this will be put into operation as soon as passengers are forthcoming. The Messageries have been having bad luck with their newspaper machines during the week, and on Sunday the machine which left Paris in the early morning was amongst the "crowd" held up at Berck.

"Flight" Copyright.

All that happened: When, on alighting after winning the Derby, Mr. James was in danger of running into a crowd of people (who ought not to have been there), he effected a masterly "save" by swerving to the right. His left tyre, as a consequence, came off, but otherwise nothing happened.

Progress in "Airway" Wireless

ONE of the "F.2's" of the K.L.M. has been fitted with wireless in Holland, and has been flying between Amsterdam and Rotterdam for some time. Signals from this machine, which was working with ground stations in Holland, have been picked up clearly by the operators at Croydon. In fact, the whole of the wireless has been improved to such an extent that it is quite a common occurrence for the Croydon operators to be in touch with a machine the moment it has let out its aerial after ascending from Le Bourget. The wireless-equipped "F.2" flew from Amsterdam to London on Friday, this being the first time a Dutch machine with wireless has flown to Croydon, and probably the first time a wirelessly-equipped machine has flown on this route.

The Grands Express were apparently determined to go one better than carrying little five-year-old George Risser, for on Saturday they had amongst their passengers a baby only eight-months-old. It was a pity that no enterprising pressman was able to get the baby's impressions of flying.

The work in the passport and immigration office has become so great that the C.A.T.O.'s were unable to look after it in addition to their usual work on the aerodrome, and a special immigration officer is now in charge. In addition there is, of course, the Scotland Yard man who sees that no undesirables go out, while the immigration officer performs a similar function with regard to those attempting to get in.

The Surrey Flying Services were busy again during the week-end with their popular 5s. joy-rides. Both Capt. Muir and Mr. Youell were fully occupied on the Clerget and Renault Avros, mainly owing to the efforts of Mr. C. J. Chamberlain, who is now employed by this Company to assure the crowds which gather in the public enclosure that flying is quite safe. Incidentally, the Surrey Flying Services staff should be able to compile an amusing book on the silly questions and comments of would-be and actual joy-riders.

On Monday, a record day, there were as many as 170 passengers in and out of the air-station, including the 64 American girl-students from Paris, who were brought over in eight Instone machines—one or two of these 'planes, by the way, delayed by bad weather in France, alighting at Croydon after dark, and by the aid of the night-lighting.

It is interesting to note that 151 of Monday's 170 passengers travelled in British machines; also that on this record day there were as many as 41 "air expresses" passing to and fro along the airways between London and the Continent.

Another item of special interest on Monday was the chartering at the air-station in the evening of an "air-taxi" by a fare who, having his family on holiday down at Hythe, desired to rejoin them speedily after an urgent visit to town.

On Sunday—it now transpires at the moment of writing—Capt. Muir took up as many as 400 "joy-riders."

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The Derby Handicap

WE have been requested to correct a mistake in the double-page advertisement of the Gloucestershire Aircraft Co. which appeared in last week's issue of FLIGHT. It was stated that the "Mars I" with Napier "Lion" engine was winner of the Derby of 1921, doing fastest time and handicap, and again winner of the Derby, 1922, fastest time and handicap. It will be remembered that last year the "Mars I" was actually winner of the Derby and first in the Handicap. This year, of course, the Mars I. won the Derby, but was third in the Handicap. The Bristol Monoplane, with 100 h.p. Bristol "Lucifer" engine, was first in the Handicap, and the Bristol "Bullet," with 400 h.p. Bristol "Jupiter," was second in the Handicap. In our table of times, etc., on p. 451, the relative positions both in the Derby and in the Handicap were correctly shown.

THE ROYAL AIR FORCE

London Gazette, August 8, 1922

General Duties Branch

Wing Comdr. C. R. S. Bradley, O.B.E., is restored to full pay from half-pay; July 28. Wing Comdr. G. P. Grenfell, D.S.O., is placed on half-pay, Scale A; Aug. 1. Flying Offr. J. H. Huxley, D.F.C., is transferred to the Reserve, Class A; Aug. 4. *Flying* Offr. S. Hobbs is placed on the Retired List; Aug. 1. Flt. Lt. R. S. Smith relinquishes his short service commn. on account of ill-health contracted in the Service, and is granted the rank of Major; Aug. 10.

Stores Branch

Flying Offr. N. Dainty is granted a permanent commn., with effect from Sept. 12, 1919, retaining his present substantive rank and seniority, and is transferred to the Stores Branch with effect from June 17, 1920. *Gazette* Sept. 12, 1919, appointing him to a short service commn. is cancelled.

Memoranda.

Hon. Sec. Lt. E. R. Bauchop relinquishes his honorary commn. on joining the Army; June 5. The permission granted to Lt. W. R. Northridge to retain his rank is withdrawn on his joining the Army.

ROYAL AIR FORCE INTELLIGENCE

The following appointments in the Royal Air Force are notified:—

Flight Lieutenants.—E. F. Turner, from R.A.F. Depôt (Inland Area) to R.A.F. Base, Leuchars (Coastal Area. 13.7.22. The previous notification wherein this officer was posted from R.A.F. Depôt to No. 10 Group Headquarters is cancelled. R. F. Durrant, A.F.C. The previous notification wherein this officer was posted from No. 10 Group Headquarters to School of Naval Co-operation and Aerial Navigation is cancelled. A. Durston, A.F.C., from Seaplane Repair Base (Mediterranean) to Headquarters, R.A.F. Mediterranean. (Supernumerary.) 1.6.22. T. H. K. Maclaughlin, from No. 2 Squadron, No. 12 Wing (Ireland) to R.A.F. Depôt (Inland Area). (Supernumerary.) 5.7.22. G. W. Allen, from R.A.F. Depôt (Inland Area) to Marine and Armament Experimental Establishment (Coastal Area). 25.7.22. A. E. Jenkins, from R.A.F. Depôt (Inland Area) to No. 1 Flying Training School (Inland Area). 12.7.22. C. F. Pitt, from Armament and Gunnery School (Inland Area) to No. 39 Squadron (Inland Area). 28.7.22. J. C. Osburne, M.B., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to No. 1 School of Technical Training (Boys) (Halton). 24.7.22. P. J. Barnett, M.C., from No. 47 Squadron (Middle East) to R.A.F. Depôt (Inland Area). (Supernumerary.) 5.7.22. A. E. Barr-Sim, M.B., from Headquarters, R.A.F., India (India), to Aircraft Park (India). 14.5.22. E. E. Isaac, M.C., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Depôt (Inland Area). 24.7.22. J. A. Perdrau, M.D., from No. 1 School of Technical Training (Boys) (Halton) to R.A.F. Depôt (Inland Area). 31.7.22. E. N. E. Waldron, from R.A.F. Base, Gosport (Coastal Area) to Stores Depôt (Iraq). 18.7.22. N. Keeble, D.S.C., D.F.C., from School of Technical Training (Men) (Inland Area) to Boys' Wing (Cranwell). 25.7.22. F. W. Walker, D.S.C., A.F.C., from School of Naval Co-operation and Aerial Navigation (Coastal Area) to Seaplane Training School (Coastal Area.) 15.8.22. C. H. B. Jenner-Parson, from Seaplane Training School (Coastal Area) to R.A.F. Base, Leuchars (No. 205 Squadron) (Coastal Area). 15.8.22. E. G. Hopcraft, D.S.C., from Seaplane Training School (Coastal Area) to R.A.F. Base, Leuchars (No. 205 Squadron) (Coastal Area). 15.8.22. J. W. B. Grigson, D.S.O., D.F.C., from R.A.F. Base, Leuchars (No 205 Squadron) (Coastal Area), to Seaplane Training School (Coastal Area). 15.8.22. G. H. Reid, D.F.C., to R.A.F. Depôt (Inland Area). (Supernumerary). 16.7.22. Frederick Petch, M.B.E., from Headquarters, R.A.F., Iraq, to R.A.F. Depôt (Inland Area). (Supernumerary.) 11.6.22 H. A. Tillman, M.D., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area) on appointment to Temporary Commission. 18.7.22. J. H. W. Fitzgerald, from Central Flying School (Inland Area) to No. 11 Wing Headquarters (Inland Area). 1.8.22. A. N. Benge, from R.A.F. Depôt to No. 5 Flying Training School (Inland Area). 1.8.22. C. L. P. Mullany, from No. 1 Armoured Car Company (Middle East) to Egyptian Group Headquarters (Middle East). (Supernumerary.). 4.5.22. J. H. Simpson, from Palestine Wing Headquarters (Middle East) to Headquarters (Iraq). 28.6.22. E. E. Isaac, M.C., from R.A.F. Depôt (Inland Area) to M.T. Repair Depôt (Inland Area). 25.7.22. G. H. H. Maxwell, M.B., from No. 39 Squadron (Inland Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) 1.8.22. J. Wren, from Headquarters Middle East Area to Aircraft Depôt (Middle East). 28.4.22.

WRITING IN THE SKY

Something more than an Advertising Stunt

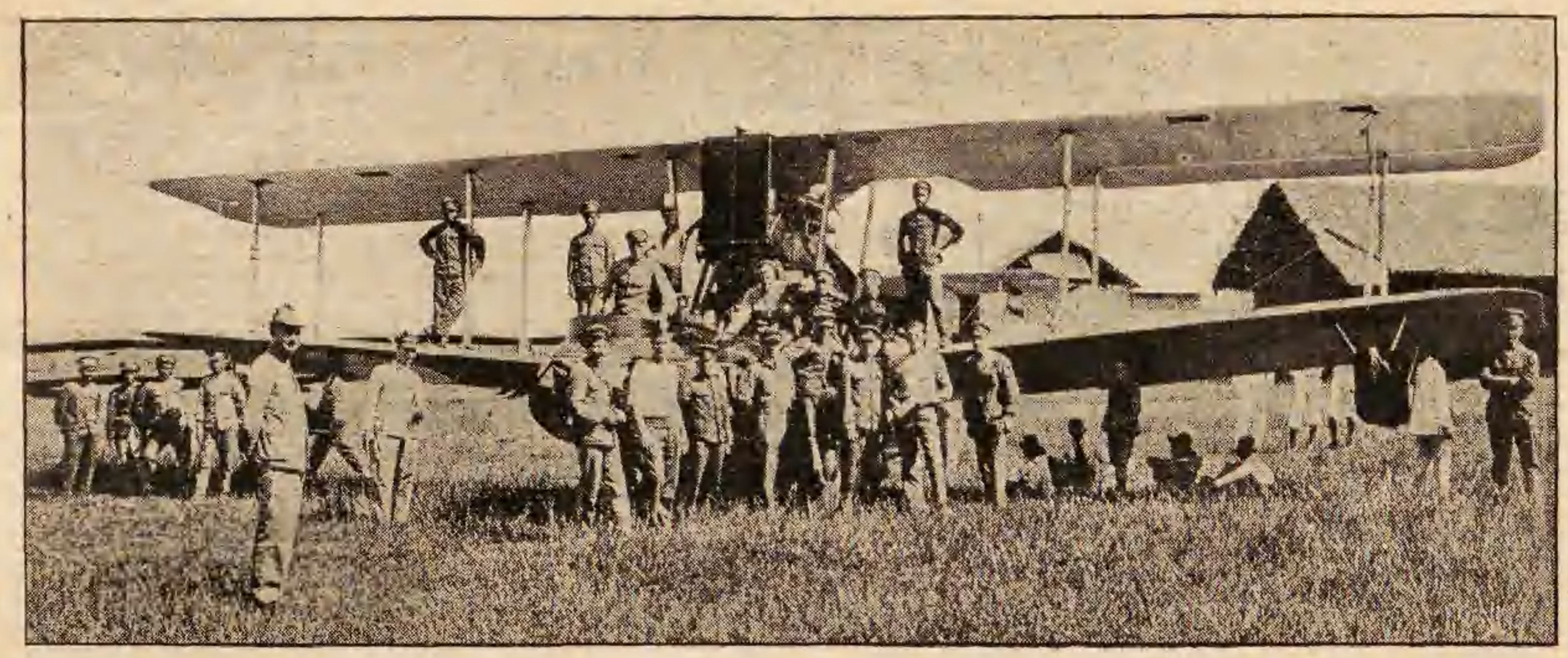
THERE can be few readers of FLIGHT—at any rate, among those who live in London—who have not seen and admired the ingenuity of the new "sky-writing," by which a trail of smoke, emitted from an aeroplane, is made to trace some name, word or phrase in the sky, where, under favourable atmospheric conditions, the smoke remains in shape for several minutes, clearly visible to the thousands who watch it from the crowded streets below. The first word to be written in this way was "Castrol," the name of the famous lubricating oil which is used almost exclusively in aero engines and in numberless other petrol motors. The most recent occasion on which this word appeared in the sky was on August Bank Holiday, just as Gen. Brancker was presenting the Cups for the Aerial Derby at Waddon.

It would have been of interest to describe in detail the apparatus by means of which the smoke is produced, but Maj. J. C. Savage, the inventor of the apparatus, has requested us to refrain from giving details, as certain Patent questions still remain to be settled in foreign countries where the invention is being covered. Suffice it to state that the smoke-producing apparatus depends for its action upon chemical reaction. The resulting smoke trail is allowed to escape from the rear portion of the *fuselage* of the machine, and the apparatus is so designed that it causes no danger from fire. In its present form the apparatus is the outcome of several years of experimentation and the expenditure of large sums of money on perfecting the details. The invention has now reached a stage where not only is the smoke trail dense and clearly defined, but it is so constituted that it hangs for a considerable time before dissolving, unless a very strong wind is blowing at the time.

As the written words are within eyesight range from an area of some 100 square miles, the number of people who see it every time must be enormous, the "publicity value" being therefore of great moment. We frankly confess that if the new invention represented nothing more than an advertising "stunt" we should not feel inclined to devote space to it in our columns, but if one studies it in greater detail it will be discovered that a number of interesting possibilities suggest themselves. Thus, to begin with, even regarding the invention purely as an advertising medium, there can be little doubt that, from its novelty and attractiveness, this form of bringing home to the public the advantages claimed for this or that commodity will rapidly become popular, thereby necessitating the employment of a number of pilots, who will thus be able not only to make a living, but will be keeping their flying hands at top efficiency. From a national point of view this is of the greatest importance, and it may well be that in the next few years as many pilots will be employed on this work as are now engaged on the London-Continental air services. Not only so, but ground staffs, engineers, etc., will be given occupation, machines will be in use and engines will be required. Thus it may be expected that quite a little industry will spring up, which will give useful work to many, and which will, moreover, sustain public interest in and familiarise flying.

The possibilities of Maj. Savage's invention do not, however, end there. One can easily conceive of the smoke trail being used for sending out code messages in Morse, and thus another form of signalling has been added to those already in existence for military and naval use. As a matter of fact, in the early part of this year Major Savage did a series of experiments for the Air Ministry on Morse signalling, hiding aircraft in flight, formation of coloured smokes, tracing the path of aircraft in flight during such manœuvres as looping, rolling, spinning, etc., and also in the use of tiny smoke filaments released around the aeroplane in order to show the actual behaviour of the air flow over its various parts.

It therefore appears possible that these smoke trails may prove of the greatest value. For instance, small jets of the smoke, allowed to emerge in front of a flying aeroplane and travelling back over its various parts, may, if observed or, better even, photographed and cinematographed from another machine, teach us a very great deal about such things as downwash, slip-stream effect, eddies around projecting parts and so on. Already the smoke trails, used for the relatively minor purpose of advertising, have indicated peculiar breaks in the trail during sharp curves, such as occur when the pilot is describing the letter O. Little hooks are always observed to form from the smoke ring, and these occur at such regular intervals and are of such uniform shape that they must be connected with vortices around the machine, probably around the wing tips. Thus quite a new field of investigation is opened up, and to our way of thinking the great value of the invention lies along lines such as these. Lateral control at large angles of incidence might be usefully investigated in this way; the experiments should not be unduly difficult, nor should the cost involved be beyond the capacity of our research votes. Thus, while believing that the first regular application of the invention will be for advertising purposes, we are looking forward to the time when official support will be given to enable use to be made of Maj. Savage's brilliant idea in the interests of aerodynamical science.



A VICKERS VIKING IN JAVA: Gradually the uses of amphibian seaplanes increase as the advantages are realised. Recently Vickers sent one of the Vikings (Napier Lion) out to Java, where it has caused the greatest interest. Our photograph shows the machine surrounded by the mechanics who erected it. Needless to say, the civil population took the opportunity afforded of inspecting one of the latest types of aircraft, and the admiration was general.

IMPORTS AND EXPORTS, 1921-1922

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
Mar. ...	14	1,471	118,199	166,607	1,565	100
April...	1,370	3,846	138,983	139,995	450	5,880
May ...	3,350	2,416	59,624	167,999	1,818	4,254
June ...	5,181	816	79,713	129,137	—	14,530
July ...	540	1,039	530,628	24,405	860	—
	17,293	11,307	1,074,104	773,824	6,997	25,887

* * *

Instone Air Line

MAJOR S. T. L. GREER, A.F.C., who until recently represented the Air Ministry at Croydon Aerodrome, has been appointed General Manager of the Instone Air Line.

The I.C.A.R. Meeting at Rotterdam

WE would remind our readers that the International Concours Aviatique, Rotterdam, takes place from September 2 to 17, 1922. There is no entry fee, but entries for all the various competitions must be sent to the Secretary of the I.C.A.R. Voormalig Raadhuis, Stadhuissteeg 1, Rotterdam, before August 25. Prizes to a total amount of £3,500 will be given, and in addition (out of a limited fund of £460) a fee of 1*s*. 6*d*. per kilom. flown from the home aerodrome to Rotterdam will be paid to entrants of foreign machines who undertake to take part in the whole meeting. Rules and regulations may be obtained by application to the Secretary.

Like Father Like Son—and Daughter

IN connection with ballooning and parachute displays, there is probably no more familiar name than that of Spencer. Now both daughter and son of Mr. Henry Spencer are graduating in the same direction. At Cambridge the other day, Miss Ena Spencer, *aetat* 16, and Fred. Spencer, 14, ascended with their father, and at 2,800 ft. high Ena dropped off, and at 3,200 ft. Freddie liberated himself.

They both landed with perfect ease about 1½ miles from where they started. They represent the fourth generation; their father, their grandfather (Mr. Charles Spencer), and their great-grandfather (Mr. Edward Spencer) being well-known aeronauts of their days.

REPORT FROM THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

London Aero Models Association

HEADQUARTERS, 20, Great Windmill Street, Piccadilly, W. 1. Meetings held every Thursday at 7.30 p.m.

It is hoped that members of the various committees will attend as often as possible so that all business may be settled before the next Annual General Meeting, and thus enable the newly-elected officers at that meeting to get to business straight away with their programme for the ensuing twelve months. On Sunday, July 30, Mr. D. A. Pavely made a record flight of 53 seconds with his compressed air-driven model, Mr. Houlberg and Mr. Rippon being the official observers.

On Sunday next, the 20th inst., members will congregate on Wanstead Flats at 11 a.m., when many members are hopeful of putting up new records.—Hon. Secretary, A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

* * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published August 17, 1922

1,223. J. W. RAPP. Spar-beams or ribs. (157,311.)
1,224. J. W. RAPP. Aeroplane spars. (157,312.)
11,368. H. E. S. HOLT. Parachute apparatus. (182,245.)
13,338. LUFTSCHIFFBAU ZEPPELIN GES. and P. JARAY. Lighter-than-air craft. (183,292.)
15,506. G. MCALPINE. Means for facilitating landing of aircraft. (183,317.)
17,794. D. A. HULL and C. ANTES. Screw propellers. (183,344.)

FLIGHT
The Aircraft Engineer and Airships
36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.
Telegraphic address: Truditur, Westcent, London.
Telephone: Gerrard 1828.

SUBSCRIPTION RATES

"FLIGHT" *will be forwarded, post free, at the following rates:—*

UNITED KINGDOM	s.	d.	ABROAD*	s.	d.
3 Months, Post Free...	7	7	3 Months, Post Free...	8	3
6 " " ...	15	2	6 " " ...	16	6
12 " " ...	30	4	12 " " ...	33	0

These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates.

* *European subscriptions must be remitted in British currency*

Cheques and Post Office Orders should be made payable to the Proprietors of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, *and crossed London County and Westminster Bank, otherwise no responsibility will be accepted.*

FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xvi.)

INSTRUMENTS (Speed), Watches, &c.—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Goldsmiths & Silversmiths Co., 112, Regent Street, W. 1.
Gerrard 9091 (3 lines).

Smith, S., & Sons (M.A.), Ltd., Cricklewood Works, N.W. 2.
Willesden 2335 (7 lines).

INSULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent. London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent. London.

MACHINING—

Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15.
Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5.
Dalston 1893.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.

PROPELLERS—

Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds.
Roundhay 601 (5 lines); "Propellers," Leeds.

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19.
Hornsey 910 & 2472.

Lang Propeller, Ltd., Weybridge, Surrey.
520-521, Weybridge; "Aerosticks," Weybridge.

PUTTEES—

Fox Bros. & Co., Ltd. (Dept. R), Wellington, Somerset.

RADIATORS AND RADIATOR REPAIRS—

Serck Radiators, Ltd., Warwick Road, Greet, Birmingham.
Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—

Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

SPARKING PLUGS—

Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15.
Putney 2132, 2133.
"Kaalgee," Phone, London.

SPRAYING PLANT—

Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1.
Holborn 2041; "Aerography," London.

STABILIZERS—

Auto Controls, Ltd., 19, Regent Street, Piccadilly Circus, London, S.W. 1.
Regent 3649.

TAPES AND WEBBING—

MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent. London.

TIMBER—

Owen, Joseph, & Son, Boro' High Street, S.E.
Hop 3811; "Bucheron," London.

TUBES, ALUMINIUM—

British Aluminium Co., Ltd., The, 109, Queen Victoria St., London.
City 2676; "Cryolite," Cent. London

TYRES AND WHEELS—

Palmer Tyre, Ltd., Shaftesbury Avenue, W.C. 2.
Gerrard 1214; "Tyricord," Westcent, London.

WELDINGS, REPAIRS—

Barimar, Ltd., 10, Poland Street, London, W. 1.
Gerrard 8173; "Bariquamar," Reg. London.

WIND SHIELDS—

Auster, Ltd., 133, Long Acre, W.C. 2.

WIRES AND CABLES (Aeroplanes)—

Bullivants, Ltd., 72, Mark Lane, E.C. 3.
Works: Millwall, E. 14

To the Publishers— The AUTO "*Yellow Cover*" 36, Gt. Queen Street, Kingsway, W.C. 2.

SUBSCRIPTION FORM.

GENTLEMEN,

*Please send the "Auto" * United Kingdom/Abroad post free, for one year, for which I enclose Remittance for ....s. ....d., the subscription to commence with the issue of..........*

Name.......... *Address*..........

* Strike out which not required. ....

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Sept. 2–17	**International Concours Aviatique, Rotterdam**
Sept. 8–10	**1,000 Miles Race round Britain for the King's Trophy**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 30	**Coupe Deutsch (300 kil.)**
Dec. 15– Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**
Mar. 15 ...	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

The Circuit of Britain

UP to the present, the rules which are to govern the Circuit of Britain Race for the King's Cup have not been announced. All that is definitely known is that the race will be a handicap race, but that is scarcely sufficient. In view of the fact that, in all probability, most, or at any rate many, of the competing machines will be commercial ones, it would appear that consideration should be given to the number of passengers, or their equivalent in ballast, carried. What we have in mind is a set of rules somewhat on the lines of those governing the competition for the Coupe Lamblin. According to these, it will be remembered, the amount of start allowed passenger-carrying machines is increased by a certain number of minutes for each passenger carried. The result is that a large machine, carrying 15 or 20 passengers, has a better chance, under the rules, than has a very fast single-seater with an engine of 400 h.p.

We do not necessarily suggest that the fast machine should be handicapped unduly, but in view of the expected preponderance of commercial machines, and the fact that such a race could not well be undertaken on a purely racing machine in any case, it would appear advisable to take into consideration load as well as speed. We admit that the handicapping will not be easy. It never is, but the Aerial Derby showed that, with one or two exceptions, the handicapping was extremely close to actual performance, and it should not be impossible to get equally good results in the Circuit of Britain.

The entries list closes on August 28, and already a number of machines has been entered. It is not yet possible to express an opinion of the size of the "field" which will face the starter on September 8, but according to enquiries there seems reason to hope that the number of machines entered will be very considerable. We understand that there is a possibility of the Supermarine Schneider Cup winner, fitted with amphibian gear, taking part in the race. Possibly a Vickers "Viking" may also be entered, which would certainly add to the interest. Otherwise it appears that this year's Circuit of Britain will be flown mainly on land machines. As we have previously pointed out in these columns, this is regrettable, especially when it is remembered that, even in 1914, we could muster quite a large number of seaplanes for this race. That conditions are such as to make this impossible in 1922 is a serious reflection on the manner in which we have allowed the seaplane to be neglected, and gives food for thought.

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The Coupe Deutsch

Elsewhere in this issue we publish a list of the entries for the Coupe Deutsch, which is to be flown for at Villesauvage aerodrome, near Etampes, on September 30 next. It had been hoped that among the British entries would be the new Bristol racer with Bristol "Jupiter" engine. The list discloses the fact that the "Mars I" of the Gloucestershire Aircraft Co. is the only British entrant, and as the list is now finally closed the Bristol will not fly in the race. This is very regrettable, as to rely upon one machine, no matter how good, necessarily means running a considerable risk of losing the race. With but one representative, the least little mishap may destroy all our chances.

We are not presuming to blame the Bristol Company for not entering the machine. On the contrary, until a fast racing machine is absolutely "right" in every way the best policy is undoubtedly to refrain from entering it. We do not know what are the reasons which have prevented the Bristol from being entered, but it may be taken for granted that they are good and sufficient, and we can only regret the fact.

As regards James' chances in the race, our opinion is that, barring accidents, he has a sporting chance of winning. There has been a tendency rather to discount British machines in pure speed races, but the Supermarine-Napier victory at Naples has demonstrated that a British machine is still capable of holding its own against the fastest machines of other nations, and we think that the "Mars I," cleaned up and fitted with special racing wings, should be able to put up a very creditable fight against the French and Italian machines entered. James' landing after winning the Aerial Derby was extremely fast. In fact, James told us after the race that he had never landed the machine so fast before, and that it could be, and had been, landed at very little more than half that speed. If that is so, it would appear that, when necessary, James could land "Mars I" at the higher speed, and thus increase his top speed.

The French machines appear to be mainly the same as those of last year. That is to say, the two really "dangerous" ones will be the Nieuport "Sesquiplans," flown by Lecointe and Lasne respectively. It is already known approximately what speed these can do, and even allowing for some slight improvement upon their performance last year, the British machine should, we think, stand at any rate a sporting chance. Altogether we are not without hopes that the Coupe Deutsch as well as the Coupe Schneider may be brought to this country. Under the rules this would not mean that the race would be held in England, but the effect could not fail to be very favourable even at that.

The Gliding Competitions

During the last couple of weeks, and more especially during the last few days, the eyes of the world have been focussed upon the gliding competitions that are taking place simultaneously in France and Germany. The marvellous durations attained by the German pilots, Herr Martens and Herr Hentzen, have come as a revelation to most people, and compared with them the French flights made at Clermont-Ferrand dwindle into insignificance. It should not be forgotten, however, that the Germans have had several years' experience in this form of flying, while the French had to begin at the bottom, and find their way slowly and step by step.

The fact is inclined to be overlooked that soaring is a question of piloting much more than of machine design. That this is so has been demonstrated by the way in which Bossoutrot, for instance, has gradually increased the duration of his flights as he gained experience. Similarly, the glider on which Herrn Martens and Hentzen made their historic flights of one and two hours respectively was, to all intents and purposes, the same as that used by Martens in last year's Rhön competition. Alterations have been made, it is true, but we are quite convinced that the handling of the machine, the power to anticipate and take advantage of wind fluctuations, etc., counts for much more than does the design of the machine. The strain is admitted by Herr Martens to have been very great, and in the very nature of things this must be so. Whether some day a glider may be evolved which will do automatically what now the pilot has to do is another thing. It is possible. Dr. Nimführ appears to have ideas of his own on that subject, but in the meantime soaring must be mainly a question of personal skill.

In some quarters the results obtained have been hailed as ushering in a new era in flying. With this view we do not agree. As a sport, and from the scientific standpoint, gliding and soaring are no doubt of very great value, but to presume that the day is approaching when an engineless aircraft will be able to go wherever it is desired is to read into the results something which the facts do not warrant. As a sport, gliding and soaring may well become popular, and we shall hope to see the art taken up strenuously in this country. It need not be very costly, and it should certainly be "good fun." From the scientific point of view, much may be learned about the behaviour of the air over obstacles, and meteorological information may be gathered which will have its value, but the direct application of gliding results to improvement in power-driven machines is not yet in sight. The conditions are so totally different that there is no reason to suppose that the machine which makes the best glider would also make the best commercial aeroplane.

This is in no way to be taken as indicating a wish on our part to belittle what has been done. Far from it. We admire the German performances enormously, and appreciate that, considering their handicaps, the French also have done well. And we congratulate all. But we do wish to point out that, just at present, there is no need to get alarmed, nor to visualise the day when millions of German gliders will sail across and drop bombs on London. The wish that has been expressed in certain quarters to suppress the German gliding experiments almost suggests that some such naive ideas may be entertained.

THE SOARING AND GLIDING EXPERIMENTS

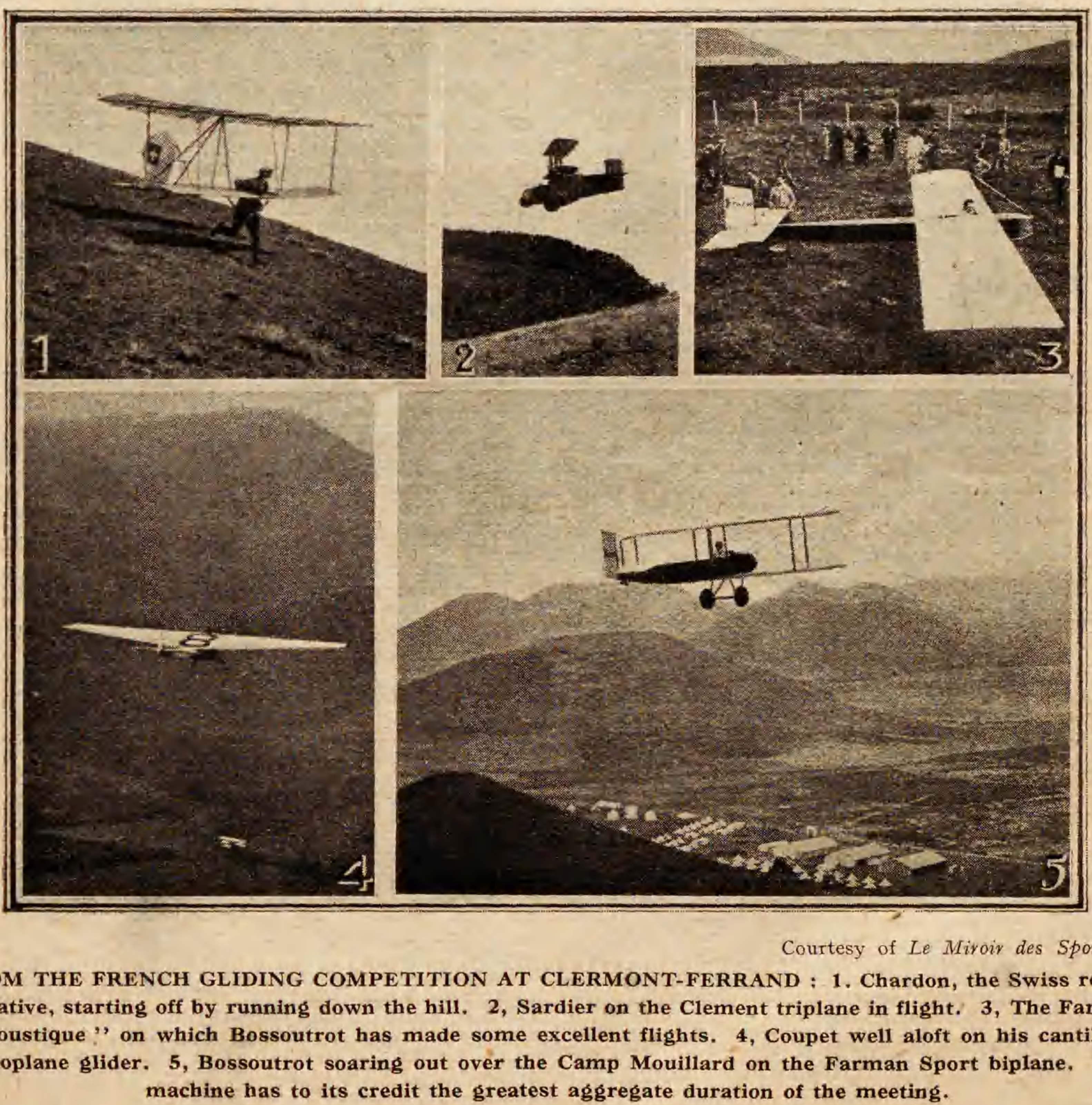
France Learning, but Germany Well Ahead

Considerable interest attaches to the gliding and soaring competitions which have been taking place during the last couple of weeks in France and Germany. The scene of the French competition is the district around the Puy de Combegrasse, near Clermont-Ferrand, and the German experiments, as in previous years, are taking place in the Rhön Mountains. Considered as a first effort, the French results are distinctly encouraging, although they are certainly put entirely in the shade by the astonishing flights made by German experimenters. No less than 50 machines were entered for the French competition, but of these several have, apparently, failed to pass the "acceptance tests," owing partly to unfavourable weather and also, no doubt, to the inexperience of the pilots. There is no doubt that these experiments are considerably more of a test of the pilots than of the machines. Until machines can be designed which will automatically adjust themselves to the ever-changing conditions the duration of motorless flights must remain mainly a question of personal skill. And it should be remembered that the German pilots have had several years' experience, whereas the majority of the competitors at Clermont-Ferrand are "riding" engineless machines for the first time. It is, of course, obvious that the handling of a glider must, to effect a prolonged flight, be essentially different from that of a power-driven machine. That the French pilots are rapidly learning is demonstrated by the way in which the duration of flights has gone up from the first days of the competition until now, at the time of going to press, Bossoutrot holds the lead with a duration of 5 mins. 18 secs.

In Germany Herr Martens first astounded the world by keeping aloft for 1 hr. 6 mins., but his performance was soon eclipsed by Herr Hentzen, who remained aloft just over two hours. This performance is simply astonishing, and gives an indication of the extent to which soaring flight may ultimately be developed. It is small wonder that among the spectators at Rhön there were those who seriously believed that Herr Hentzen must have had a motor tucked away somewhere on his machine.

Herr Martens, during his one-hour flight, is stated to have sailed over his starting-point nine times, while the distance covered in the straight flight with which the performance terminated was one of about 6½ miles. Herr Hentzen, after his two-hour flight, alighted at the same spot as did Herr Martens on the previous day, but counting in the distance which the machine must have covered while aloft and cruising around, the flight must easily constitute a world's record, both for duration and distance.

With regard to the machines used, it is understood that the one used by Martens and Hentzen is the same as that used by Martens last year. This machine, it will be remembered, was a cantilever monoplane, which was characteristic on account of its novel undercarriage. This simply took the form of two footballs mounted on an axle, and is stated to have given very good results. This year the wing span has



Courtesy of *Le Miroir des Sports.*

FROM THE FRENCH GLIDING COMPETITION AT CLERMONT-FERRAND: 1. Chardon, the Swiss representative, starting off by running down the hill. 2, Sardier on the Clement triplane in flight. 3, The Farman "Moustique" on which Bossoutrot has made some excellent flights. 4, Coupet well aloft on his cantilever monoplane glider. 5, Bossoutrot soaring out over the Camp Mouillard on the Farman Sport biplane. This machine has to its credit the greatest aggregate duration of the meeting.

been cut down somewhat and other minor alterations effected, but essentially the machine is the same, which tends to confirm the opinion expressed above that duration in sailing flight is mainly a matter of personal skill on the part of the pilot. No particulars are available of the other German machines entered this year, but in a subsequent issue we hope to be able to publish illustrations and particulars.

The French machines show a great deal of originality, but, as was the case with last year's German competition, the freaks do not appear to have done very much, the majority of the successes having gone to machines of more or less orthodox design. Thus the Farman gliders entered are simply the Farman "Sport" and the Farman "Mosquito," with engine removed and the pilot placed farther forward so as to balance the machine. The flight by Bossoutrot of five minutes was made on the "Mosquito," a small monoplane. The Clement triplane has been shown at the Paris Salon both as a power-driven machine and as a glider.

The machine flown by Chardon (Swiss) is a biplane without under-carriage, and the pilot sits on a strap suspended from the lower plane. To get into the air he runs down the hill, much as did Lilienthal in his pioneer experiments many years ago. Control is mainly a matter of dexterity on the part of the pilot.

The American glider is a monoplane, with the tail carried on an open girder. It was designed and built by the Aeronautical Engineering Society, and in the competitions it was piloted by Mr. Allen. In the earlier part of the meeting this machine held the lead as regards total duration, but during the later stages was outdistanced by other competitors, notably Chardon on the Swiss glider, and, most recently, by the Farman "Sport" and Farman "Moustique."

At the moment of going to press the position of competitors, as regards total duration, is as follows: 1st, Farman "Sport" (Bossoutrot and Paulhan) (48 mins. 5 secs.); 2nd, Farman "Moustique" (Bossoutrot) (43 mins. 18 secs.); 3rd, Chardon (27 mins. 53 secs.); 4th, Coupet (24 mins. 5 secs.); 5th, Descamps (17 mins. 49 secs.); 6th, Douchy (14 mins. 12 secs.); 7th, Allen (12 mins. 27 secs.).

The prize awards are as follows: Duration, 1, Farman (Bossoutrot), 5 mins. 18 secs.; 2, Coupet, monoplane, 4 mins. 50 secs. For greatest height attained and slowest rate of descent the position was the same, with Bossoutrot first and Coupet second.

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LONDON TERMINAL AERODROME

Monday, August 21, 1922.

The outstanding event of the week is the closing down of their entire goods service by the Instone Air Line. From today onwards they are concentrating on passengers to the exclusion of goods. Their new goods' office on the aerodrome, which was only built at the beginning of this season, is now being demolished together with their original office at the back of it, and which has, for the past year, been the pilots' room; and the firm are vacating this plot entirely. The staffs and cars for the collection and distribution of goods in London, Paris and Brussels are being disbanded: in fact, so thoroughly are they closing down the goods' business that they are giving up the air parcels' post.

Major Greer has quickly discovered what has been common knowledge to those studying air transport, and this is that the parcels' service does not pay for the vans used in collecting and delivering the goods between the aerodrome and the towns. In fact, without making the slightest alteration to the existing air services, and with machines carrying less load, there will be an actual saving. The Daimler Airway recognised this from the start, and have refused to carry goods that needed collecting and delivering except under specially favourable circumstances.

All this does not mean that goods will never pay by air. If there were a big bulk of large consignments, then it would be a proposition worth considering, but with the present numerous small parcels, each weighing only a few pounds, which have to be delivered by motor-van to every corner of London, involving the vans in perhaps a journey of 10 to 20 miles to deliver a parcel on which the entire freight is perhaps a couple of shillings, the situation is ridiculous.

Record Week for Passengers

As many as 741 passengers have departed from, or arrived at, the air-station during the week—which is a record figure. The flow of returning holiday traffic has now set in from the continent.

The first of the long-expected Rolls-Fokker monoplanes arrived during the week from Amsterdam, piloted by Mr. Hofstra. The passenger-cabin is rather larger than in the Puma-engined machine, and has seating accommodation for six passengers. Wicker seats are provided instead of the elaborately upholstered heavy seats in the original Fokkers. A large goods compartment is provided at the back of, and separate from, the cabin. The pilot sits on the opposite side of the engine to his position in the Puma-Fokker, and conforms in this respect to the suggestions made at the meetings of pilots for prevention of collisions in the air, enabling the pilot to keep to the right of the airway, and have a clear view of landmarks and approaching machines.

Both goods and passengers on the K.L.M. are on the increase. The goods traffic by this line has the advantage of being chiefly large parcels which allow of economy in road transport, while, although there is such a volume of goods, the prices charged are as much as four times those charged on the London-Paris service.

I hear that the Messageries Aériennes are to take over the plot vacated by the Instone Air Line and erect offices on it. They have been attempting for some time to get an office on the aerodrome "Broadway" as their present office is hidden away and somewhat difficult to find.

Jockey's Use of Aeroplane "Taxis"

Steve Donoghue, the jockey, has been using the various "air taxis" of the Surrey Flying Services, and the De Havilland Hire Service, to be "in two places at once" during the week. On Wednesday afternoon Capt. Muir, in one of the Surrey Flying Services' Avros, flew to Leicester, alighting actually on the race-course, and fetched Donoghue to Croydon. Here he embarked on a D.H.16 which had just arrived from Ostend with four passengers and was returning empty to Lympne. At Lympne a D.H.9 used on the De Havilland newspaper service from Lympne to Ostend took him to Deauville, returning early the next morning in time for the newspaper service. On Thursday night Capt. Muir left for St. Inglevert, and, after remaining there the night, flew on to Deauville and, picking up Donoghue, brought him back to Hurst Park on Friday morning. Donoghue was again attempting to fly to Deauville and back in the early hours of Saturday to ride in trial there and still be back in time to ride at Hurst Park in the afternoon. There was, however, no machine available, but, as he had to ride at Deauville once again on Sunday, he left Croydon on a De Havilland 9 at 5.30 p.m. for that place.

The Surrey Flying Services met with misfortune during the week. Capt. Muir was flying their Renault-Avro with two passengers who wished to go by air to Ostend. Just after he had left the ground, however, his engine failed, and he was compelled to land in the cornfield on the side of the aerodrome. He alighted all right, but, owing to the fact that he was landing down-wind, and therefore moving rather fast, the corn checked the machine too rapidly, and it went over on its nose. The passengers were not in the least dismayed, and embarked again on a Clerget-Avro and completed their journey "O.K." As a result of this accident, however, the Surrey Flying Services had only one machine available for joy-rides this week-end, which, of course, would be, under such circumstances, fine.

Air Traffic Control from the Tower

At last the various aerodrome controls are getting in their proper place—that is, in the control-tower. The man who waves the red flag which gives pilots permission to take off is now situated on the balcony of the tower, while there is a wireless operator in the tower itself. A field-telephone connects the tower with the duty office, and a wonderful Heath Robinson message-hoist has been constructed, apparently out of bits of old wire, a mustard-tin and a couple of old pulleys, to convey weather-reports up to the wireless operator without the fatigue of climbing up the tower steps each time.

The arrangements for saving road transport made by the Instone Company are working quite smoothly. They time their services to and from Paris and Brussels to leave and arrive at Croydon together, with the result that, in many cases, only one car is needed for both services. At present their machines leave for both Paris and Brussels at 10.30 a.m. and 4 p.m.

On Sunday two special newspaper photographers went over to Paris to obtain photographs of the Olympic sports there, and the Daimler Airway obligingly arranged that a special machine which was running to cope with the rush of passengers from the other side should not leave until 5.30 p.m., to give them an opportunity of getting back to London with a full set of pictures.

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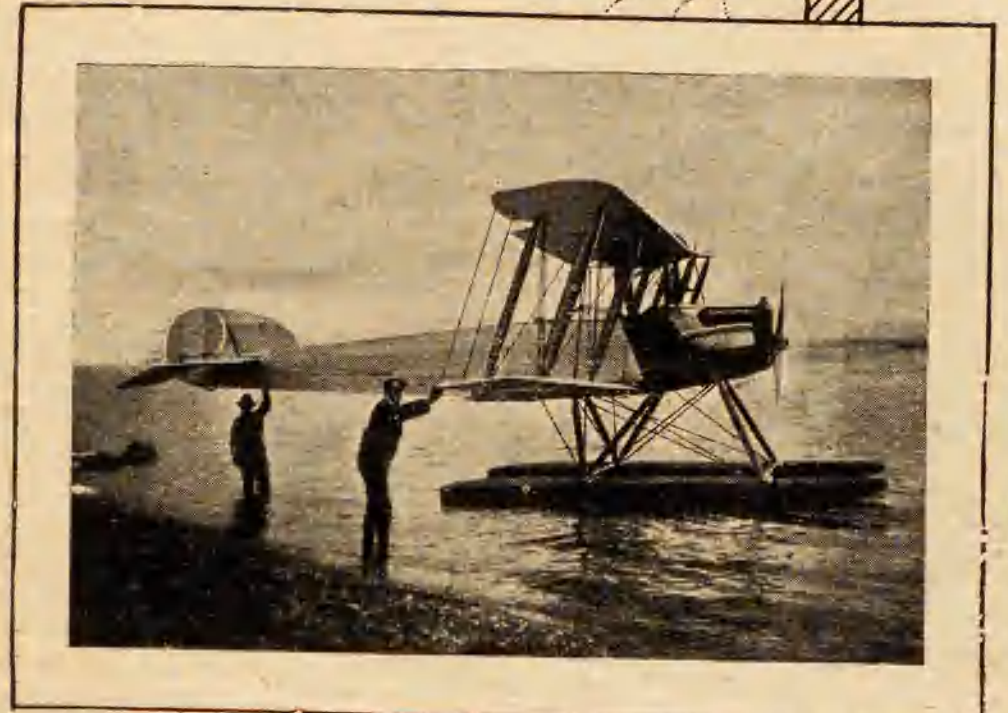

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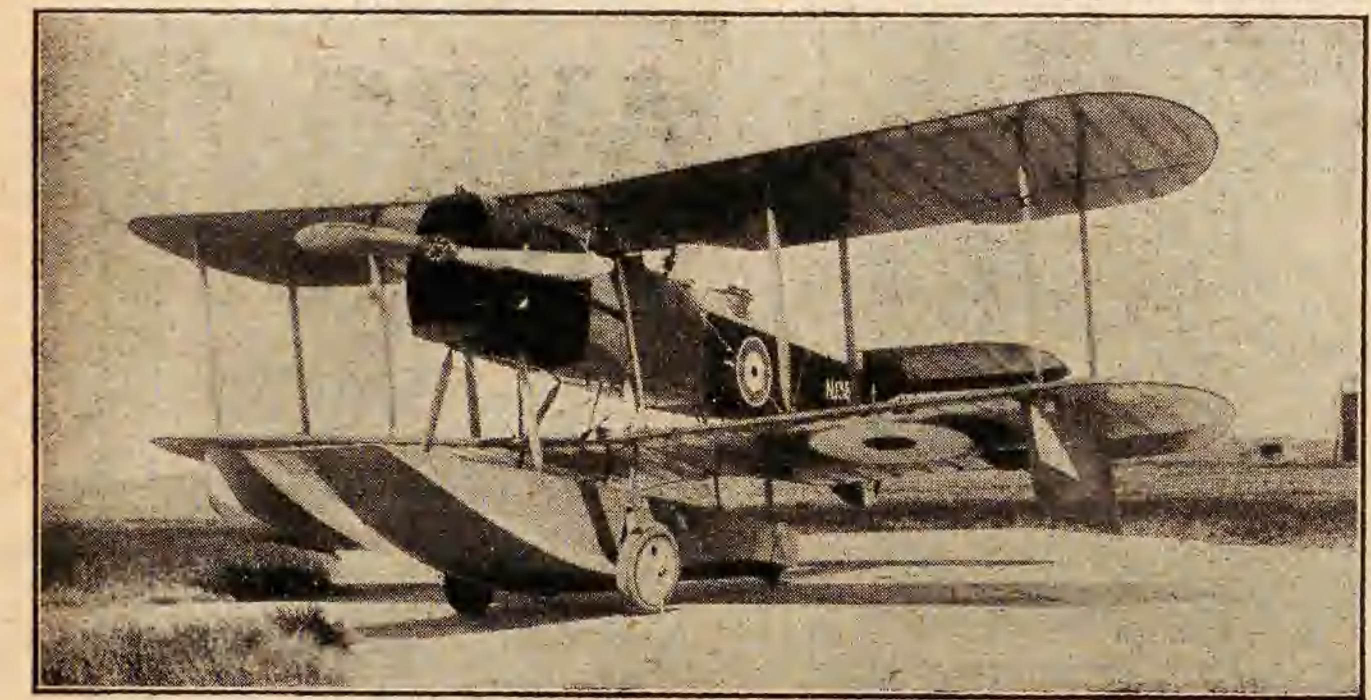

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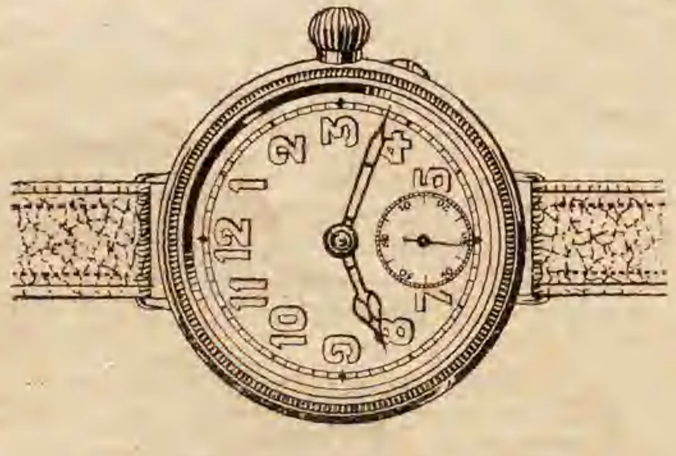

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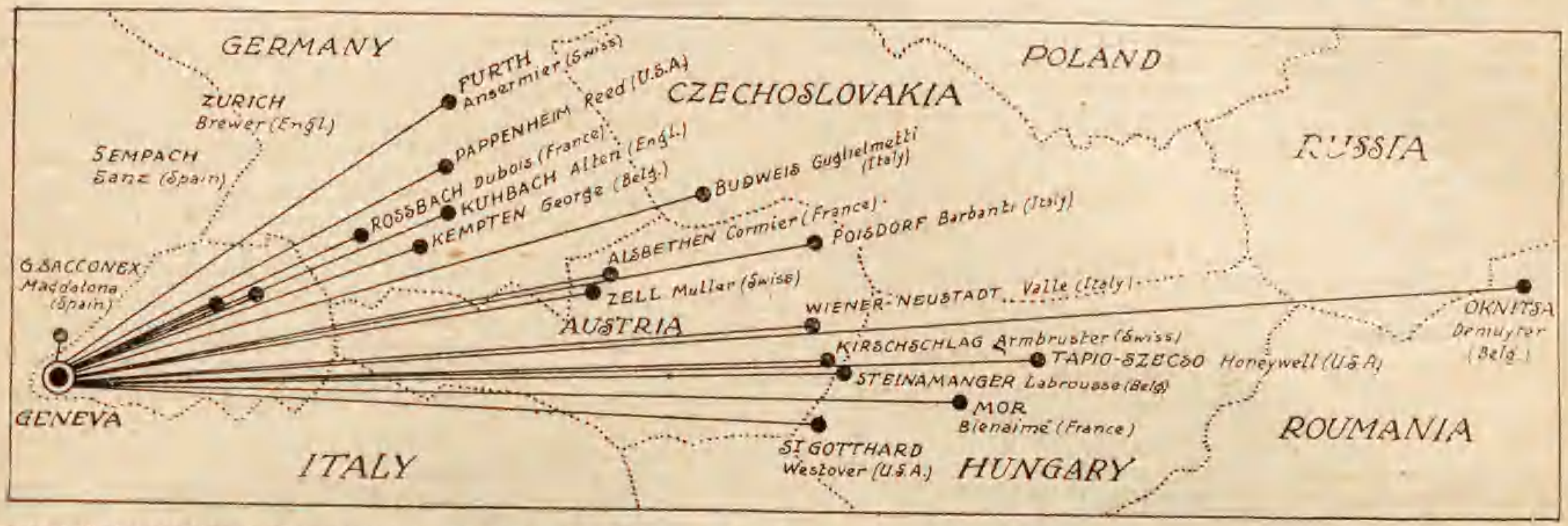
GORDON-BENNETT BALLOON RACE

Demuyter Declared the Winner

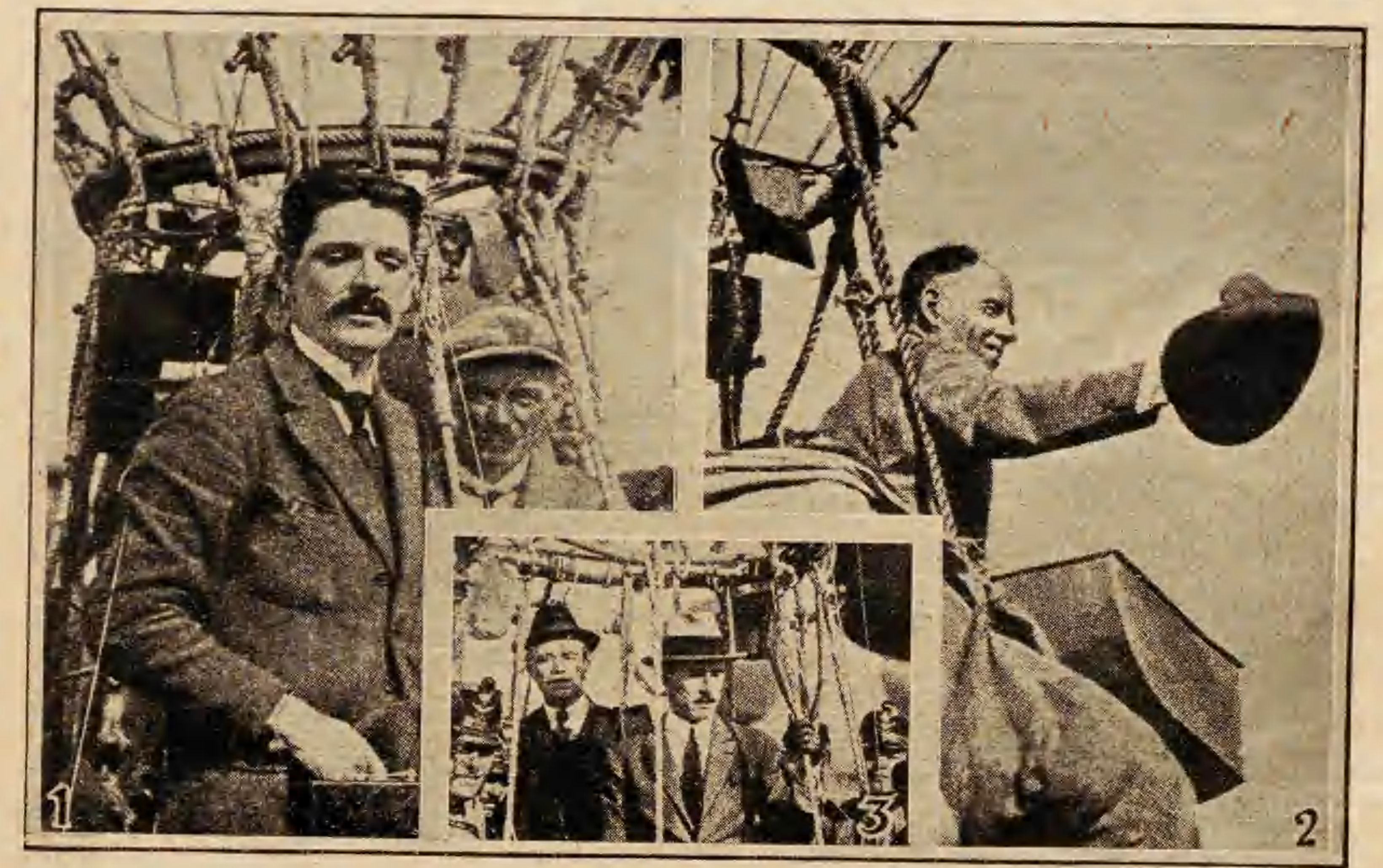
After a good deal of controversy, owing to the fact that he alighted from his balloon, which then ascended again, the Belgian aeronaut Demuyter has been declared the winner of the Gordon-Bennett Balloon Race, which started from Geneva on August 6. It was at first thought that Demuyter had been disqualified through his balloon escaping, but the instruments and log-book of the balloon have now been examined, and the distance covered, reckoned to the point of alighting, has been accepted. This is approximately 870 miles from Geneva. Second appears to be the American Honeywell, and third Bienaime.

The Gordon-Bennett race was not devoid of excitement, some of the competitors being fired at by local militia, evidently taking the balloons for hostile aircraft. Others had their guide rope cut and lost their balloon, while they themselves were hauled to the nearest police-station, where it took several hours to convince the authorities of their innocence.

The routes followed by the various competitors are shown in the accompanying map, as are also the points where they alighted. In the photograph, for which we are indebted to *Le Miroir des Sports*, are seen the aeronauts winning first, second and third places in the race.



THE GORDON-BENNETT BALLOON RACE : Sketch map of the landing places. The words in capitals are the names of the towns where alightings were made. Following them are the names of the pilots, and, in brackets, the nationalities.



FIRST, SECOND AND THIRD IN THE GORDON-BENNETT BALLOON RACE : 1, Demuyter at the start of his balloon, Belgica. He covered a distance of approximately 870 miles. 2, The American representative, Honeywell, whose distance was 660 miles. 3, The French aeronaut Bienaime, who covered a distance of 575 miles.

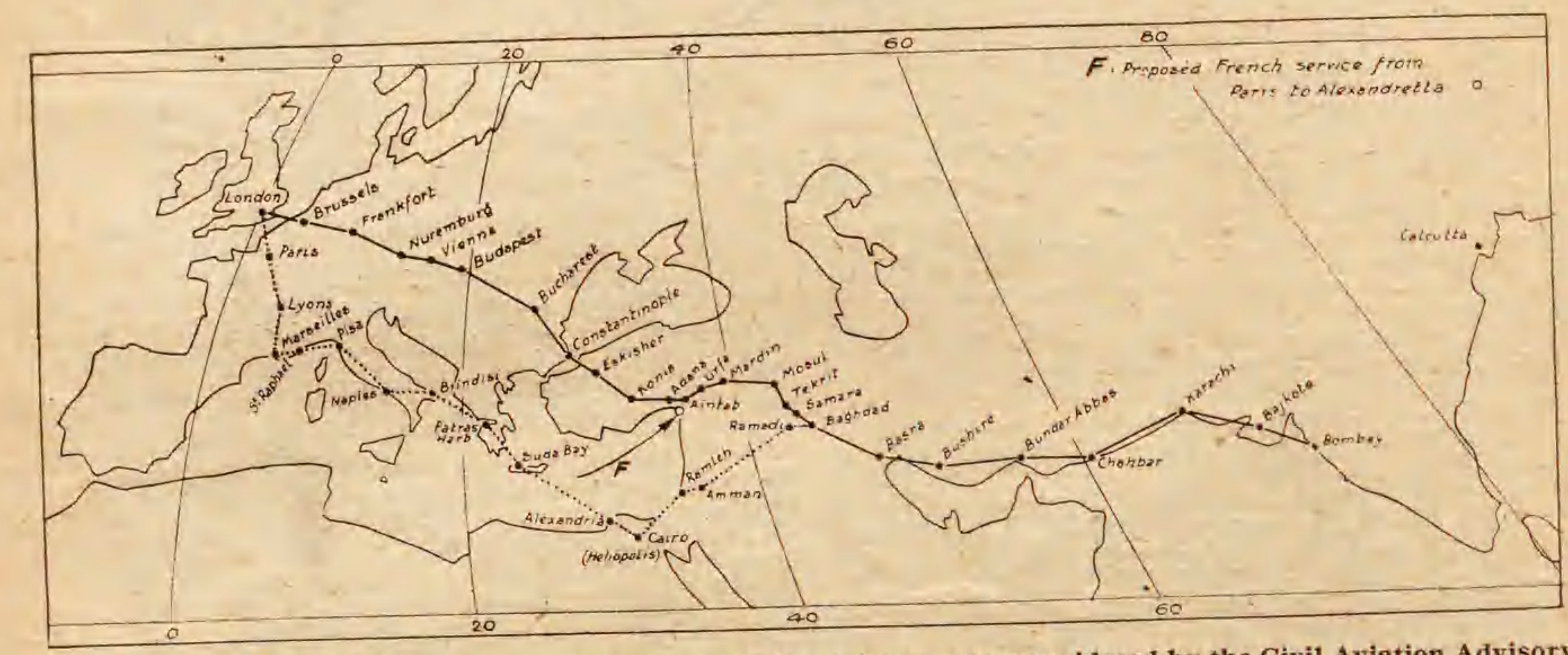
AIR MAIL SERVICES TO INDIA

IN our issue of last week we published a review of the first report of the Civil Aviation Advisory Board on the practicability of Air mail services to India. Three main routes were, it will be remembered, considered by the C.A.A.B., of which one, the seaplane route from Southampton *via* Cherbourg, Bordeaux, Sardinia, Malta and Crete to Alexandria, was considered too long (2,650 miles) for practical comparison with the other routes suggested.

In order to assist in forming a mental picture of the various routes and stages involved, we have prepared a sketch map of the routes considered, from which the countries traversed and the landing-places suggested may be readily located.

Taking first the overland route *via* Constantinople, the landing grounds and length of stages are as follows:—

	Miles.
London—	
Brussels	200
Frankfort	200
Nuremburg	110
Vienna	270
Budapest	150
Bucharest	390
Constantinople	280
	1,600



AIR MAIL SERVICES TO INDIA: Sketch map of the various routes considered by the Civil Aviation Advisory Board, a review of whose first report was published last week.

	Miles.	
Constantinople—		
Eskisher	125	295
Konia	170	
Adana	170	375
Aintab	120	
Urfa	85	
Mardin	105	255
Mosul	150	
Tekrit	125	220
Samara	30	
Baghdad	65	
		1,145

In above table inset names indicate intermediate landing-grounds, which would not necessarily be used on every trip, but are more in the nature of emergency landing-grounds.

The second route considered is by aeroplane from London to Brindisi, and by seaplane from Brindisi to Alexandria. The stages on this route would be as follows:—

	Miles.
(i) London—	
Paris	200
Lyons	245
Marseilles	170
St. Raphael	70
Pisa	185
Naples	285
Brindisi	200
	1 355

	Miles.
(ii) Brindisi—	
Patras Harbour, Greece	270
Suda Bay, Crete	260
Alexandria	480
	1,010

This route gives a total mileage from London to Alexandria of 2,365 miles.

From Egypt onwards the R.A.F. route from Cairo to Baghdad would be used. This is as follows, the intermediate landing-grounds being inset—

	Miles.	
Cairo (Heliopolis)—		
Ramleh	240	303
Amman	63	
Ramadi	467	530
Baghdad	63	
		833

The mails would be picked up, not at Cairo, but at Port Said or Alexandria.

A third route, *via* Alexandretta (Iskanderun) in Syria, will, the report states, come into prominence if the French proposed route from Paris *via* Italy and Greece to Alexandria matures; the British route from there would link up with the route outlined above, either at Adana or Aintab.

Whichever route is followed, the Baghdad to Karachi section is a necessary link in the chain. One route suggested is along the Persian side of the Persian Gulf. This would probably be as follows:—

	Miles.
Baghdad—	
Basra	290
Bushire	230
Bundar Abbas	400
Chahbar	330
Karachi	400
	1,650

An alternative route would be along the Arabian shore of the Persian Gulf, but the report states that this is unlikely to be opened for service purposes in the near future.

The C.A.A.B. have assumed provisionally that a feeder line, operated with seaplanes, must be established from Karachi to Bombay. The stages for this section would probably be Karachi-Rajkote (290 miles), Rajkote-Bombay (260 miles); total, 550 miles.

It will be seen that the London–Constantinople–Baghdad route is the shortest of those considered, but the report points out that, until conditions in Turkey in Asia have settled down there are difficulties, apart from physical ones, to be overcome and that whether or not this route is practicable remains to be determined.

THE RACE FOR THE KING'S CUP

List of Turning-Points

COMMANDER H. B. PERRIN, Secretary of the Royal Aero Club, has been touring the north, making arrangements for the turning points in the race for the King's Cup, which will start from Waddon aerodrome on Friday, September 8th. In spite of many difficulties, especially at Newcastle, the arrangements have now been completed, and we are able to announce that the route will be as follows :—

Waddon (start).
Birmingham (Castle Bromwich).
Newcastle (Town Moor).
Glasgow (Renfrew).
Manchester (Alexandra Park).
Bristol (Filton).
Waddon (finish).

There will be compulsory stops of one hour at each turning point, and Friday night will be spent at Renfrew. Further details will be announced shortly.

In the meantime entries are, we understand, beginning to come in, and it is expected that quite a good "field" will assemble at Waddon on September 8.

The very handsome Cup presented by His Majesty the King has been on view in the Air Ministry window in the Aldwych during the last week or so, and has attracted very great attention from passers-by. The Cup, which has been made by Mappin and Webb, weighs over 200 ozs., is about 20 ins. in height and carries the following inscription: "Royal Aero Club Circuit of Britain Race, 1922. Cup presented by King George V."

As will be seen from the accompanying photographs, the Cup is an extremely beautiful one, and His Majesty's gracious act in presenting it will be greatly appreciated, not only by those directly interested in aviation, but by all who realise the importance to our air power of sporting aviation. It now rests with us (the aviation community) to see to it that the list of entries is a thoroughly representative one, and worthy of the honour which His Majesty has so generously bestowed.

The closing date for entries is August 28, and there will be no late entries, against special late fees, after that date.

Two views of the Cup presented by H.M. the King for the Circuit of Britain, which will start from Waddon Aerodrome on Friday, September 8.

◆ ◆ ◆ ◆

Air Defence of London

THE War Office announces that arrangements are now practically complete for the raising of the Royal Artillery and Royal Engineers Anti-Aircraft units and the Signals Company of the two London Air Defence Brigades which are to form part of the Territorial Army, and to be known provisionally as the 2nd and 3rd London Air Defence Brigades. Recruiting will be opened shortly. Meantime, those who wish to serve in the new formations should make application in writing to the Headquarters, Air Defence Brigades, 145, Sloane Street, W.

Each of the Air Defence Brigades will consist of a Headquarters, two Anti-Aircraft Brigades, R.A., and Anti-Aircraft Battalion, R.E., and an Anti-Aircraft Signal Company. The Air Defence Brigades will be administered by the County of London Territorial Army Association, except in the case of the two Anti-Aircraft Brigades, R.A., of the 3rd Defence Brigade, which will be administered by the City of London Territorial Army Association.

Air-Commodore Higgins and Air-Commodore Charlton

THE transfer of Air-Commodore T. C. R. Higgins, C.M.G., from No. 7 Group Headquarters (Inland Area) to the Air Ministry, on appointment as Director of Training and Staff Duties, was officially announced on August 18 to date September 1. Air-Commodore L. E. O. Charlton, C.B., C.M.G., D.S.O., is appointed to command No. 7 Group Headquarters.

A Swedish Duration Record

ON July 23 the Swedish pilot Lieut. Ljungdahl established a new Swedish duration record by flying from 6.32 a.m. to 8.42 p.m., a period of 14 hrs. 10 mins. He is estimated to have covered during that period a distance of approximately 1,000 miles.

A Seaplane Flight Around Norway

Two Norwegian aviators, Lieuts. Riiser-Larsen and Lützow-Holm, on July 14 completed a flight around the coast of Norway. Starting from Horten, in the Christiania Fiord, at 6 a.m. on July 12, each on a Hansa-Brandenburg monoplane, they flew down the fiord, around by Christiansand and up the west coast. Kirkenes, on the boundary between Norway and Finland, was reached at 4.30 a.m. on July 14, a distance of approximately 2,250 miles having been covered in under 48 hours.

Paris-Mainz in 2 hrs. 18 mins.

FROM Paris is reported a flight on August 18 by six aeroplanes of the 34th Regiment of the French Air Force, under the command of Lieut. Bastide, from Paris to Mainz, a distance of 342 miles, in 2 hrs. 18 mins. Leaving Le Bourget at 5.45 a.m., the 'planes landed at Mainz at 8.3.

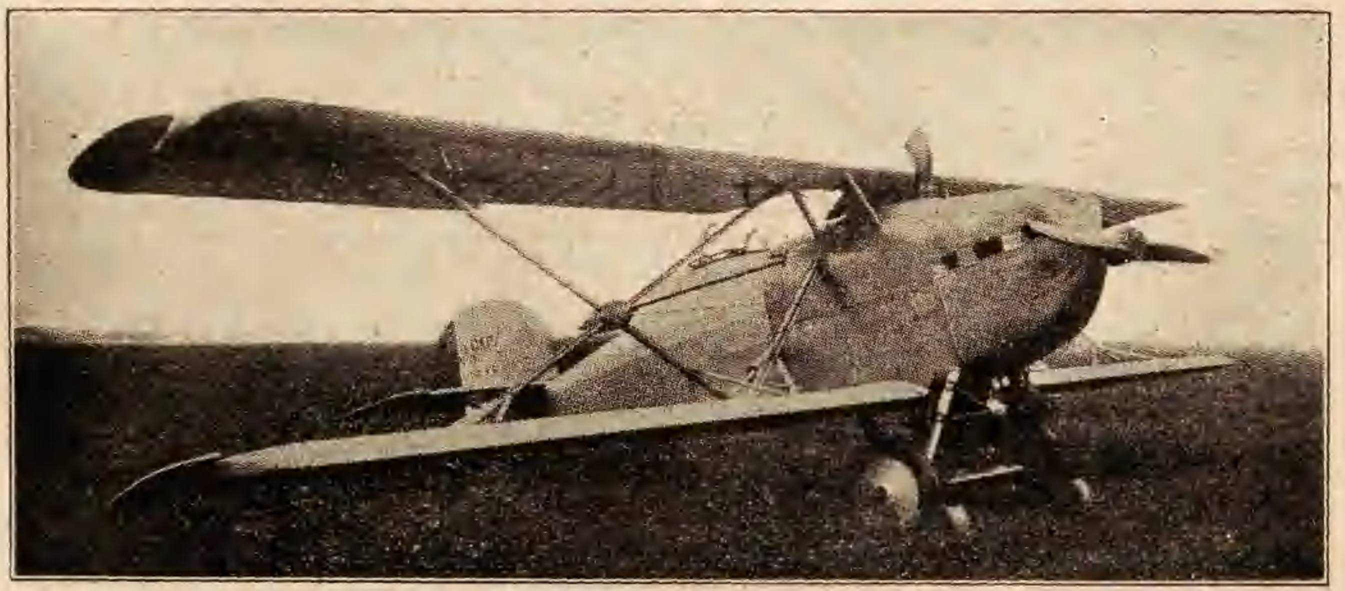
Brussels Air Mail

THE Postmaster-General announces that the air parcel-post service from London to Brussels is suspended as from August 21.

THE HANRIOT TWO-SEATER FIGHTER, TYPE H. 15

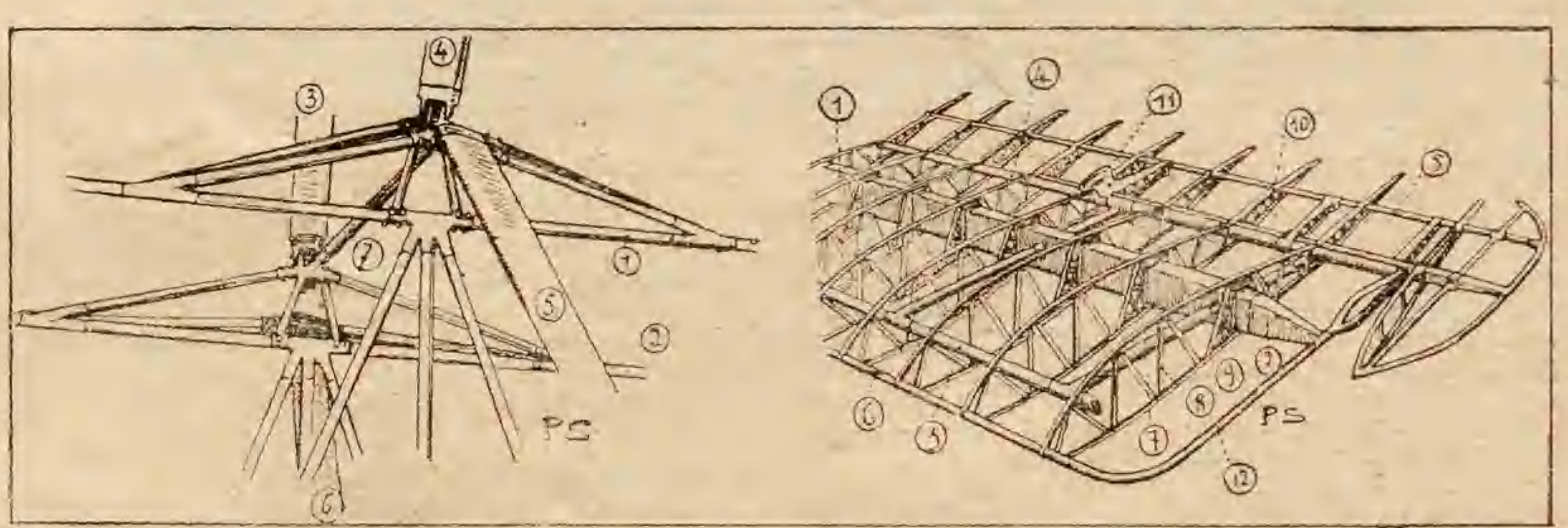
An Interesting French All-Metal Machine

At the last Paris Aero Show there was exhibited on the Hanriot stand a very business-like racing monoplane, with cantilever wings, remarkable for its aerodynamic cleanness of design no less than on account of its all-metal construction. Certain of its details were not, perhaps, all that they might have been, but, generally speaking, the machine, which had been designed for last year's Coupe Deutsch, was one of very considerable interest. The racer was not finished in time to take part in the race, and we have not up to the present heard of it being tested in flight. However that may be, the Hanriot Works are carrying on with all-metal construction, and one of the latest to issue from the works for flying tests is the type H.15, for the illustrations and characteristics of which we are indebted to our excellent French contemporary *L'Aéronautique*.



The New Hanriot All-Metal Two-Seater Fighter.

Designed for the *Section Technique*, the Hanriot 15 is an all-metal two-seater fighter of unorthodox design. The power plant is a 300 h.p. Hispano-Suiza, and a Rateau supercharger is fitted, as the machine is intended to operate at great altitudes. As to how far the estimated performance will be realised, no information is as yet available. In the meantime, it is of interest to note that the calculated speed at the height at which the H.15 is intended to operate (23,000 ft.) is 143 m.p.h. The theoretical ceiling (on the assumption that the supercharger works perfectly) is 33,600 ft., and it is estimated that the climb to 23,000 ft. will be accomplished in 25 minutes. It will thus be seen that, assuming the estimated performance to be attained, the Hanriot 15 should be a very useful machine for military purposes.



THE HANRIOT TYPE H. 15 : Some constructional details. In the drawing on the left, 1 and 2 are the top *longerons* of the *fuselage* ; 3 and 4, centre-section struts ; 5 and 6, sloping struts to lower plane ; 7, horizontal strut in top of *fuselage*. In the right-hand sketch, 1 is the Duralumin box spar ; 2, wooden end piece of spar ; 3, front auxiliary spar ; 4, rear auxiliary spar ; 5, *aileron* spar ; 6, tubular leading edge ; 7, rib flange (tubular) ; 8, rib trellis ; 9, gusset plate, securing ribs to spar ; 10, *aileron* rib ; 11, *aileron* crank ; 12, tubular wing tip.

As regards general design and detail construction, the former is shown by the accompanying photograph to be a considerable departure from orthodox lines, with its very unusual wing bracing, while some of the wing details are shown in the sketches. The *fuselage* construction consists of tubular *longerons* with triangular bracing, also of tubular construction. The front portion of the *fuselage* is covered with aluminium, but fabric is used from the pilot's cockpit to the stern post.

Wing Construction

Apart from the fact that it is fitted with a supercharger, the Hanriot 15 is chiefly interesting on account of the all-metal wing design, the *fuselage* construction showing fewer points of interest. From the accompanying sketches, it will be seen that each wing has one main spar only, but that this single spar is reinforced against torsion by two tubular auxiliary spars. The latter do not appear to be intended to take any part of the bending stresses. The main spar is of Duralumin, apparently of box section, terminating at the tip in a wooden end piece so as to avoid shaping the Duralumin box. The wing section is deep, so as to allow of a good spar depth, but apparently the wing does not taper either in chord or thickness. The auxiliary spars are in the form of Duralumin tubes, and bolted to them, and passing through the main spar, are the tubular compression struts of the internal drag bracing. The ribs are built up of Duralumin tubing, this material being used both for flanges and triangulated webs, as shown in the sketch.

The wing bracing is unusual in that the single struts are arranged to act as lift and anti-lift members at the same time. From a short distance out on the lower plane a strut runs to the top *longeron* of the *fuselage*, while another strut slopes outward and upward to the top plane. The outer end of the lower plane is supported by a sloping strut running to the top centre section, crossing the lift strut *en route*. To reduce the bending moment on the fairly long bay in the top plane a wire is taken from the point where the main struts cross each other to the top spar, while from the same point on the struts an external drag wire runs to the nose of the *fuselage*.

The incidence of the outer portion of the wings is adjusted by means of the members running from the auxiliary spars to the main struts, but, owing to the obliquity of these struts, it might be imagined that considerable stress would be put on the spars and ribs with travel of the centre of pressure.

Contrasted with the tendency in British design towards a duplication of parts and relatively small factors of safety on each, the Hanriot wing bracing is interesting as an example of the opposite method: as few parts as possible, and these of necessity highly stressed. It would appear that a lucky shot in one of the main inter-plane struts might seriously endanger the strength of the wing structure, as might also a shot in one of the single main spars.

The main characteristics of the Hanriot 15 are as follows: Length o.a., 25 ft. 7 ins. Span, 35 ft. Wing area, 300 sq. ft. Height, 9 ft. 10 ins. Gap, 5 ft. 3 ins. Weight, empty, 2,300 lbs. Weight of fuel, 660 lbs. Useful load, 880 lbs. Total loaded weight, 3,840 lbs. Wing loading, 12·8 lbs./sq. ft. Power loading, 12·8 lbs./h.p. Speed at 23,000 ft. (estimated), 143 m.p.h. Climb to 23,000 ft. in 25 mins. Theoretical ceiling, 33,600 ft.

THE COUPE DEUTSCH

Only One British Representative

THE entries list for the Coupe Deutsch race, which is to be flown over the Villesauvage–la Marmogne course, near Etampes, on September 30, has now been closed, and we regret that only one British machine, the "Mars I" of the Gloucestershire Aircraft Co., has been entered. The race is undoubtedly the most important international speed race in Europe, and it had been hoped that the Bristol monoplane racer with Bristol "Jupiter" engine would be entered. This, it now appears, has not been found possible, owing to the difficulties of getting such a fast machine tuned up in time, and the task of representing Great Britain will thus rest entirely with Mr. J. H. James. That he will be matched against some formidable "projectiles" goes without saying, but the "Mars I" has been considerably cleaned up of late, and James should be in a position to put up a creditable fight for the Coupe Deutsch. Italy has entered one machine, the Fiat, flown by Brack Papa. This machine has a 700 h.p. Fiat engine, and will thus easily be the most powerful in the race.

France has entered no less than six machines, and as each country is only allowed to enter three machines in the race, eliminating trials will have to be held. The six French machines, pilots and engines are: Jean Casale (type Casale), Blériot with 400 h.p. Lorraine engine; Nieuport-Delage biplane, 320 h.p. Hispano-Suiza, to be flown by Lasne or Berthelin; two Nieuport-Delage "Sesquiplans," 320 h.p. Hispano-Suiza engines, to be flown by Lasne and Sadi Lecointe; Madon "Simplex" monoplane, 320 h.p. Hispano-Suiza, to be flown by Canivet; and one machine, type and engine not stated, to be flown by Nungesser.

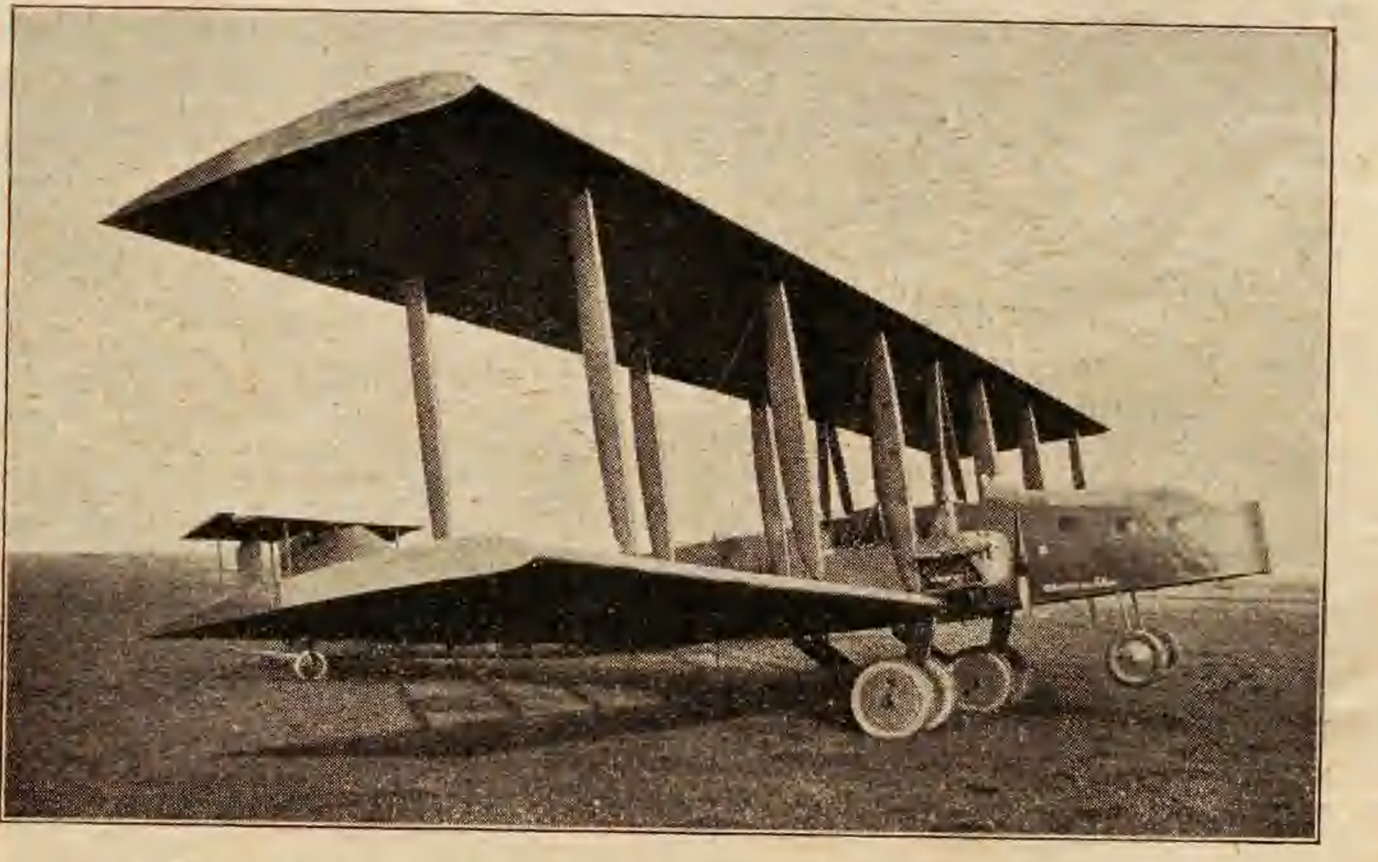
The Nieuport-Delage biplane is the old type which is already well known. The "Sesquiplans" will probably be similar to that with which Kirsch won the Coupe last year, but with minor modifications. The Blériot, type Casale, is an unknown quantity, but we believe that, as a matter of fact, it is a Spad-Herbemont, fitted with the Bristol "Jupiter" engine which recently passed the French Air Ministry Type Tests.

The Madon monoplane, type "Simplex," is evidently an outcome of the experiments which M. Canivet has been carrying out for M. Madon on tailless machines. The machine on which the experiments were made was a small biplane with rotary engine, the longitudinal stability apparently being derived from back-swept wings, after the fashion of the Dunne. How this system makes for extra speed is a little difficult to see; the Dunne certainly was not wildly fast. On the other hand, the suppression of the tail should result in a certain saving in resistance, but it might be expected that this advantage would be nullified by the alterations necessary to the wings.

The machine entered by Nungesser is quite an unknown quantity, but no doubt something will be heard of it in the eliminating trials.

The 700 h.p. Fiat is probably the same machine as that flown by Brack Papa last year, possibly with minor alterations by way of cleaning up.

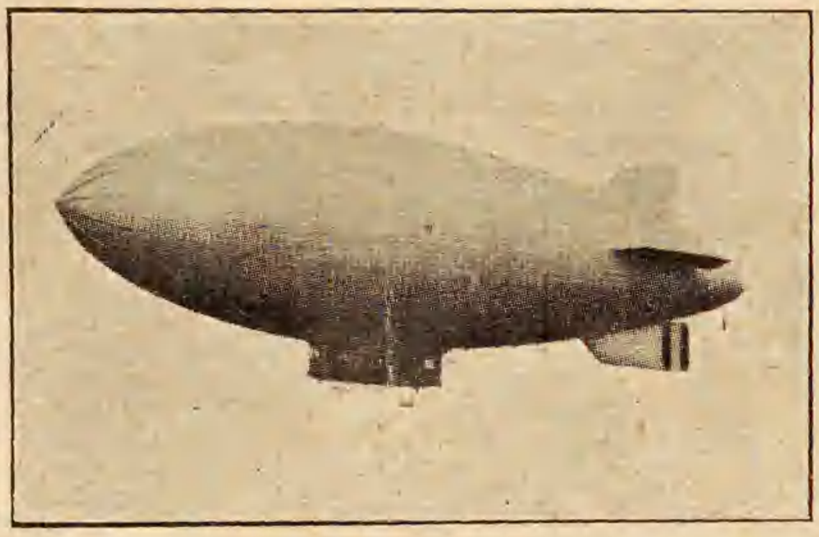
Altogether it looks as if James is going to have his work cut out, but Mr. Folland has not been entirely idle of late, and may be expected to have something up his sleeve. The Aerial Derby gave no indication of the speed of which the "Bamel" was really capable, much less of what it can do when in trim for an event like the Coupe Deutsch.



THE FARMAN FOUR-ENGINED NIGHT BOMBER: At the last Paris Aero Show one of the machines exhibited on the Farman stand was a large four-engined night bomber, the B.N.4, with four Lorraine-Dietrich engines of 400 h.p. each. This machine has now been flown, M. Bossoutrot taking it into the air on August 1, before the "Section Technique." The B.N.4 weighs, with full load, about ten tons, and carries fuel for a flight of seven hours' duration. In addition it is armed with machine guns for repulsing attack, and carries a long-range wireless outfit, so as to be always in communication with its base.

THE GOODYEAR "AC" NON-RIGID DIRIGIBLE

SOME successful trials were carried out recently at the Akron (Ohio) Air Station of the Goodyear Tyre and Rubber Co. with a new type of non-rigid dirigible, designed and constructed by this firm for the U.S. Army Service. The outstanding features of this dirigible, which is of medium size, consist of the unit-type power plant and propeller transmission, the location of the car flush with the envelope, and the somewhat squat shape of the latter.



THE GOODYEAR "AC" NON-RIGID DIRIGIBLE: The Ship in Flight.

The results obtained from the trials have indicated that these features — which are more or less of an experimental nature — will prove satisfactory and probably mark a considerable improvement in airship design. Not only has the squat shape of the envelope—the aspect ratio being 3.6 to 1—proved to be remarkably efficient and stable, but it has permitted a concentration of lift, and enabled a considerable saving to be effected in the weight of car suspensions. With a length and diameter respectively of 170 ft. and 48 ft., the volume of the envelope is 185,000 cu. ft.

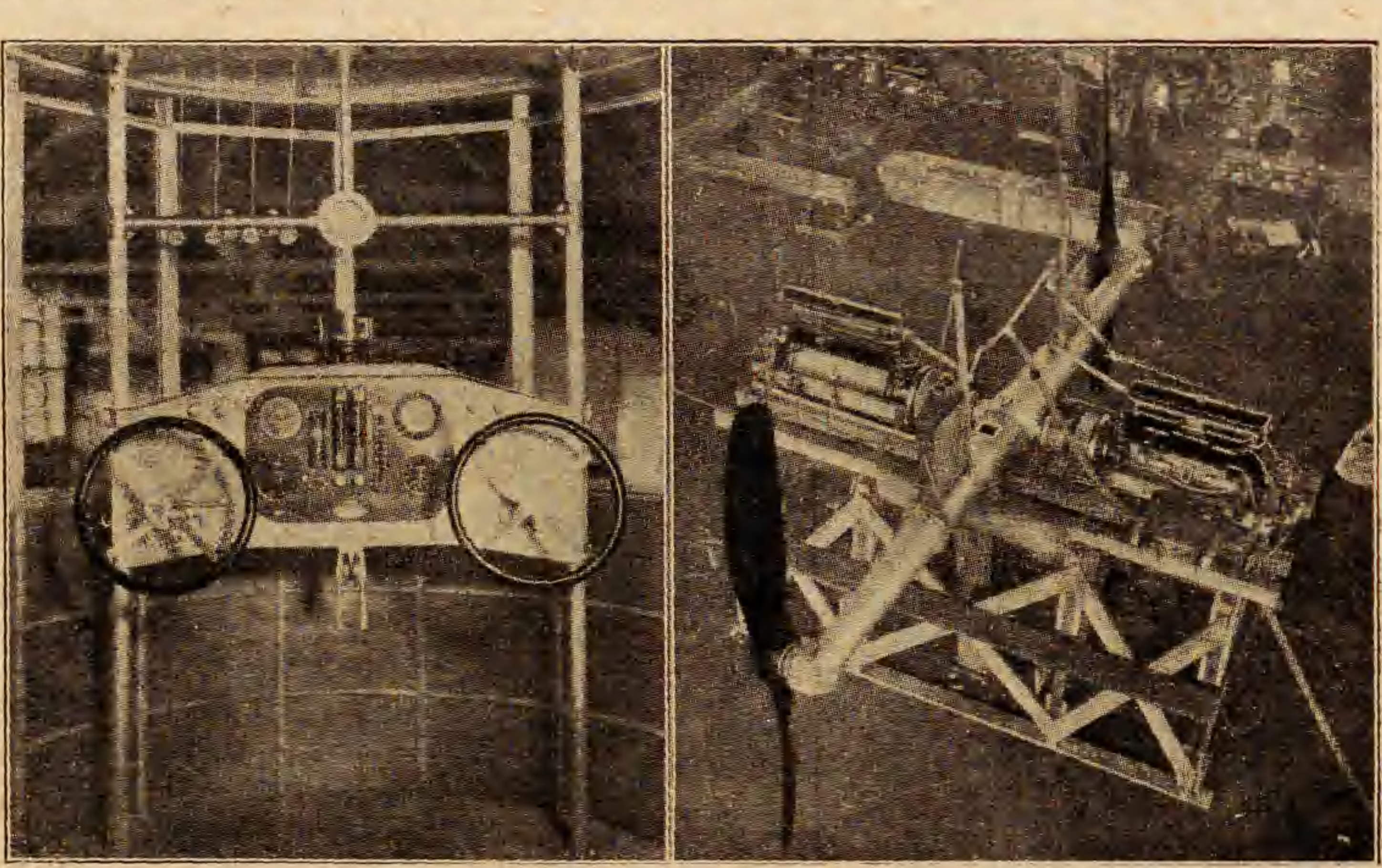
The car is of the enclosed type, with two longitudinal sills, 18 ins. deep, which constitute the backbone, or main framework of the structure. The remainder of the car is practically a shell housing the crew, etc., and in this way the weight of the car comes out at about the same as that of an ordinary open car. It is divided by a soundproof bulkhead into two compartments, one forward forming the control and navigating cabin, and one aft forming the engine room.

In the forward portion of the pilot's cabin is a neat control board, which carries practically every instrument that is required for successful airship navigation. The pilot controls the entire transmission, clutches, reverse, etc., from the cabin. An instrument board is also provided in the engine room whereby the engineer may read all pressures and temperatures, etc., of the engines and transmission assembly.

The power plant consists of two 130 h.p. Aeromarine, U6D engines placed end to end in the rear compartment of the car, and driving two airscrews, one on each side of the car, through a spiral bevel transmission and enclosed propeller shafts which extend out from the sides of the car. The shafts, together with reverse gear, etc., lie between the engines, and the whole power plant forms one complete unit. It is possible for both engines to drive one propeller, or for one engine to drive both propellers. The propellers are of large diameter (11 ft. by 10 ft. 6 ins. pitch), and run at about 800 r.p.m. (1,600 r.p.m. engine speed). The detail design and production of the transmission were accomplished by Mr. J. Rüse, chief engineer of the Wellman-Seaver-Morgan Co.

The fuel tanks are located in the rear part of the navigating cabin, in two 160-gall. tanks so constructed as to permit them to be used as sleeping bunks. All check valves, fuel lines, and miscellaneous fittings are beneath the floor, out of the engine room. Below the floor line and extending the full length of the car, is a duct, 32 ft. long and 20 ins. wide, which is so ventilated as to get a constant flow of fresh air at all times. It is of interest to note that the walls of the engine room are lined with sheet asbestos. The mufflers are of the dual type, in which a part of the air which is delivered to the ballonet is circulated around the exhaust chamber and then into the exhaust itself, to assist in silencing the exhaust. The air for the ballonet is supplied by Sirocco type fans, bolted directly to the engine flywheels.

Water ballast is carried in the floor of the car immediately below the navigating cabin, wherein a dial is located to indicate the amount of water available for ballast.



The Goodyear "AC" Non-rigid Dirigible: On the left, the control in the fore-cabin. On the right, the power plant.

Between the envelope and the car proper there is an air space of 14 ins. clearance, this being faired into the envelope by elastic fabric, with openings at the forward part of the ship to insure constant circulation between the envelope and the roof of the car. The possibility of hydrogen gas getting into the control or engine compartments is thus eliminated. It should be noted that the top of the car is made gas-tight, further to guard against this danger, whilst the single ballonet—which constitutes 30 per cent. of the ship's volume—is directly above the car, thereby securing another layer of air between the bottom of the envelope and the gas.

All suspension cables run to the floor of the car, thus permitting veneer sides of $\frac{3}{32}$-in. thickness to be used. As all loads are concentrated at the floor line, the surge of the car while in flight is resisted by two lateral cables and four longitudinal cables attached to the centre bulkhead. This, in addition to martingales, which are also attached to the floor line, have proved to be very successful in overcoming the fore and aft surging usually experienced when a car is hung too far away from the envelope. The disposable load being located directly under the centre of volume of the ballonet, permits the employment of a single ballonet without any possibility of the ship getting out of trim, irrespective of the loads carried within the car.

The principal characteristics of the Goodyear A.C. Airship are :—

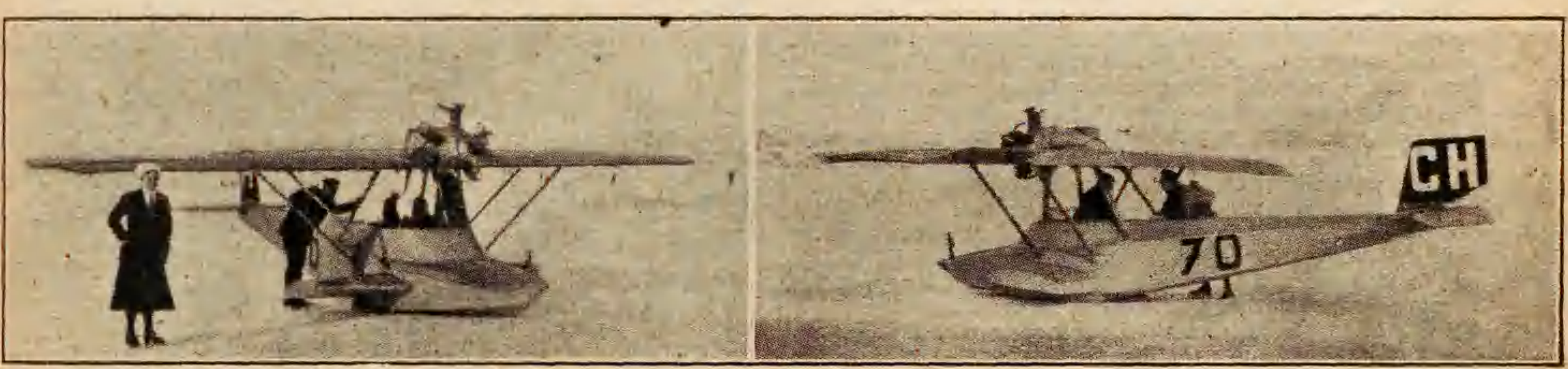
Volume	185,000 cu. ft.
Length	170 ft.
Diameter	48 ft.
Speed	65 m.p.h.
Ceiling	12,000 ft.
Rate of climb	1,000 ft. per min.
Rate of descent	800 ft. per min.
Radius of action (full speed)	20 hrs.
Radius of action (cruising speed)	30-40 hrs.
Percentage of useful load	39
Crew	7

THE DORNIER "DRAGON-FLY" FLYING BOAT LANDING ON THE ICE

In our issue of October 20 last we gave a description and general arrangement drawings of the Dornier all-metal "Dragon-fly" flying boat, fitted with a 60 h.p. Siemens-Halske engine, and this week we supplement the aforesaid particulars with the accompanying illustrations, showing one of these handy little machines on the ice at Lake Constance. These views were taken on the occasion of some interesting and successful experiments carried out, on the Swiss side of the Lake, with the object of demonstrating the capabilities of the machine in landing on, and taking off from, the ice.

There are occasions, in certain countries, where such a performance would be of considerable value on commercial air routes, especially in such localities where the formation of ice hinders or prevents steamship communication. Successful experiments have been made in the past with aeroplanes fitted with ski-landing gear, but while landings on, and take offs from, snow or ice were accomplished, the machine was unable to alight on or take off from anything else—land or water. It is obvious that this is an important point where a particular air route presents both conditions, and it was this dual operation the Dornier flying boat demonstrated some time ago.

On this occasion a start was made from the water about 25 miles from the spot (Lower Lake) where the landing on ice was to take place. The load was 450 lbs., and consisted of pilot, passenger, and a full load of petrol. After flying for about 18 mins., the machine arrived above the completely frozen Lower Lake, and made a successful landing on the lightly snow-covered ice surface. Following several "skating" tests over the surface, with the object of determining the possibility of steering, etc., a start was made from the ice. Owing to the very low resistance offered by the ice, it took only some 12 to 14 secs. to take off. Several more starts and landings were made, alternating on snow-covered ice and on polished ice. Tests were also made with the wind abeam and from the stern. All tests proved satisfactory, and the flying boat was not in any way damaged or strained.



The Dornier "Dragon-fly" Flying Boat, with which experiments were carried out some time ago on Lake Constance (Switzerland), in alighting on and taking off from the ice.

"Daily Mail" Prize for Gliders

Just as we are going to press the announcement is made that the *Daily Mail* is offering a prize of £1,000, *open to aviators of any nationality*, for the longest flight made on an engineless glider in England (presumably this means Great Britain) during September. The prize will be won by the competitor who, rising from a specified area, remains longest in the air, provided the flight occupies not less than 30 minutes. A larger prize for next year is also announced. For particulars apply to the Secretary of the Royal Aero Club, 3, Clifford Street, New Bond Street, London, W. 1.

Seaplanes for Sweden

From Stockholm it is reported that the Swedish aircraft firm Svenska Aero Aktiebolaget has just delivered to the Swedish Navy a seaplane which is to be the first of a series of 10 machines ordered. The new seaplane has been designed, it is understood, by Herr Ingeniör Heinkel, now Technical Director of the German Caspar works. The machine is very similar in general design to the Hansa-Brandenburg monoplanes of the War period, but the detail construction is said to be a considerable improvement. The engine fitted at present is a Maybach, but there is talk of fitting Siddeley Pumas instead, which it is expected will considerably improve the performance. The length of the new seaplane is 41 ft. 6 ins. and the span 57 ft. 5 ins. The wing area is 565 sq. ft., and the weight empty 3,300 lbs. With a useful load of 1,430 lbs. the machine has a speed of 100 to 105 m.p.h., and climbs to 3,000 ft. in 7 minutes. On one occasion the useful load was increased to 1,870 lbs., with which the machine got off without great difficulty.

London-Lausanne by Air

Messrs. Thomas Cook and Sons now issue through tickets from London to Lausanne and Geneva by Daimler air-express, leaving London Air Station at 5.30 a.m. on Saturdays. By this service passengers will arrive in Paris in time for breakfast, before leaving for Switzerland on a French air-express at 9 a.m. Lausanne is reached at 12.30 p.m. and Geneva an hour later.

A return flight will be made each Monday from Geneva at 8 a.m., London being reached in the afternoon. The through fare for the one-day journey is 675 fs.

An extension of this service is shortly to be opened between Lausanne, Evian-les-Bains and Aix-les-Bains.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

THE R.A.F. AND THE NAVY

[2060] I have read with much interest the recent correspondence in regard to the Air Service, and as an old pilot and a great believer in the future of the air, I venture to give my views :—

The advocates seem to be divided into two main classes :—

Class 1.—Those who wish to increase the Air Force at the expense of our One-Power Naval Standard.

Class 2.—Those who wish to increase the Air Force and at the same time keep up our One-Power Naval Standard.

The advocates of Class 1 have certainly a strong argument from the point of view of economy, but there would appear to be very serious objections from other points of view. Some of these are as follows :—

1. It does not yet appear to have been proved that the aeroplane has at present definitely made the battleship useless. In my opinion (given for what it is worth), it will not be proved until the next war. After all, the "dazzling constellations of political talent," mentioned in the *Daily Mail* appear to be supported by Lord Beatty, whose opinions are worth at least as much as those of the "Anti-Battleship" party.

2. Granted that the above is a reasonable argument, it logically follows that not to build the two battleships that are at present being discussed (and so maintain our One-Power Standard) would be stepping off one rung of the ladder before getting a secure grip of the next.

3. Enough notice does not appear to have been taken of the serious loss of prestige that would ensue if we abandoned our One-Power Naval Standard. This would inevitably react against us politically and commercially, for it is as true today as ever it was that "Trade follows the Flag." This is a loss that cannot easily be defined or measured, but it is none the less real.

4. I am strongly of the opinion that our civil expenditure should be pruned before our security.

5. A lot has been said about the little our battleships did in the Great War, but not so much as to what would have happened if we had not happened to have them.

To turn to the second class and its subdivisions, I would submit that the best solution is a combination of (not a "compromise between") *a* and *b*, more or less as follows :—

1. The Navy and Army should have complete control of their own aircraft and personnel for the purposes of reconnaissance and artillery co-operation only.

2. The Royal Air Force should remain a separate entity, which would undertake :—

(*a*) Responsibility for protection of reconnaissance and artillery machines as requested by the Army and Navy. (This would to some small extent resemble the arrangement under which the Navy guaranteed the transport of the B.E.F.)

(*b*) Offensive action against enemy aircraft and prevention of enemy aircraft activity over our lines, fleet and shores.

(*c*) Strategical offensive work (*i.e.*, long-range bombing, etc.).

(*d*) Tactical bombing and "trench-strafing," etc., in battles in accordance with the plans and under the command of the naval or military officer in charge of the operations (*i.e.*, in, say, a land battle, the R.A.F. co-operating would be instructed that certain points were to be destroyed by bombs, or troops in certain positions were to be attacked, etc.).

My arguments in favour of a system on the above lines are :—

1. Unless reconnaissance, contact and artillery co-operation pilots and observers are trained with and by the arms of the Service they are to work with, there is bound to be a loss of efficiency due to their lack of knowledge of those services. A correspondent to the *Morning Post* states that if a naval officer is to become efficient as a co-operation pilot, he must be 95 per cent. an aviator, and remain not more than 5 per cent. a naval officer. I think this is not correct when applied only to naval reconnaissance and spotting, as it would be far more advantageous to remain chiefly the naval officer. Similar arguments apply to the Army.

2. On the other hand, unless a separate Air Force is retained for air offensive work generally, the full development of aircraft in war will undoubtedly be hampered. There are bound to be important strategical and tactical advances in the use of aircraft and in air fighting which need scope for their development unhampered by the other Services. There is also the main point that, even if opinions are divided as to whether or not the Air Force is the first line of defence *now*, it is bound to be so in the future, and the Air Force *must* be given a free hand to arrive at that stage.

3. A system on the above lines might be a little more costly, and might present difficulties in working out. It would, however, have the inestimable advantage of clearing the atmosphere and of doing away with squabbles. It would also eliminate the troubles of "divided command." Each Service would have its own responsibilities clearly marked out, and could develop along its own lines within the limitations laid down. It would then be directly responsible to the Government, and could not put the blame for failure on either of the others.

To conclude, I would refer to the rather short-sighted outcry against "bricks and mortar" expenditure by the Air Ministry. Generally speaking, it is difficult for one who has not been in the Air Force to realise the amount of ground organisation necessary to keep machines in the air. If, as I believe and hope is the case, the Air Force is being prepared for rapid expansion during war, it is quite sound to carry out the necessary—and it is necessary—"bricks and mortar" expenditure now, whilst war is unlikely in the near future, and to see, as Capt. Guest so aptly put it, that "the foundations are well and truly laid."

I must apologise for the length of this letter, but trust you will find space for it.

PIERRE B. PATTISSON, Jun., Captain.

St. Meddan's House,
Troon, Ayrshire, N.B.

* * *

THE COUPE SCHNEIDER : Mr. H. C. Biard, the pilot of the winning Supermarine-Napier flying boat, who arrived back in London from Naples on Tuesday afternoon, at the entrance to the Royal Aero Club to "report." Mr. Biard, who is seen in the centre, was escorted by Mr. Hubert Scott-Paine and Mrs. Scott-Paine, and was received at Victoria Station by Commander J. Bird, Commander Perrin, and a host of friends prior to his calling at the Club. In the photograph with Mr. Biard are, left to right, Mr. Scott-Paine, of the Supermarine Aviation Works ; Col. Darby, of the Aircraft Disposal Company ; Col. Frank McClean, and Mr. H. T. Vane, C.B.E., Managing Director of Messrs. D. Napier and Son.

THE ROYAL AIR FORCE

London Gazette, August 15, 1922

General Duties Branch

E. V. Culverwell is granted a short service commn. as a Flying Officer, with effect from and with seniority of, August 1.

The following Pilot Officers to be Flying Officers:—N. H. D'Aeth, J. E. L. Drabble, C. W. Weedon H. L. Beatty, C. G. Hancock, H. G. Brookman, G. R. C. Spencer, H. W. Foote, D. C. Prance, J. G. Peck; June 21. J. S. L. Adams, M. H. Ely, D. H. Geeson, J. de la P. B. Preston, R. L. Ragg, G. H. Smith; July 15.

Wing Commander I. T. Courtney, C.B.E., is seconded for duty with the British Naval Mission in Greece; August 9. Flying Officer B. Scovell, A.F.C., is placed on the retired list on account of ill-health; August 16.

Stores Branch

E. G. Jolliffe is granted a short service commn. as a Flying Officer on probation, with effect from, and with seniority of, July 25.

Medical Service

J. G. F. Heal, M.D., is granted a short service commn. as a Flight-Lieut., with effect from, and with seniority of, August 1. The following are granted temporary commns. as Flight-Lieuts., with effect from, and with seniority of, August 1:—M. Coghlan, M.B., J. W. H. Steil, M.B.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Air Commodores.—L. E. O. Charlton, C.B., C.M.G., D.S.O., from R.A.F. Depôt (Inland Area) to command No. 7, Group Headquarters (Inland Area). 1.9.22. T. C. R. Higgins, C.M.G., from No. 7 Group Headquarters (Inland Area) to Air Ministry on appointment as Director of Training and Staff Duties. 1.9.22.

Group Captains.—C. L. N. Newall, C.M.G., C.B.E., A.M., from Air Ministry to No. 1 School of Technical Training (Boys), Halton. 24.8.22. A. G. Board, C.M.G., D.S.O., from No. 1 School of Technical Training (Boys), Halton, to Air Ministry, on appointment as Deputy Director of Personnel. 24.8.22. J. Hearson, C.B., D.S.O., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F. (Iraq). 28.7.22. E. F. Briggs, D.S.O., O.B.E., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F. (Iraq) (Supernumerary), to command Basrah Group Headquarters (on formation). 28.7.22.

Wing Commanders.—A. V. Bettington, C.M.G. The previous notification concerning this Officer which appeared in R.A.F. Intelligence No. 73 is hereby cancelled. I. T. Courtney, C.B.E., from Headquarters, Coastal Area, to British Naval Mission, Greece, on secondment to the Greek Government. On ceasing to be attached to the Air Ministry. (D.O.I.) 9.8.22. B. A. Playne, D.S.O., M.B., B.A., from R.A.F. Central Hospital (Coastal Area) to Headquarters (Inland Area). 9.8.22. C. R. S. Bradley, O.B.E., from Half-Pay List to Headquarters, R.A.F. (Iraq). 28.7.22. G. C. St. P. de Dombasle, O.B.E., from No. 1 Group Headquarters (Inland Area) to Headquarters, R.A.F., Iraq. 28.7.22. G. P. Grenfell, D.S.O., from R.A.F. Depôt (Inland Area) to Half-Pay List. 1.8.22. K. G. Brooke, C.M.G., from Air Ministry (D. of E.) to Headquarters (Inland Area). 4.8.22.

Squadron Leaders.—N. M. Martin, C.B.E., from C. and M. Party Donibristle (Coastal Area) to command No. 100 Squadron (Inland Area). 10.8.22. A. W. H. James, M.C., from R.A.F. Cadet College (Ground Wing), Cranwell, to Half-Pay List. 7.8.22. W. W. Shorten, F.R.C.S., from R.A.F. Depôt (Inland Area) to Headquarters (Inland Area) (Supernumerary). 14.8.22. H. J. F. Hunter, M.C., from R.A.F. Depôt (Inland Area) to No. 10 Group Headquarters (Coastal Area) for Personnel Staff Duties. 19.9.22. W. A. S. Duck, O.B.E., from Headquarters (Coastal Area) to command R.A.F. Central Hospital (Coastal Area). 7.8.22. R. A. G. Elliott, M.B., B.A., from Central Medical Board (Coastal Area) to Headquarters (Coastal Area). 11.8.22. F. E. P. Barrington, from R.A.F. (Cadet) College (Flying Wing), Cranwell, to R.A.F. (Cadet) College (Ground Wing), Cranwell. 3.8.22. Paul Adams, O.B.E., from Air Ministry (D. of E.) to No. 4 Stores Depôt, 8.8.22. W. R. Bruce, O.B.E., from No. 1 Group Headquarters (Inland Area) to Headquarters, R.A.F., Iraq. 28.7.22. J. F. Carruthers, M.D., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area), on appointment to Temporary Commission. For short course of instruction. 31.7.22.

Flight Lieutenants.—H. Cockerell, O.B.E., from Iraq Group Headquarters (Middle East Area) to Headquarters, Iraq Group. 1.2.22. D. H. de Burgh, A.F.C., from Electrical and Wireless School (Inland Area) to R.A.F. Depôt (Inland Area) (Supernumerary), whilst attending course of instruction at Cambridge University. 1.9.22. N. R. Fuller, from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Cranwell (Supernumerary). 26.7.22. R. Halley, D.F.C., A.F.C., from Headquarters (Inland Area) to Half-Pay List. 1.8.22. N. Keeble, D.S.C., D.F.C., from School of Technical Training (Men) (Inland Area) to R.A.F. College (Cadet) (Flying Wing) Cranwell. 8.8.22. Substituted for the previous notification concerning this Officer which appeared in R.A.F. Intelligence No. 74. F. E. J. Coates, from Air Ministry (D. of E.) to No. 4 Stores Depôt (Supernumerary). 14.8.22. G. C. Gardiner, D.F.C., from R.A.F. Depôt (Inland Area) to No. 7 Group Headquarters (Inland Area) for Personnel Staff Duties. 27.8.22. W. C. Clark, from School of Technical Training (Men) (Inland Area) to No. 12, Wing Headquarters (Ireland). 15.8.22. T. E. Drowley from Air Ministry (D. of E.) to No. 4 Stores Depôt. 1.9.22. J. G. F. Heal, M.D., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area), on appointment to Short Service Commission. For short course of instruction. 1.8.22. M. Coghlan, M.B., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area), on appointment to Temporary Commission. For short course of instruction. 1.8.22. J. W. H. Steil, M.B., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area), on appointment to Temporary Commission. For short course of instruction. 1.8.22. A. L. Lingard, from R.A.F. Depôt (Inland Area) to the Packing Depôt. 9.8.22. W. H. Oakey, from Headquarters, R.A.F. (Ireland), to Inland Area Aircraft Depôt (Inland Area) (Supernumerary). 4.8.22. J. W. Harper, M.D., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F. (Middle East). 28.7.22. P. F. Fullard, D.S.O., M.C., A.F.C., from No. 12 Squadron (A. of Rhine) to No. 4 Squadron (Inland Area) for duty as Adjutant. 29.7.22. J. S. Goggin, from R.A.F. Base, Leuchars (Coastal Area) to R.A.F. Base, Gosport (Coastal Area) (Supernumerary). 1.9.22. H. M. Daniel, M.B., from No. 1 School of Technical Training (Boys), Halton, to R.A.F. Depôt (Inland Area). 8.8.22. H. A. Tillman, M.D., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to No. 1 School of Technical Training (Boys), Halton. 31.7.22.

NOTICES TO AIRMEN

Standard of Time for Meteorological Reports

1. The times used for meteorological purposes are Greenwich Mean Times.

This will apply, from August 1, 1922, to Meteorological reports issued for purposes of aviation, whether the reports are printed, exhibited or issued by radio-telegraphy, radio-telephony, telephone or telegram. It includes the times in the messages referred to in Notice to Airmen No 80 of 1922.

2. The corresponding British Summer Times (B.S.T.) are obtainable from the Greenwich Mean Times (G.M.T.) by the addition of one hour; *e.g.*, 13.25 G.M.T. is identical with 14.25 B.S.T.

3. The fact that Greenwich Mean Times are used will be indicated as clearly as possible in printed reports and charts for exhibition, and the times quoted in the messages will be followed by the letters G.M.T.

(No. 85, 1922.)

Projected Flights: Special Arrangements

(1) *Meteorology and Wireless.*—When meteorological and wireless facilities, in addition to or different from those normally available are likely to be required, either (*a*) for a special individual flight, or (*b*) for regular services on new routes, or (*c*) through changes in the routine services of aviation companies operating on recognised air routes, particulars should be forwarded (marked "Urgent") to the Director of Civil Aviation, Room 550, Air Ministry, Adastral House, Kingsway, W.C. 2.

In case (*a*) one week's notice should be given, with full particulars of the route, the proposed date and time of flight and of the W/T or R/T equipment of the aeroplane.

In case (*b*) the period required for making any necessary arrangements before the commencement of the contemplated service will vary according to circumstances, but the necessary details should be supplied as early as possible.

In case (*c*) at least 48 hours' notice (Sundays excluded) of proposed changes should be given.

(2) *Navigation.*—Similarly, information of a navigational character and details of ground organisation at home and abroad can be supplied in cases (*a*) and (*b*) above.

(3) *General.*—It is in general desirable that the earliest possible intimation of projected flights be given, especially in cases where arrangements are necessitated with foreign countries.

(No. 89 of 1922.)

Pilots' Class B Licences: Lectures in Elementary Meteorology.

1. In order to assist pilots preparing for the examination in Elementary Meteorology which must be undergone by applicants for Class B Licences or renewals of such Licences (as notified in Notices to Airmen Nos. 55 of 1921 and 72 of 1922), arrangements are being made for a short course of lectures on this subject to be given at Croydon aerodrome.

2. The course will commence on about August 21, 1922, and the lectures will be given at times to be arranged to suit the convenience of as large a number of pilots as possible. Those desiring to attend should communicate direct with the Meteorological Officer, Croydon Aerodrome.

3. The following ground will be covered by the lectures:—

(i) *General Meteorology.*—Winds—Trade Winds, Monsoons, etc.—Temperature—Water Vapour in the Atmosphere—Fog and Mist—Formation of Clouds, Rain, Snow and Hail.

(ii) *Synoptic Meteorology.*—Barometric Pressure—Synoptic Charts—Types of Pressure Distribution—Special Phenomena—Forecasting.

(iii) *The Upper Air.*—The Variation of Wind with Altitude The Troposphere and Stratosphere—Pressure, Density and Humidity in the Upper Air—Special Considerations relating to Altimeters.

(No. 91 of 1922.)

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association.)

British records broken 1922 :—

(1) D. A. Pavely, compressed air-driven model, Wimbledon Common, July 30, 53 secs.

(2) L. Grey, enclosed tractor rubber-driven R.O.G., Wanstead Flats, August 20, 26 secs.

(3) L. Grey, enclosed tractor, rubber-driven, hand-launched, Wanstead Flats, August 20, 37 secs.

(4) C. Hersom, twin pusher R.O.G., Wanstead Flats, August 20, 247 secs.

(5) C. Hersom, single-tractor waterplane, Wanstead Flats, August 20, 43 secs.

At the last meeting it was decided to call an Extraordinary General Meeting for Thursday, October 5, at Headquarters, 7.30 p.m., for the purpose of electing new officers, etc.

Report from Competition Secretary, Sunday, August 20, 1922, will stand out in the annals of the L.A.M.A. for a considerable time to come. Perfect flying weather prevailed, the first we have had for about four months, and excellent model flying was accomplished which was witnessed by large numbers of the general public on Wanstead Flats. The members congregated for the purpose of attempting to improve the British records.

Mr. C. Hersom was the first member to attract the attention of the time-keepers with his single-tractor waterplane. At his first attempt he broke the official British record by several seconds, the model getting away from the water very smartly. At his second attempt he broke the official record held by Mr. Dutton (of 29 secs.) by 14 secs. By this time Mr. Bedford had tuned up his twin-pusher waterplane and succeeded in making a flight of 49 secs., which will give some of the other members something to think about. Mr. L. Grey was the next to be ready, with his enclosed tractor monoplane, and put up a splendid performance by making a record for this type of machine—R.O.G., 26 secs. ; hand-launched, 37 secs. The latter effort was accomplished with his large machine. Mr. C. Hersom was now ready with his twin-pusher R.O.G. monoplane, and started off with an unofficial flight of 117 secs., the model flying at a great height. In his official attempt his model left the ground perfectly, and after one or two circles, during which it gradually gained height and flew away towards Wanstead Park. The power apparently gave out over a small plantation, but the model continued to circle and climb until lost to sight, having been in the air 247 secs., beating the British official record of 145 secs. and incidentally providing all present with a fine exhibition of soaring flight which I am sure would have gladdened the heart of Dr. Hankin. Mr. Hersom received many congratulations from those present, including Mr. J. Louch, the previous holder of the record.

The timekeepers were Messrs. Houlberg, Rippon and Wilson.

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SIDE-WINDS

As in previous years, British Thomson-Houston magnetos appear to have had a large share in the regularity with which the winning machines lapped the course of the Aerial Derby. The Gloucestershire Aircraft Co.'s "Mars I," with Napier "Lion" engine, was equipped with a B.T.H. Av. 12 ; the Bristol "Bullet," 400 h.p. Bristol "Jupiter," with a B.T.H. AQ.9 ; and Raynham's Martinsyde F.6,200 Wolseley "Viper," with B.T.H. QV.8. That this was the fourth successive Derby in which the machines gaining first and second place were fitted with B.T.H. magnetos is one more proof, if such were needed, of the realiability of British Thomson-Houston products. It might be added that in this year's Derby the machines gaining second, third and fourth place in the Handicap were also fitted with B.T.H. "mags.," as were three of the machines flying in the August Open Handicap.

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THAT the modern aeroplane is fitted with Smith's instruments is now taken almost as much as a matter of course as is the fact that it is fitted with a control stick or an under carriage. One has come to take it for granted. If a visit is paid to almost any aerodrome in the country it is a fairly safe guess that at least 90 per cent. of the instrument boards carry the well-known black dials. It is, therefore, almost superfluous to state that in the Aerial Derby all the machines were fitted with these famous instruments. While on this subject it might be mentioned, if we are not divulging a secret, that a new Smith's instrument is being experimentally tested. This is a new turn indicator, known, we believe, as an "electro-gyro" type. We hope to be able to refer in some detail to this instrument shortly. Another innovation which is coming along is a single-dial revolutions counter for twin-engined machines. In this latter instrument two pointers—a red for the port and a green for the starboard engine—are mounted in front of the same dial, and the arrangement should greatly facilitate synchronisation of the two engines. Altogether S. Smith and Sons (M.A.), Ltd., are *not* resting on their laurels, but are doing everything possible to maintain the position which this firm has won during the past years.

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IN connection with the Aerial Derby, it may be mentioned that the two Bristol machines, the monoplane and the "Bullet," which won first and second place in the Derby Handicap, were doped with Cellon, the Bristol Company having chosen red for their racing colours. The Supermarine flying boat "Sea Lion," which won the Schneider race, was also doped with Cellon, as was the Martinsyde type A, Mark II, described in last week's issue of FLIGHT. The scheme chosen for the latter machine was the well-known Cellon aluminium dope, which certainly added considerably to the appearance of the Martinsyde.

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PUBLICATIONS RECEIVED

Aircraft Year Book, 1922. Aeronautical Chamber of Commerce of America, New York City, U.S.A.

Income Tax and Super-Tax, 1842-1923 ; Tabular View. Oliver and Boyd, 33, Paternoster Row, E.C. Price 1*s.* net ; by post 1*s.* 2*d.*

Report No. 132. Aeronautic Instruments, Section VIII. Recent Developments and Outstanding Problems. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Revue Juridique Internationale de la Locomotion Aérienne. July, 1922. Paris : Edition Aérienne, 4 rue Tronchet.

"*Send to Barimar.*" Barimar, Ltd., 10, Poland Street, London, W. 1.

Technical Note No. 100. *Theory of the Slotted Wing.* Lecture by A. Betz. National Advisory Committee for Aeronuatics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 101. *Comparing Maximum Pressures in Internal Combustion Engines.* By S. W. Sparrow and S. M. Lee. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : **cyl. = cylinder ; I.C. = internal combustion ; m. = motors**

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Applied for in 1921.

Published August 24, 1922.

5,771. RAUL, MARQUIS OF PATERAS PESCARA. Screw propellers. (159,205.)

8,805. E. H. J. C. GILLETT. Rotary I.C. engines. (183,517.)

9,848. LUFTSCHIFFBAU ZEPPELIN GES. and P. JARAY. Passenger airship for long-distance travel (161,180.)

11,201 and 11,203. A. G. BELL and F. W. BALDWIN. Hydroplanes, hydro-aeroplanes, etc. (163,034 and 163,036.)

22,385. P. W. PETTER and PETTERS, LTD. Lubrication of I.C. engines, (183,728.)

29,540. H. JUNKERS. I.C. engines. (171,115.)

FLIGHT

The Aircraft Engineer and Airships

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xiv.)

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Goldsmiths & Silversmiths Co., 112, Regent Street, W. 1. Gerrard 9091 (3 lines).

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INSULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C. 1. City 3115; "Vanduara," Cent. London.

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MACHINING—

Monk Engineering Co., Ltd., Coventry. Coventry 807; "Assistance," Coventry.

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British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry. Telephone 278; "Asteroidal," Coventry.

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Rubery, Owen & Co., Darlaston. Darlaston 87; "Roofs," Darlaston.

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D.A.P., Replingham Road, Southfields, S.W. 18.

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E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5. Dalston 1893.

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A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

1922.	
Sept. 2–17	**International Concours Aviatique, Rotterdam**
Sept. 8–10	**1,000 Miles Race round Britain for the King's Trophy**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 30	**Coupe Deutsch (300 kil.)**
Oct. 16–21	**Daily Mail £1,000 Gliding Competition.**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition.**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

Mastery of the Air

IN a most lucid and clearly-reasoned letter in *The Times* of August 28th Admiral Mark Kerr recalls the dictum that "War is an affair of communications," and goes on to give illustrations of the way in which, in modern times, the greatest danger to communications comes from the air, reiterating that it is, therefore, essential that command of the air should be in the hands of any country which hopes to be successful in war. In future wars the opening struggle will be between the fleets of the air, endeavouring to preserve their own and destroying the lines of communications of the enemy. The gallant Admiral points out that there is nothing new in this strategy; it is merely new weapons applied to old principles. He then asks how we are to arrive at a proper state of preparedness to preserve the Empire from ruin, and answers the question by stating that first we must rouse public opinion, which task he considers the duty of the Press, and, secondly, we must ensure a proper organisation which shall produce the fighting machine which will preserve us from war or ensure success by giving us the means of striking first and striking hardest. The second part Admiral Mark Kerr puts into concrete form by outlining a scheme under which he considers that the desired object would be attained.

The Admiral states that the best plan is to have a Minister for War, with the three Services equally represented under his orders. This is a policy which we have advocated for a very long time. He foresees, however, that the opposition to such a great innovation may be too strong, and by way of an alternative outlines a scheme, quoted at the end of these comments, the broad principle of which is that the Air Ministry shall design, train, build, contract and supply all the finished articles to the Navy and Army, and that the Navy and Army will ask for what they want, and as soon as it is supplied it becomes part of the Service to which it has been affiliated. In its broad outline this scheme follows closely on the lines that have been suggested in these columns for many years past, and we welcome the confirmation of our views by so well-known an authority as Admiral Kerr. We have never attempted to elaborate detail to the extent that the Admiral does, but in the general principles involved we see our own views reflected. We are not, however, quite so pessimistic as the gallant Admiral with regard to the formation of a Ministry of Defence, and we imagine, and we hope, that, sooner or later, our Fighting Services will be co-ordinated in some such manner. It is only a natural corollary to the successful one-command experience in the late War.

◆ ◆ ◆

Circuit of Britain The list of entries for the Circuit of Britain for the King's Cup, which is to start from Waddon on September 8, is published under the Official Notices of the Royal Aero Club in this issue of FLIGHT. No less than twenty-one machines have been entered, and there is reason to hope that they may all be starters. Many prominent men figure in the list of entrants, and a number of famous pilots are down to fly in the race. As the competing machines will be seen by tens of thousands, the race cannot fail to increase aeronautical interest throughout the country, and focus public attention on practical flying. This is all to the good at the present time, and we sincerely trust that His Majesty may see his way to honour Waddon with his presence on the day of the finish of the race for his Cup, as this would undoubtedly put the finishing touch to the encouragement already so opportunely extended, and thereby mark another red-letter day in the history of Aviation.

◆ ◆ ◆

The "Daily Mail" Glider Competition The date for this year's gliding competition for the *Daily Mail* Prize of £1,000 has now been fixed. The competition will open on October 16, and the last day upon which competitors may try for the Prize is October 21. In a way, it is a pity that such short notice has been given, as it will scarcely be possible for potential British entrants to get machines built in time for the competition. On the other hand, the very generous prize offered may be instrumental in bringing to this country some of the German and French machines which have just done so well in competitions in those countries, and this could scarcely fail to add greatly by actual demonstrations to the interest already being taken in the subject of gliding and soaring.

It might also be pointed out that, in the French competition at any rate, some of the most successful machines were little more than small sporting aeroplanes, the engines of which had been removed. Probably certain structural parts had been lightened, but no great alterations were, we believe, carried out. Thus, in order to be in a position to make some sort of fight for the Prize with British machines, it might be possible to enter one or two machines of this type, such as the Avro Baby, the Austin Whippet and the Bristol monoplane, with the wings placed low on the body. If the Bristol Babe is still in existence, this also might be called into use.

◆ ◆ ◆

"FLIGHT" Designing Competition In order to encourage, even if but in a small way, the production of specially designed gliders, the proprietors of FLIGHT have decided to offer a Prize for the best design submitted before November 30, 1922. The competition is open to all, and we hope that many useful ideas, as well as at least one really practical design enabling amateurs or professionals to build, may result. The science of gliding is still very young, and no one can at present venture to forecast what a good glider design should be. There is ample room for originality, even while remaining within the rigid limits of present-day knowledge, and the author of the winning design will have to convince the Judges, by facts and figures, that his design is thoroughly practical, and worthy to be constructed in fair quantities.

We hope that gliding clubs may be formed in different centres of the country, and cordially invite any such to collaborate and send in designs for the competition.

ADMIRAL MARK KERR'S IDEAL AIR ORGANISATION

THE scheme suggested by Admiral Mark Kerr, to which reference is made above, is as follows :—

The Air Ministry shall consist of :—

Secretary of State ; Air Secretary.

Air Council, consisting of : War C.O.S., with Deputy C.O.S., R.N.A.S., and Deputy C.O.S., R.F.C. ; Navy Member ; Army Member ; Finance Member ; Personnel Member ; Experimental Member ; Training Member ; Civil C.O.S., with Deputy C.O.S. for Lighter-than-Air and Deputy C.O.S. for Heavier-than-Air.

1. There shall be an Air Member on the Board of Admiralty and one on the Army Council.

2. All experimenting work, training, building and contracting shall be done by the Air Council, Ministry and Air Force.

3. All the personnel will be entered and trained by the Royal Air Force under the direction of the Air Council. There will be both Naval and Military Air Classes of Instruction, in which the instructors are taken from the Air Service for which his class is being trained. The first term of instruction shall consist of general knowledge classes, and at the end of it pupils will be divided into the Naval and Military classes. Pupils will have the right of selection, but it will not be guaranteed that they shall join the branch that they select, as regard will always be paid to the qualifications and temperament of the individual in appointing him to any particular branch of the Service. If, in the course of training, a pupil be found to be more suitable for some other branch than that which he has been working for, he will be changed to that line for which he is most suited.

4. The Navy and Army will indent on the Air Ministry for their requirements in personnel and material for the Royal Naval Air Service and Royal Flying Corps respectively. When such supplies have taken place, they will become part of the Service, R.N.A.S. or R.F.C., and be under the complete control of the Admiralty or War Office, as the case may be.

5. Records of the officers and men of the R.N.A.S. and R.F.C. are to be rendered to the Air Ministry, and all information as to performance of machines, etc., by the Admiralty and War Office. The Air Ministry will reciprocate in these matters with regard to the officers from the R.N.A.S. and R.F.C., who are serving under the orders of the Air Ministry.

6. The personnel of the Air Ministry and Royal Air Force shall be drawn from the R.N.A.S. and R.F.C.

7. In the case of disagreement on any subject of policy or other cause which the Secretaries of State and First Lord of Admiralty cannot agree on, the matter shall be referred to the Cabinet.

8. The Air Ministry's Estimates shall only be made out for the personnel and departments and the administration for which it is responsible, and which is actually under its orders. The personnel of the R.N.A.S. and the building of all aircraft hangars, etc., which the Air Ministry orders or builds for the Navy or Army shall be charged to the Naval and Military Estimates, as the case may be.

9. The Air Ministry shall have its own Medical Department, especially trained for the Air Services, and they shall provide specialists for aerodromes and squadrons as necessary, as well as for the Air Hospitals.

"FLIGHT" DESIGNING COMPETITION

Prizes Offered for Designs for Motorless 'Plane

In view of the very great interest which is now being taken all over the world in gliding and soaring, the proprietors of "Flight" have decided to offer a prize for the best design for a motorless 'plane suitable for gliding and soaring. From the number of letters that have reached us during the last few months it is quite evident that, although but little has been done in this country towards taking up this promising sport, interest is far from lacking, and that the absence of practical results is chiefly to be attributed to the fact that good designs are not available. Many amateurs have shown themselves anxious to construct gliders, but have been prevented from doing so by lack of a suitable design to which to build. It is not within the capacity of every enthusiast to get out a suitable design, although he may have the necessary skill with tools to build such a craft if reliable drawings and designs are available.

The conditions of the "Flight" Designing Competition are set out below, and the publication of suitable designs for engineless 'planes should serve to encourage the sport of gliding.

I. Conditions

(*a*) The "Flight" Designing Competition is open to all, irrespective of nationality, and includes plans, drawings and calculations for motorless aircraft, suitable for gliding and soaring.

(*b*) Designs submitted will be judged by two well-known designers and constructors of aircraft, in conjunction with the Editor of "Flight," and the decision of the Judges will be final.

(*c*) The winning drawings become the property of "Flight," and the Editor reserves the right to publish any or all of the designs submitted, whether prize winners or not.

(*d*) Two Prizes will be awarded, one of £25 for the design which, in the opinion of the Judges, shows greatest merit, and a Consolation Prize of £10 for the design which is considered: (i) to incorporate useful features, but which is not considered best as a complete design; (ii) promising design along original lines, but which is too much of an experiment to be standardised without actual tests.

(*e*) The Editor reserves the right to divide the Prizes if, in the opinion of the Judges, more designs than one are of equal merit, and also to withhold the award of one or both Prizes if the Judges should consider that no design is worthy of an award.

(*f*) Each sheet of drawings, descriptive matter, calculations, etc., must be marked with a *nom de plume*, and a sealed envelope, containing the name and address of the competitor, is to be enclosed with the drawings, only the *nom de plume* chosen being written on the outside of the envelope. In this manner designs will be judged entirely on their merits both the Editor and the other Judges being ignorant of the identity of the competitors.

(*g*) All communications in connection with the competition should be addressed to the Editor, and marked "Designing Competition."

(*h*) The Competition closes at midday on Thursday, November 30, 1922, by which time all designs must be in the possession of the Editor of "Flight." No designs sent in after that date will be considered.

(*i*) The Editor reserves the right to alter details of the regulations, should this be deemed necessary, so long as the fundamental basis of the competition is not changed.

II. Particulars Required

In the following are set out some of the conditions to note, and particulars which competitors are required to embody in their designs, although the sub-heads should not be regarded as covering the complete list which can be submitted:—

(*a*) Designs will be judged not only on the merits of the aerodynamic and structural design, but also on the completeness or otherwise of the data submitted, and on the facility with which the machine can be built from the information supplied. Cheapness of construction should be taken into consideration, and facility of erecting and dismantling are points of importance as the machines will frequently have to be transported from a valley to the top of a hill.

(*b*) The machines may be monoplanes, biplanes, or multiplanes, with enclosed *fuselages* or with open tail booms.

(*c*) The undercarriage (if any) may be of the wheel type or of the skid type, or a combination of the two.

(*d*) Aerodynamical estimates, based upon recognised model or full-size data, must accompany the designs. This refers to such component parts as wing sections, *fuselages*, struts, bracing, undercarriages, tail planes, etc.

(*e*) A curve of gliding angles (estimated) must be drawn, covering a reasonable range of speeds, and the figures of total resistance and weight upon which this curve is based are to accompany the design.

(*f*) Stress calculations must be carried out and submitted for all important members such as wing spars, struts, wires or cables, *fuselage* or tail outrigger parts, tail planes, rudders, and elevators. No factors of safety are specified, as the adequacy or otherwise of these will be taken into account in judging the designs. The strength of material assumed in calculating the factors of safety should be stated.

(*g*) General arrangement drawings, to scale, must accompany the design, and should include side elevation, plan and front elevation, with all main dimensions and areas marked on the drawings.

(*h*) Assembly drawings of such main components as wings, *ailerons*, *fuselage* or tail outrigger, tail planes (fin, rudder, tail plane and elevators), and undercarriage must also be submitted.

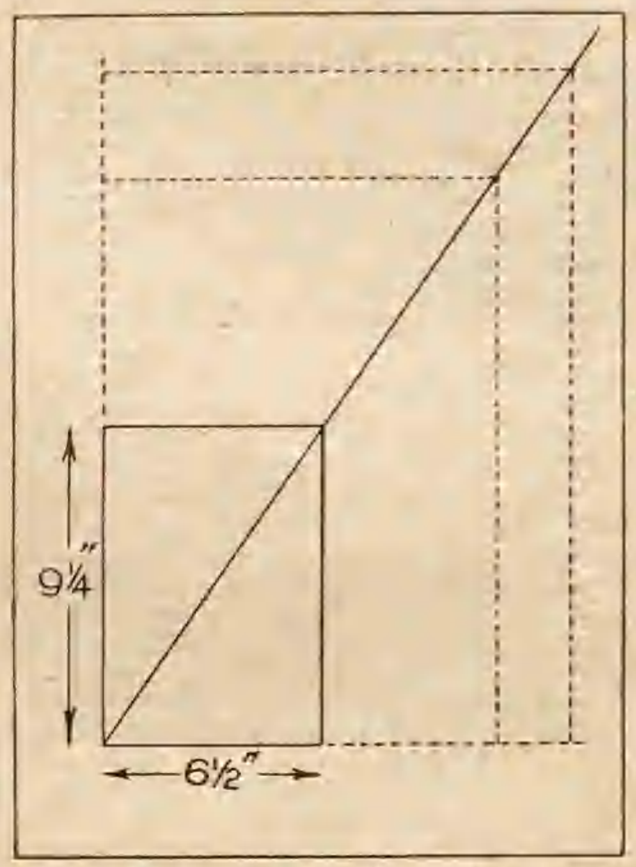


Diagram showing method of determining proportions of drawings for reproduction.

(*i*) Such detail drawings as are necessary should be sent in. Where a fitting of the same shape is used in several places, but differs in dimensions, it is advisable to mark on one drawing the required dimensions as *a*, *b*, *c*, *d*, etc. A table can then be prepared, giving the dimensions of *a*, *b*, *c*, *d*, etc., according to where the fitting is to be used. Spar sections, strut sections, etc., should be dimensioned sufficiently to enable them to be built to correct size and shape.

(*j*) A specification of materials must accompany the designs, and in the case of all drawings of components, parts, fittings, etc., the materials to be used should be marked on the drawing.

(*k*) A table of item weights must be prepared, and indication given of the specific gravity, or weight per cubic inch or cubic foot upon which the weight estimates are based. The calculated centre of gravity (with pilot on board) should be shown on the general arrangement drawings.

III. Preparation of Drawings, etc.

(*a*) All drawings must be done in Indian ink on white paper or tracing cloth, as should also all lettering, figures, etc., on the drawings. Large drawings should be rolled and not folded. (The creases detract from the drawings in reproduction.)

(*b*) General arrangement drawings, sets of details, etc., on large sheets, must be drawn on sheets of such proportions, or so arranged together, as will reduce to the size of a page in "FLIGHT" (6½ ins. by 9¼ ins.).

(For the assistance of those not accustomed to arrange drawings for reproduction to a certain size, the accompanying diagram, showing the "diagonal" method, may be consulted. First set out a rectangle, 6½ ins. by 9¼ ins., and draw the diagonal. So long as the diagonal of the large sheet is at the same angle as that of the small rectangle, the sheet will reduce to the required proportions. In this connection it should also be remembered that lettering, figures, etc., will be reduced in the same proportion, and this should be kept in mind, as otherwise if the lettering is too small it becomes illegible in the reproduction.)

Although prolonged glides, or, as they are usually termed, soaring flights, are mainly a matter of personal skill on the part of the pilot, it is obvious that the more efficient the machine, the more readily it responds to its controls, and the slower its rate of descent, the better the results that can be obtained. The fundamental requirement before construction of a glider can be started is therefore a good design. Now at the present moment it is not at all clear what constitutes a good design. There is still a very wide scope for originality, although we would point out at the outset that the machines which have accomplished most are all of fairly orthodox design. Freaks, of which there have been not a few, have never hitherto achieved much success in practical tests. It was so in Germany last year; it has been so again this year, and in the French Competition at Clermont-Ferrand the machine which did best was a Farman aeroplane which had had its engine removed.

However, even within the limits of orthodox design, if this expression is permissible in relation to engineless aircraft, there is ample scope for individuality. Monoplane, biplane or triplane each has points in its favour, and each has drawbacks. In the choice of wing sections also there is ample room for speculation. Details of construction, to give the lightest possible structure in conjunction with adequate factors of safety, offer almost unlimited scope. Thus a very great number of considerations, often conflicting, enter into the problem, and we think competitors will find much of interest in trying to decide upon the best compromise, and in the planning of the designs, quite apart from the possibility of winning a prize. Creative work is always interesting, and we hope that the competition may, in addition to producing a number of good glider designs, be the means of getting many interested in the subject who would not otherwise have troubled to look into the matter. The competition is open to all, and there are no restrictions, professional designers standing no better chance than does the amateur who has sufficient aerodynamic and engineering knowledge to make the necessary calculations and estimates. If gliding clubs are formed, there is nothing to prevent several members of a club from collaborating in the preparation of designs. The competition is an absolutely open one, for which anyone may enter. Every design, as is shown in the regulations, will be judged solely on its merits, without regard to the identity of the author.

THE WORLD FLIGHT ABANDONED

Having reached Lukhidia Char (near Chittagong in the Bay of Bengal), where a forced landing was made and the machine wrecked, Capt. Macmillan and Capt. Malins—who, accompanied by Maj. Blake, left Croydon on May 24 last for a flight round the world—were obliged to abandon the flight after thrilling and by no means cheerful experiences.

After effecting certain repairs to the floats of the Fairey seaplane, they left Calcutta on Saturday, August 19, with the intention of reaching Akyab. Weather conditions were extremely bad, heavy monsoons, storms and torrential rain prevailing, but by flying low they managed to reach the coast, at the mouth of the Bangarah river, on the direct compass line for Akyab. They had barely sufficient petrol to reach the latter place, and, as weather conditions ahead were against them, they decided to make for Chittagong, further north, and so keep in touch with the islands.

Shortly after, an air lock in the petrol system necessitated a landing which was successfully accomplished, and, casting the sea anchor, they proceeded to set matters aright, but not without the heavy seas breaking over them and smashing a rib of the elevator. They got going again eventually, however, and taxied back in the direction of Lukhidia Char, near which place they grounded, in somewhat calmer waters. Here they remained three days, during which time they went over the machine, executing various repairs under most trying circumstances and stormy weather conditions. In the meanwhile, the scared natives looked on from a safe distance, and only one or two ventured close up to exchange milk for some cigars.

On the fourth morning the gale had blown itself out, and it was decided to make an attempt to reach Chittagong, and at 12.10 p.m. they took off as a good Fairey should, and proceeded, hungry but hopeful. After going for about 15 mins., however, water in the petrol forced them down on the sea once again, entirely out of sight of land, and with the distant smoke of a steamer gradually passing out of sight. An attempt being made to clear the petrol system, they next turned their attention to the floats, and found the starboard float in a very sorry condition, but decided to try and taxi right away to Chittagong rather than spend time in making repairs. They accordingly started up the engine, and proceeded slowly and spluttering for about an hour, when the engine suddenly picked up. Seeing the smoke of another steamer in the distance, they tried to take off to get in touch with it, but the float was too water-logged, and they had to taxi once more, in a strong southerly current, until the petrol gave out.

It was here their real troubles commenced, for with the machine gradually sinking and strong seas sweeping over them, they had to cling on as best they could, have the last drink of water, and wait for someone to come and pick them up. During the night, a heavy sea turned the machine turtle, leaving them sitting on the bottom of the float as a monsoon broke over them. Thus they drifted about in the varying currents, at one time sighting land not very far off, till the sun came up, and an extremely painful day commenced, a scorching sun and acute thirst causing them much suffering.

Night fell, and they were still drifting helplessly, and at dawn they saw the island of Sandwip about four miles off, but found themselves being carried away by the current. It was not until some hours later—after a native boat had come close up, and passed on ignoring their signals—that Lieut.-Commander Cumming of Chittagong, arrived on the scene in the river launch *Dorothea* and rescued them, and took them off to Chittagon hospital, where, it is reported, they are progressing favourably.

Major Blake hopes to leave for England with his companions in the course of the next fortnight.

Brack Papa Flies 208½ M.P.H.

In an attempt to beat the world's speed record, held at present by Sadi Lecointe, Brack Papa the Italian pilot, succeeded in attaining a speed of 208·5 m.p.h. at Mirafiori Aerodrome on Saturday last. He was flying a 700 h.p. racing Fiat biplane, making two flights in each direction over the one kilom. course. His times for each kilom. were as follows:—1, 10·9 secs.; 2, 10·3 secs.; 3, 11·3 secs.; 4, 10·4 secs., or an average of 10·7 secs.

American Airship as Aeroplane Carrier

The American War Department has placed an order with the Goodyear Co. for five non-rigid airships, and also for a semi-rigid airship, which will be the first of that type to be built in America. The new semi-rigid is to have a capacity of 750,000 cubic ft., and the ship will have the distinction of being the first to be designed specially for use as an aircraft carrier. No details of the arrangement are available, but it is stated that provision will be made for launching, as well as picking up, aeroplanes while in the air. The possibilities of using airships as aircraft carriers are considered by many experts to be very great, and it will be interesting to watch the results obtained with the new American airship.

Surveying New Guinea from the Air

A party, headed by Capt. Frank Hurley, and including an ethnologist and a naturalist, has left Sydney by steamer for Port Moresby to explore New Guinea from the air.

A wealthy resident of Sydney, Mr. L. Hordern, has provided two seaplanes, one of which is already in New Guinea, while the other is being conveyed in the steamer with Capt Hurley.

It is proposed to leave Port Moresby towards the end of September for the Fly River, and to make a four months' air survey of the western portions of British New Guinea. The scientific section will navigate the Fly River in a ketch. The party has further plans, but they will depend upon the behaviour of the seaplanes.

SCHNEIDER VICTOR'S WELCOME HOME

When Mr. H. Scott-Paine and Capt. H. C. Biard, the heroes of the Schneider Cup Race, returned "home" to Southampton last Thursday, they were accorded a very hearty and well-deserved civic reception. As they stepped out of the London train at Southampton West, they were received by the Mayor of Southampton, who shook hands with each, and spoke a few brief words of welcome and congratulation. They were immediately surrounded by a cheering and enthusiastic crowd, which included many well-known Southampton personalities. Lieut.-Commander Mackenzie-Grieve, of cross-Atlantic fame, was also one of those to offer congratulations. Cheering and congratulations over, they were conveyed by car to Audit House, and in the Mayor's parlour Mr. Scott-Paine gave a most interesting account of the winning of the race.

In his opening remarks he referred to the fact that Great Britain was unrepresented in the race on the last two occasions, and pointed out that Italy only had to win the race this year to win it outright, and the event would have been closed, which, from an International standpoint, would have been very unfortunate. Last June the Supermarine decided to build a challenger, the work being carried out with the utmost secrecy. The Italians had been watching very closely the progress and shaping of events in the different countries, and had practically made up their minds they were going to have another "walk over" this year.

Both Italy and France, continued Mr. Scott-Paine, built machines for this race with the financial aid of their respective Governments, whilst "we did ours ourselves, you know."

He then referred to the sporting help they had received—how the General Steam Navigation Co. helped them to Naples, how Napiers' lent an engine without any charge, Shell's supplied the fuel, Wakefield's the oil, etc., etc.

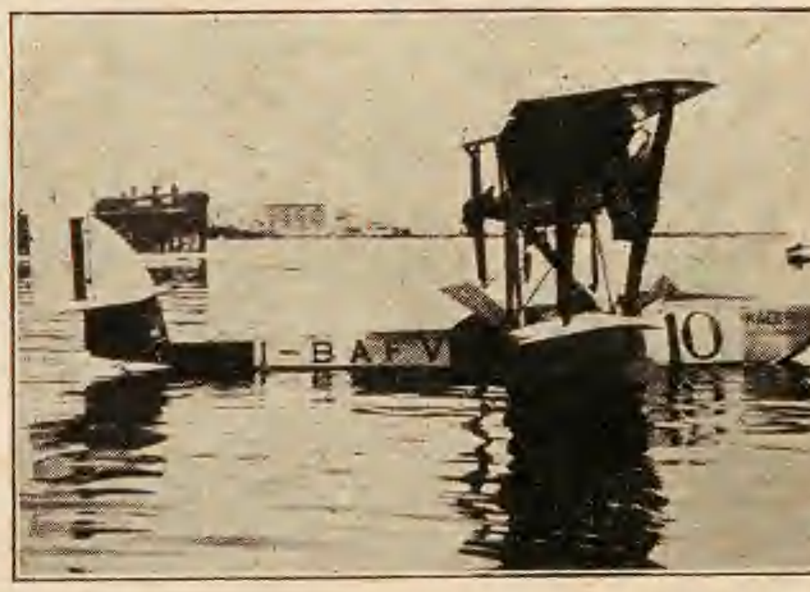
The arrangements for the race were perfect and absolutely fair. They gave the Italians notice of their intentions when they made test flights, and their trials were carefully watched and timed. Capt. Biard flew at a speed of about 140 m.p.h., and the Italians thought he was going "all out," with the result that the betting odds on their machine increased. During the six-hours' mooring-out test the fastest Italian machine capsized, and had to be righted by her crew. "This was contrary to regulations, and we could have disqualified her if we had liked to protest," said Mr. Scott-Paine. During the navigability test the same boat split her propeller and damaged other parts of the machine, and they could have disqualified her for this, but did not.

On the day of the race four machines started, three being Italian. All got away exactly to the second, all engines commenced working at once, and the lapping times on the various laps were absolutely exact. The Supermarine machine went first, and when the Italians compared Capt. Biard's first lap time with that of their machines they were a little bit downhearted. The Supermarine boat had never done its full speed on trials out there, and when turning Capt. Biard had made the turns very clumsily on purpose to deceive the Italians. The latter were so sure they were going to win that they were laying big odds against the British boat. Capt. Biard did his first lap at a very extraordinary speed—well over 160 m.p.h.—and held his time for six laps, during which time he overhauled two of the Italian machines, and passed them in a way which was perfectly amazing. On the 7th, 8th, 9th, 10th and 11th laps he nursed his engine a little bit, and the effect in the control station was amusing. They found his time was easing down, and the fastest of the Italian machines was creeping up, or, rather, reducing the lead. Capt. Biard was lapping just 20 seconds better time than the best of the Italians. They brought 24 and 25 seconds down to 20, and the British pilot held them at 20 on the 12th lap.

On the 13th lap Capt. Biard opened his engine all out, and to the consternation of the Italians, won by 2 minutes 3 seconds, in 1 hour 35 minutes. Before coming down he wisely covered two extra laps," just to make sure."

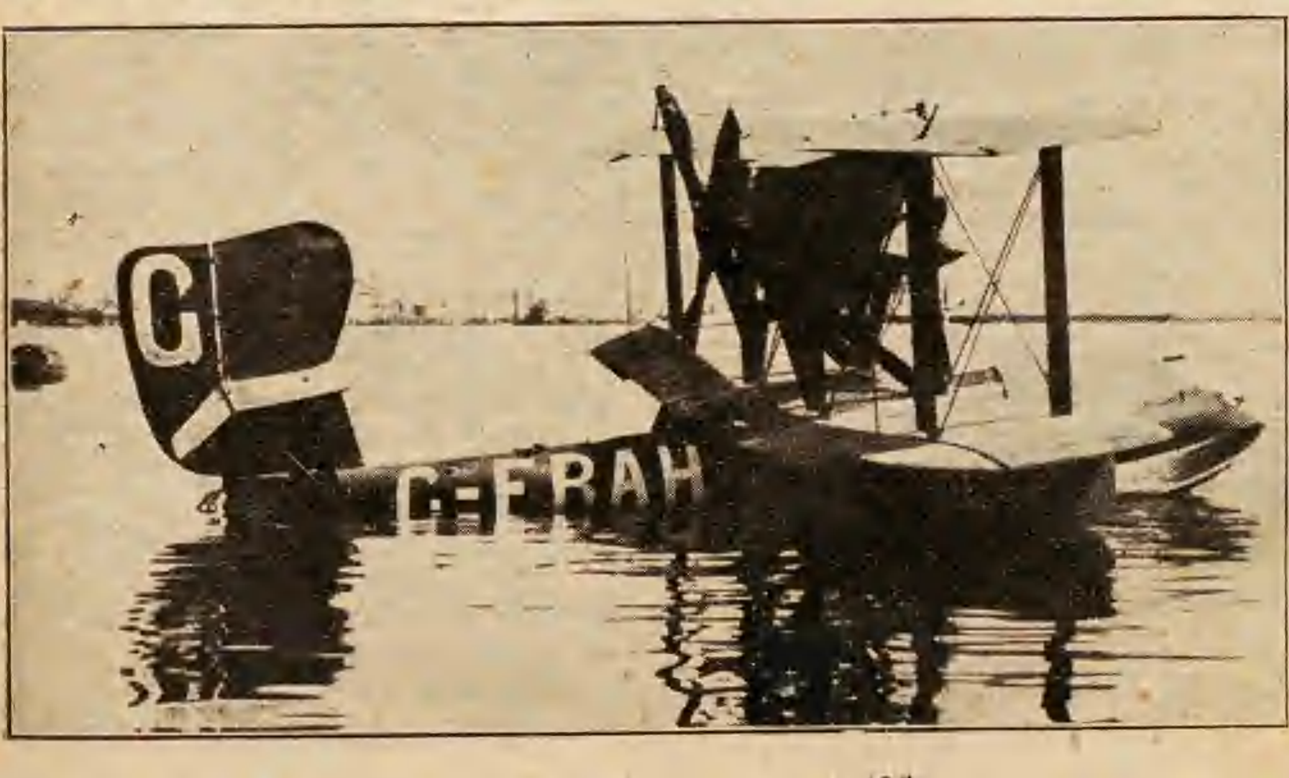
In conclusion Mr. Scott-Paine said, "It is the hardest race of any kind that has ever been carried out in the world, because of the small course." The longest leg was only a few miles, and the turning point was only very small indeed. Capt. Biard made 39 turns in 1½ hours at a speed of 160 m.p.h. He also referred to the extraordinarily difficult air conditions that prevailed.

In response to the Mayor, Capt. Biard said: "Mr. Scott-Paine has told you the whole history of the thing, and I don't think there remains much for me to say. Thank you, sir, for the reception we have had, and I should like to say how pleased we are to get back again."



THE COUPE SCHNEIDER: One of the Italian Macchi flying boats. A representative of this firm secured second place in the race.

After this the whole party, with the exception of the Mayor, adjourned to the Supermarine Works at Woolston, where remarkable scenes were witnessed during the enthusiastic welcome accorded by the staff and employés of the works. Further "speechifying" was indulged in, and Mr. Scott-Paine again told his story of the race, "For he's a jolly good fellow" being a natural conclusion to the day's proceedings.



The Coupe Schneider: The winning Supermarine, "Sea Lion II," Napier "Lion" engine, at rest on the sea off Naples.

THE IRWIN "METEORPLANE"

The Irwin Aircraft Co., of Sacramento, Cal., U.S.A., recently put on the market a small sporting biplane called the "Meteorplane" Model MT, which embodies several interesting features. We are indebted to our American contemporary *Aviation* for the following brief particulars of this little machine.

It is a single-seater tractor biplane, and was designed to meet the demand for a small lightweight aeroplane of conventional design that the average aero enthusiast could afford to have and operate. The "Meteorplane" has a quick get away (160 ft. run), good climb, is speedy, yet at the same time has a very low landing speed, insuring the greatest degree of safety. In landing, it comes to rest after a run of 110 ft. Consistent with these qualities, the design and construction embrace very light weight, yet the factor of safety at any point of the whole machine is more than five. The power loading is 26 lbs., while the wing loading is only a little over 3½ lbs./sq. ft.

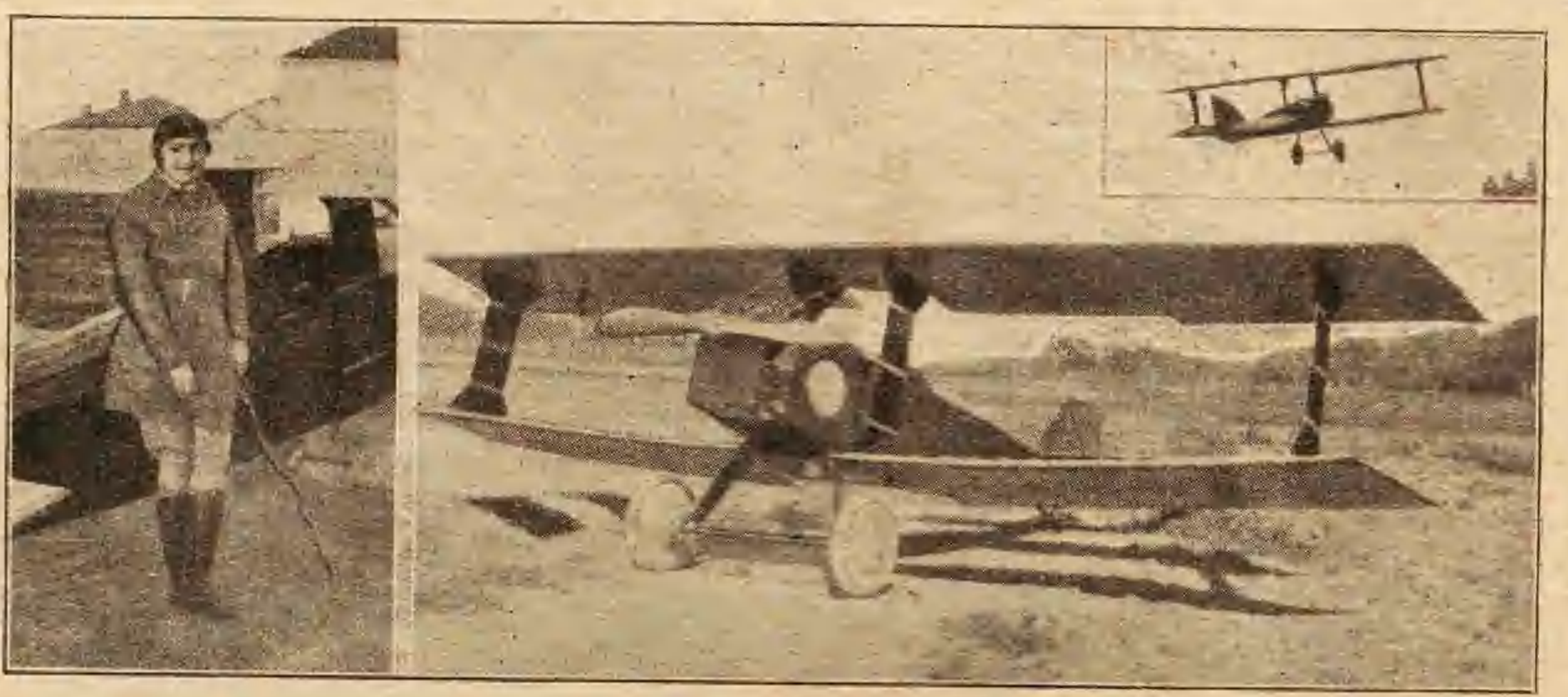
The main planes are adjustable as regards their fore and aft position, provision being made for sliding them along the *fuselage*. This enables a perfect balance being obtained at all times. Hollow spruce spars are employed, and the rib webs and cap strips are of yellow pine and spruce respectively. The interplane struts, of which there are four, two being close up to the *fuselage*, are of I-form, and are built up of three-ply wood. Thus incidence wires are eliminated. Irwin No. 4 wing section is employed, the dynamical stability of which is almost the same as the Eiffel 32. *Ailerons* are fitted to the top plane only, and the lower plane, which is of shorter span than the top, is set at a dihedral angle

Of good streamline form, the *fuselage* is of box-girder construction, with ash *longerons* and four three-ply panels holding the body in shape The whole framework is wire braced from engine panel to stern post, and the covering is sheet metal at the nose and doped fabric elsewhere

The under-carriage is of novel, yet simple construction, and consists of two wide members forming an "A"—viewed from the front—which is attached to the *fuselage* at three points, the apex at the top of the *fuselage*, and the middle at the lower *longerons*. The lower extremities of these members are slotted to receive the rubber sprung axle, which carries two 20 in. by 3 in. wheels.

The *empennage* is composed of a non-lifting horizontal stabiliser, to which are hinged divided elevators, and a triangular vertical fin, to which is hinged a rudder. The latter is of sufficient area to insure complete control when handling the machine on the ground. Conventional stick and rudder bar control is used.

A two-cylinder air-cooled engine of 15 h.p. is mounted in the nose, and drives a 4 ft. 11 in. tractor screw of 3 ft. pitch at 1,900 r.p.m.



THE IRWIN "METEORPLANE" (MODEL M.T.) : An American sporting biplane of 15 h.p. On the left its constructor, J. F. Irwin, is shown standing beside the machine, giving an idea as to its size. Inset (right), the machine in flight.

The principal characteristics of the "Meteorplane" are as follows:—

Span (upper)	19 ft. 10 ins.
Span (lower)	19 ft. 1 in.
Chord	3 ft. 1 in.
Gap	2 ft. 10 ins. to 3 ft. 2⅝ ins.
Overall length	13 ft. 9 ins.
Overall height	5 ft. 10½ ins
Angle of incidence ..	2° 30′.
Dihedral (lower)	3°.
Area of main planes ..	105 sq. ft.
Area of tail plane	9 sq. ft.
Area of elevators	8 sq. ft.
Area of fin	1½ sq. ft.
Area of rudder	5 sq. ft.
Weight of machine empty	240 lbs.
Weight loaded	396 lbs.
Weight/h.p.	26 lbs.
Weight/sq. ft.	3¾ lbs.
Speed range	32–56 m.p.h.
Climb in 15 mins.	2,500 ft.
Gliding angle	1 in 7.
Range	1 hr. 45 mins.

* * * *

A "Saintess" for Air Pilots.

A new statue of Our Lady of Loretto is to be taken by four cardinals to Rome in September to be blessed by the Pope, this particular statue of the Madonna being regarded as the protectress of men of the air. The Cardinal-Archbishop of Loretto, in honour of the occasion, will be one of the cardinals who will accompany the statue, in a motor-car, to Rome and back.

Severndroog Castle

Under the will of the late Mr. Probyn Godson, Severndroog Castle, Shooters Hill, becomes the apex of one of London's public parks. This fact is of interest to aviation, as Severndroog Castle is the highest point between London and Paris, being 450 ft. above the level of the sea, and during the Great War it was in the occupation of the R Division of Special Constabulary for six years, it being considered by the authorities the most valued and important observation post for the defence of London against attack by enemy aircraft.

Proposed Australia to New Zealand Flight

It is reported that early next year—in February or March—an attempt is to be made to fly from Australia to New Zealand, a distance of between 1,500 and 1,600 miles. The pilot will be Capt. G. H. Keat, D.F.C., and Capt. Bruce Ross will act as navigator. The start will probably be made from Cape Howe, N.S.W., and Christchurch, N.Z., the finishing point.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

RACING COMMITTEE

A meeting of the Racing Committee was held on Thursday, August 24, 1922, when there were present :—Maj.-Gen. Sir W. S. Brancker, K.C.B., in the Chair ; Lieut.-Col. W. A. Bristow ; Lieut.-Col. M. O. Darby ; Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S. ; Mr. W. O. Manning ; and H. E. Perrin, Secretary.

The King's Cup.—The arrangements were considered, and the Secretary reported his visit to the various Controls, and it was decided to have the official Controls as follows :—

Birmingham ..	(Castle Bromwich).
Newcastle	(Town Moor).
Glasgow	(Renfrew).
Manchester	(Alexandra Park).
Bristol	(Filton).

Capt. R. J. Goodman Crouch and Lieut.-Col. W. A. Bristow were appointed Handicappers.

It was decided to start the first machine from Croydon at 9 a.m. on Friday, September 8, the others following in accordance with their handicap times. The first start from Glasgow on Saturday, September 9, was also fixed for 9 a.m.

"Daily Mail" £1,000 Prize for Gliders.—The Secretary reported the interview which he and Col. Darby had with the *Daily Mail* in connection with their offer of a prize of £1,000 for a Gliding Competition, at which it was decided to hand over the Competition to the Royal Aero Club.

The following Committee was appointed to draw up the regulations and proceed with the arrangements :—

Lieut.-Col. M. O. Darby, Lieut.-Col. W. A. Bristow, C. R. Fairey, Maj. O. T. Gnosspelius, W. O. Manning, Lieut.-Col. A. Ogilvie, F. Handley Page, Capt. W. H. Sayers, Squad.-Ldr. M. Wright.

THE KING'S CUP

Circuit of Britain Air Race, September 8-9, 1922.

Entries :

Entrant.	Machine, Engine and Pilot.
Brig.-Gen. James G. Weir, C.M.G.	Boulton and Paul P.9, 90 h.p. R.A.F. 1A (C. T. Holmes).
Duke of Sutherland ..	D.H.9, 230 h.p. Siddeley Puma (Capt. A. F. Muir).
A. S. Butler	D.H.37, 275 h.p. Rolls-Royce Falcon (A. S. Butler).
Lt.-Col. F. K. McClean, A.F.C.	Sopwith Gnu, 110 h.p. Le Rhone (Fl.-Lt. W. H. Longton, D.F.C., A.F.C.).
Lt.-Col. J. E. Tennant, D.S.O., M.C.	Boulton and Paul P.9, 90 h.p. R.A.F. 1A (Lt.-Col. J. E. Tennant, D.S.O., M.C.).
Douglas Vickers, M.P., J.P.	Vickers Vulcan, 350 h.p. Rolls-Royce Eagle VIII (Capt. S. Cockerell, A.F.C.).
J. D. Siddeley, C.B.E. ..	Siskin, 325 h.p. Jaguar (F. T. Courtney).
F. P. Raynham	Martinsyde F6., 200 h.p. Wolseley Viper (F. P. Raynham).
Sir Samuel Instone ..	D.H.4A, 350 h.p. Rolls-Royce Eagle VIII (F. L. Barnard).
Lt.-Col. John Barrett-Lennard, C.B.E.	D.H.9A, 350 h.p. Rolls-Royce Eagle VIII (H. H. Perry).
Lt.-Col. M. O. Darby, O.B.E.	D.H.9, 230 h.p. Siddeley Puma (M. Maurice Piercey).
Sir G. Stanley White, Bart.	Bristol 10-seater Biplane, 400 h.p. Bristol Jupiter (Cyril Frank Uwins).
Sir Henry White-Smith, C.B.E.	Bristol Monoplane, 100 h.p. Bristol Lucifer (Rollo Amyatt de Haga Haig).
Lady Anne Savile ..	D.H.9C, 230 h.p. Siddeley Puma. (Flying Officer Leslie Hamilton).
Sir William Letts, K.B.E.	Avro Baby, 35 h.p. Green (B. Hinkler).
Henry Fildes, M.P. ..	Avro Baby, 35 h.p. Green (Squad-Ldr. H. Payn),
A. V. Roe	Avro Viper, 200 h.p. Wolseley Viper (Capt. F. C. Broome).
John Lord	Avro Lucifer, 100 h.p. Lucifer (Major C. R. Carr).
Capt. G. de Havilland ..	D.H.9B, 230 h.p. Siddeley Puma (A. J. Cobham).
H. Scott-Paine	Sea Lion II, 450 h.p. Napier Lion (H. C. Biard).
Major J. C. Savage ..	S.E. 5A, 200 h.p. Wolseley Viper (C. C. T. Turner).

Controls and Officials

CROYDON (Waddon)

Officials.—Maj.-Gen. Sir W. S. Brancker, K.C.B. ; Lieut.-Col. M. O. Darby ; Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S. ; Col. F. Lindsay Lloyd, C.M.G., C.B.E. ; Lieut.-Col. F. K. McClean, A.F.C. ; Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P.

BIRMINGHAM (Castle Bromwich)

Officials.—Mr. Gilbert Dennison (Aerodrome Official) ; Capt. D. G. Murray, Capt. F. K. Walker (Royal Aero Club Officials).

NEWCASTLE (Town Moor)

Officials.—Mr. A. E. George (Aerodrome Official) ; Mr. W. O. Manning (Royal Aero Club Official).

GLASGOW (Renfrew)

Officials.—Mr. J. Allison, jun. (Aerodrome Official) ; Lieut.-Col. W. A. Bristow, Major E. Moyes (Royal Aero Club Officials).

MANCHESTER (Alexandra Park)

Officials.—Mr. J. Lord (Aerodrome Official) ; Com. F. L. M. Boothby, R.N., Capt. J. C. Brooke (Royal Aero Club Officials).

BRISTOL (Filton)

Officials.—Mr. H. J. Thomas (Aerodrome Official) ; Mr. A. J. A. W. Barr, Flight Lieut. L. H. Cockey, Capt. F. R. Walker (Royal Aero Club Officials).

Handicappers.—Lieut.-Col. W. A. Bristow ; Capt. R. J. Goodman Crouch.

Secretary.—Harold E. Perrin. *Assistant Secretary.*—B. Stevenson.

GLIDING COMPETITION COMMITTEE

A meeting of the Gliding Competition Committee was held on Monday, August 28, 1922, when there were present : Lieut.-Col. M. O. Darby in the Chair, Lieut.-Col. W. A. Bristow, Major O. T. Gnosspelius, Mr. W. O. Manning, Mr. F. Handley Page, Capt. W. H. Sayers, Squad.-Ldr. M. Wright, and H. E. Perrin, Secretary.

The Supplementary Regulations for the Gliding Competition for the prize of £1,000 offered by the *Daily Mail* were drawn up as follows :—

The prize of £1,000 offered by the proprietors of the *Daily Mail* will be awarded to the competitor who remains the longest time in the air, providing such flight occupies not less than thirty minutes, under the following conditions :—

Supplementary Regulations

Date.—The competition will begin on Monday, October 16, 1922, and close on Saturday, October 21, 1922.

All flights must be commenced between sunrise and sunset.

Organisation.—The competition will be conducted by the Royal Aero Club.

Place of Contest.—The locality has not yet been definitely decided upon, and will be announced shortly.

Competitors.—The competition is open to persons of any nationality.

The competition is open to any heavier-than-air machine not provided with any motive power except that produced by the personal exertions of the occupants during flight and which is not supported either wholly or in part by any gas which is lighter than air.

Timing.—The timing of flights will be taken from the moment at which free flight commences until first contact with the earth. The machine must have no connection with the earth during flight.

Alighting.—The alighting must take place within an area which will consist of a circle of a radius of approximately 800 yards measured from the official point of departure.

Entries.—Entries must be made to the Royal Aero Club, 3, Clifford Street, London, W. 1, not later than 5 p.m. on Saturday, October 7, 1922. There is no entry fee.

The Royal Aero Club, in the interests of safety, reserves to itself the right to refuse any entry and/or to prohibit the flight in the competition of any competitor if it considers the flight would be dangerous.

Accommodation.—Information as to accommodation for the competing machines will be issued later.

General Conditions.

1. A competitor, by entering, thereby agrees that he is bound by the Regulations herein contained or to be hereafter issued in connection with this competition.

2. The interpretation of these Regulations or of any hereafter issued shall rest entirely with the Royal Aero Club.

3. The competitor shall be solely responsible to the officials for the due observance of these Regulations, and shall be the person with whom the officials will deal in respect thereof, or of any other question arising out of this competition.

4. A competitor, by entering, waives any right of action against the Royal Aero Club or the proprietors of the *Daily Mail* for any damages sustained by him in consequence of any act or omission on the part of the officials of the Royal Aero Club or their representatives or servants or any fellow competitor.

5. The machine shall at all times be at the risk in all respects of the competitor, who shall be deemed by entry to agree to waive all claim for injury either to himself, or his passenger, or his machine, or his employés or workmen, and to assume all liability for damage to third parties or their property and to indemnify the Royal Aero Club and the proprietors of the *Daily Mail* in respect thereof.

6. The Committee of the Royal Aero Club reserves to itself the right to add to, amend, or omit any of these rules should it think fit.

Capt. W. H. Sayers, Squad.-Ldr. M. Wright and H. E. Perrin, who made a tour of the South of England to inspect sites for the competition, made a report, and it was decided to defer the selection until a later date.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

Personals

Married

Guy George Houssemayne Du Boulay, R.A.F., only son of Mr. and Mrs. Ralph Houssemayne Du Boulay, of East Grinstead, was married on August 23 at St. Mary's, East Grinstead, to Ruby Violet Emmeline, youngest daughter of Mr. Godfrey Knox, of Sally Park, Templeogue, co. Dublin.

Henry Michael Moody, M.C., R.A.F., only surviving son of the Rev. Henry Moody, Vicar of Welshampton and Rural Dean of Ellesmere, and Mrs. Moody, was married on August 3, at St. Aubin's Church, Jersey, to Austin Robina (Bobbie), youngest daughter of Mr. and Mrs. C. A. Horn, of Beaumont, Jersey, and Adelaide, South Australia.

Flight-Lieut. Gerard Stephen Oddie, D.F.C., was married on August 3, at St. Peter's, Falcon Avenue, Edinburgh, to Helen Chalmers, only daughter of Alan Lockhart Menzies, W.S., Larch Grove, Balerno, Midlothian.

To be Married

A marriage has been arranged, and will take place in the autumn, between Dorothe, widow of Captain Jack Barnato, R.A.F., and daughter of Mr. and Mrs. Joe Lewis, and Lord Plunket son of the late Lord Plunket and Lady Victoria Braithwaite, and nephew of the Marquess of Dufferin and Ava.

Killed

Robert Blaine Luard, R.A.F., who died on August 17, in India, as the result of an aeroplane accident, aged 24, was the second son of Maj. Luard, R.E.

Items

The will of the late Mr. David Williamson Stewart Paterson, sometime of Broomlands, Kirkcudbrightshire, later 2nd Lieut. R.F.C., has been proved at £8,250.

The will of the late Mr. Arthur Charles Spencer, aircraft manufacturer, of 52, Highgate Hill, N.W., formerly of 6, West View, Highgate, N., has been proved at £21,196.

Capt. Juan Leguia y Swayne, Air Attaché to the Peruvian Legation, left London on August 17 for Berlin.

Lieut. Willy Coppens, Assistant to Military Attaché of the Belgian Embassy for Air Service duties, left London on August 17 for Brussels, on leave.

Lieut. G. F. C. Florman, Military Attaché to the Swedish Legation for Air Service duties, returned to London on August 22 from Paris.

Capt. Juan Leguia, son of the President of Peru, Air Attaché at the Peruvian Legation, and Senora G. de Leguia, left London on August 28 for Lima.

Major Nobile Carlo M. Graziani, Air Attaché to the Italian Embassy, left London on August 29 for Geneva.

NOTICES TO AIRMEN

Swinging of Compasses in Aircraft

1. Compasses in aircraft, owing to their delicate construction, are liable to be thrown out of truth by many different causes. A compass should, therefore, be swung whenever, for any reason, there may be a doubt as to its accuracy. In particular, the compass should be swung:—

(1) On change of position of any magnetic material in the vicinity of the compass, such as change of an engine, electrical or Wireless equipment, etc.

(2) On replacement of the compass in an aircraft by another.

(3) After the aircraft has been standing in one position for four weeks or more (*e.g.*, after undergoing overhaul or large repairs).

(4) At any time when the accuracy of the deviation table is open to doubt.

(5) In addition, after a bad landing, the cap and pivot should be tested.

2. Pilots should keep a constant watch on the behaviour of, and take every opportunity to test, their compass whilst flying over a long stretch of road or railway, the magnetic bearing of which has been ascertained beforehand.

It is only by the constant use of the compass during fine weather and when the ground is visible that pilots will obtain sufficient confidence in the reliability of their compass to enable them to be assisted by it under adverse weather conditions. (No. 92 of 1922.)

Germany's Civil Aircraft

In our issue of May 18, 1922, we published the regulations drawn up by the "Committee of Guarantees" (which replaces the Inter-Allied Aircraft Commission) in respect to the manufacture of German aircraft. The following is a list of German "Civil" aircraft complying with these regulations; 1, Dornier "Dragon-Fly" flying boat (60 h.p. Siemens); 2, Junkers J15 Limousine (60 h.p.); 3, Junkers J16 Limousine (60 h.p.); 4, L. F. G. V20A mono-seaplane (230 h.p.); 5, L.F.G. V13 bi-seaplane (220 h.p.); 6, L.F.G. V18 bi-seaplane (220 h.p.); 7, L.F.G. V8 bi-flying boat (120 h.p.); 8, Casparwerke P.F. 4 seaplane (220 h.p.); 9, Stübing sport biplane (25 h.p.); 10, Stübing single-seater mono (25 h.p.); 11, Entler Sport biplane (25 h.p.); 12, Hermann Venier (50 h.p.); 13, Max Schüler (50 h.p.); 14, Dornier CIII mono (230 h.p.); 14, Dornier CII "Dolphin" mono-flying boat (230 h.p.); 16, Zeppelin twin-engined monoplane (4,120 h.p.); 17, Casparwerke seaplane (260 h.p.); 18, Albatross (230 h.p.); 19, Fokker Limousine mono. (160 h.p.); 20, Junkers Limousine (160 h.p.); 21, Sablatnig Limousine mono. (220 h.p.); 22, Sablatnig Limousine biplane (220 h.p.).

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

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AT the Rhön Gliding Competition the German pilot Herr Hentzen has beaten his own record of last week by flying for 3 hrs. 10 mins. The machine used by Hentzen is illustrated and described below.

- - -

MIJNHEER FOKKER, the well-known Dutch-German designer, has established a world's record by flying for 13 mins. accompanied by a passenger. The flight took place at Rhön, and the machine used was, we believe, the glider exhibited on the Fokker stand at the last Paris Aero Show.

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IT has been pointed out in FLIGHT that gliding and soaring is nine-tenths piloting and one-tenth machine design. Thus at the French competition at Clermont-Ferrand the machines which did best were small sporting aeroplanes whose engines had been removed. Why should we not do the same in this country? The Avro Baby should make quite a good glider, as would probably also the Austin "Whippet," if their engines were taken out and the pilot's seat shifted farther forward to trim the machines properly.

- - -

THE first definite entry for the *Daily Mail* prize has now been received by the Royal Aero Club. This is by Mr. Eric Cecil Gordon-England, who, it may be remembered, did a good deal of gliding in the early days of flying, first on the Jose Weiss bird-shaped monoplane gliders, and later on the extraordinary circular plane invented by Mr. Kitchen (of rudder fame), and elaborated and made practical by the late Mr. Cedric Lee and Mr. Tilghman-Richards. The machine which Gordon-England will fly has not yet been announced.

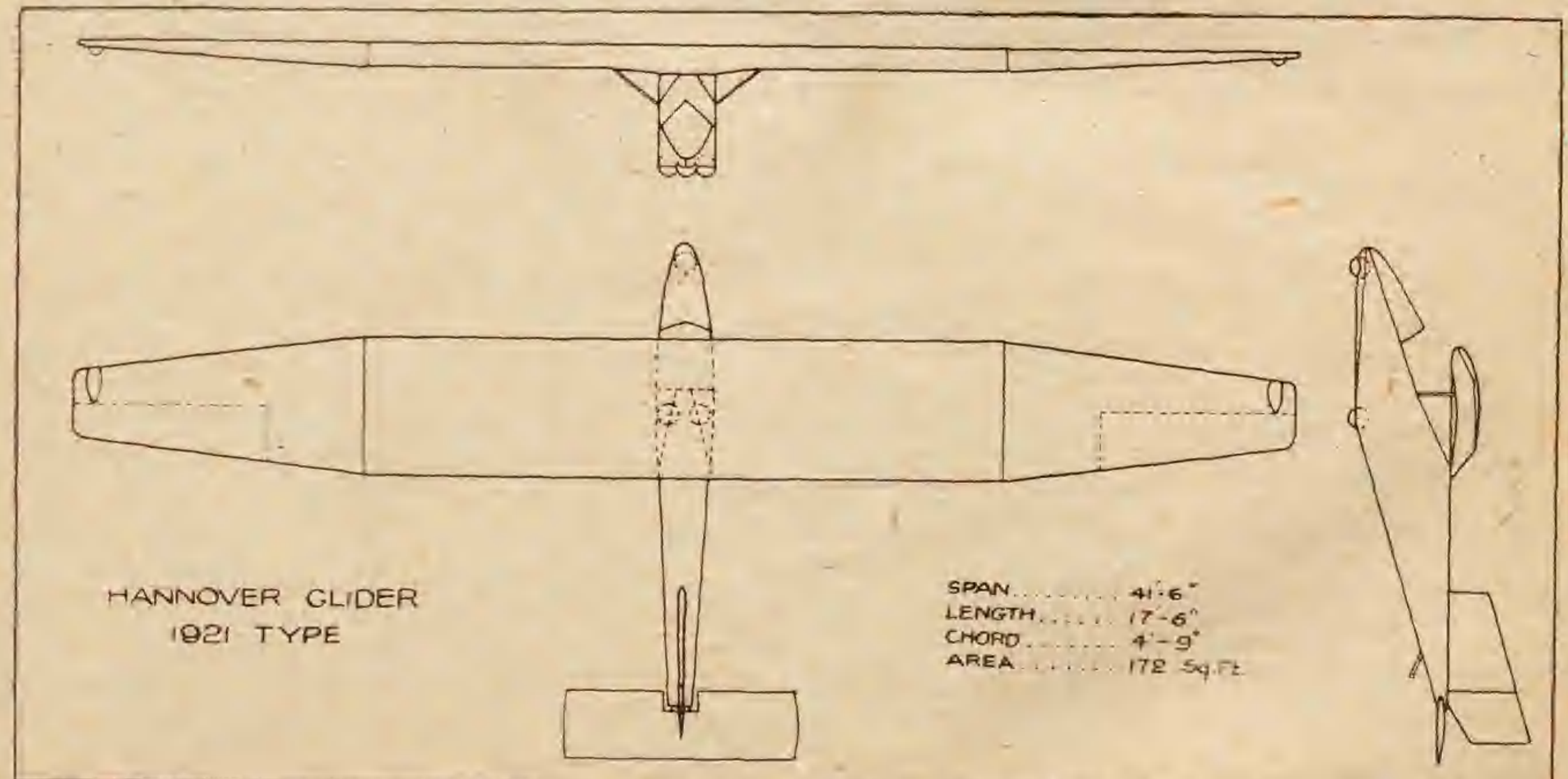
THE HANNOVER GLIDER

IT is no exaggeration to say that world-wide admiration has been aroused by the splendid flights made in the Rhön mountains during the recent German gliding competition. First the news came that Herr Martens had remained aloft for one hour on a Hannover glider. The next day it was announced that a college fellow of Martens, Herr Hentzen, had kept in the air for two hours. This performance, excellent as it was, did not long remain a world's record. A few days later Herr Hentzen increased the duration to 3 hours 10 minutes. How long this record will be allowed to stand there is no way of telling. It may be, however, that exceptionally favourable weather conditions helped materially in enabling this performance to be attained, and that it will be some time before the four-hours mark is reached. On the other hand, if a glider will remain aloft for three hours there is apparently no reason why it should not remain up for any length of time, provided the pilot is physically and mentally capable of sustaining the strain which must of necessity accompany the constant alertness required to take advantage of every gust of wind. However that may be, we congratulate Herr Hentzen on his remarkable feat, and trust to have the pleasure of seeing him in this country, either in connection with this year's *Daily Mail* competition, or at some future date. In the meantime, a few notes dealing with the glider on which the flights were made may not be without interest.

Generally speaking, the machine used by Martens and Hentzen in the Rhön competition this year is similar to last year's model. Certain modifications have been made, such as a reduction of the wing span, which is obviously somewhat large, and certain other minor alterations. The accompanying general arrangement drawings show last year's model, and it should be kept in mind that certain changes have taken place. However, even last year flights of long duration were made; for instance, one of 15 minutes 40 seconds, during which Herr Martens covered a distance of 4½ miles. It is understood that, in spite of the reduction in wing span, the wing area has been slightly increased. This would mean that the chord has been increased, and the aspect ratio reduced to more normal proportions.

Fundamentally, the Hannover glider consists of a cantilever monoplane wing of thick, high-lift section and large aspect ratio, mounted *en parasol* above a rectangular section *fuselage*. The wing is built in three sections, the central one of which measures approximately 22 ft. in span, with two end sections (tapered) attached to it. The wing section employed is one of the Göttingen sections, and the wing construction is somewhat unusual inasmuch as there is only one main wing spar.

This spar is of I-section, with the web built up of a series of lattices in order to save weight. The spar is located approximately one-third of the chord from the leading edge. As a single spar, although capable of resisting the bending moments, could not be expected to resist torsion, the wing



THE HANNOVER GLIDER, 1921 TYPE: It was on a similar machine that Hentzen remained in the air for 3 hours 10 minutes.

has been built up in the form of a tube of three-ply wood. This three-ply extends from the top of the spar, around the leading edge, and back over the lower surface as far as the lower edge of the spar. The tube thus formed, although being quite light, is very stiff against torsion, while at the same time having the advantage that it retains the shape of the leading edge of the wing better than could the usual rib construction. The main ribs are spaced about 18 ins. apart, but in the front portion false nose ribs are placed in the intervals between main ribs, thus supporting the three-ply at short intervals. The rear portion of the wing is covered with fabric in the usual way.

The *fuselage*, which is of rectangular section, has four *longerons*, and is a girder of the usual type, with struts and cross-members, and braced with wire. The wing is attached to the *fuselage* by three bolts, one through the main spar in the centre, which engages with a fitting on the top *longerons* (which meet at this point), and two through special reinforced ribs over the full-width edge of the body. In order to reduce the bending moments somewhat, single struts slope out some distance and are attached to the single spar.

A notable feature of the Hannover glider, which, by the way, was designed by Dr. Madelung, is the undercarriage, which consists of three footballs, two side by side under the deepest part of the *fuselage*, and one under the nose. Two similar, but smaller, air-filled spheres are housed in the wing tips. In practice this undercarriage is stated to have worked very well, and certainly it would be difficult to imagine anything lighter and simpler. The machine was built for some of the members of the flying club of the Hannover Technical High School by the Hannover Coach and Carriage Works.

THE FRENCH GLIDING COMPETITION

IN our issue of last week we announced briefly the results of the French gliding competition, which was held at Puy de Combegrasse, near Clermont-Ferrand, from August 6 to August 20. Unfortunately, the meeting was marred by a serious accident, which resulted in the death of one of the competitors, M. Fetu, who was flying a Bellanger-Denhaut biplane. Otherwise, in spite of the fact that the durations of the flights did not approach those made by German pilots, the meeting at Clermont-Ferrand must be counted a success much having been learned and the entries list being very large, no less than 50 machines having been entered. In the accompanying table are set out the main characteristics of all the fifty machines entered, while in the following notes reference is made to some of the more interesting of the gliders. For the table, as well as for the information upon which the notes are based, we are indebted to our excellent French contemporary *L'Aéronautique*, whose August issue contains a great deal of useful information relating to the various machines.

The Farman Machines.—Curiously enough, the machines which did best of all at Puy de Combegrasse were aeroplanes with the engines removed. Thus the Farman biplane glider was the Farman "Sport," with the Anzani engine taken out and the pilot's seat moved forward to trim the machine correctly. The same applies to the Farman "Moustique" which normally is a small monoplane, also with Anzani engine. It will, therefore, be gathered that both machines were somewhat heavy, having been designed for the stresses of a power-driven aeroplane. Nevertheless, Bossoutrot managed to make some very good flights on them, and on several occasions succeeded in gliding over his starting point. The fact that such heavy machines should have proved capable of good glides is encouraging, inasmuch as it indicates that with machines specially designed for gliding, with the weight kept down to a minimum and wind resistance reduced as much as possible, much better results may be hoped for. From the table of particulars it will be seen that the weight of the biplane is 275 lbs., for an area of 269 sq. ft., or practically 1 lb./sq. ft. empty. With the pilot in place the wing loading must have been approximately 1.6 lbs./sq. ft. In the case of the monoplane, the wing loading would work out at approximately 1.9 lbs./sq. ft. If such light loadings can be obtained with relatively heavy machines, it would appear probable that it might be possible to reduce, in a machine designed for gliding, the wing loading, with pilot on board, to about 1 lb./sq. ft., which should give very low landing speeds and also low rates of descent.

The Chardon Glider, flown by M. Chardon, the only Swiss representative at the meeting, is a very small and light biplane with open tail outrigger and no undercarriage. The pilot straddles a leather strap hanging down from the lower plane, and he gathers speed for starting by running down the slope of the hill. This procedure is rendered possible by the extremely light weight of the machine (about 30 lbs.). By energetic work, M. Chardon managed to bring his total duration of flights during the meeting up to 34 mins. 15 secs., thus gaining third prize, but no individual flight was of very long duration.

The Coupet Monoplane, flown by its designer M. Coupet, gained second prize for duration of individual flights, his longest flight lasting 4 mins. 50 secs. The Coupet monoplane is of the cantilever type, with wings tapering in chord and thickness from root to tip. The pilot is enclosed in the *fuselage*, his head projecting into a cut-out portion of the leading edge of the wing. The machine weighs but 88 lbs. empty, and has a wing area of 215 sq. ft., so that, with pilot on board, the wing loading is probably about 1 lb./sq. ft. As the head resistance is low this glider should be very efficient.

Table of Characteristics of Machines entered for French Gliding Competition.

No.	Entrant.	Type.	Under carriage.	Span.		Length.		Area.	Weight Empty.	Pilot.
				ft.	in.	ft.	in.	sq.ft.	lbs.	
1	M. Abbins ..	M	WS	26	4	9	10	129	88	Abbins.
2	De Monge ..	M	S	36	1	25	0	270	176	Casale.
3	De Monge ..	M	S	36	1	25	0	270	176	Roques.
4	Nessler ..	B	WS	21	7	14	9	194	143	Nessler.
5	Dewoitine ..	M	WS	37	1	15	11	124	176	Barbot and Thoret.
6	Beuchet ..	M	S	29	6	16	5	162	110	Beuchet.
7	Derivaux ..	B	W	15	9	21	8	215	88	Derivaux.
8	Coupet ..	M	?	36	1	19	8	215	88	Coupet.
9	Gilbert ..	M	W	31	10	13	10	172	198	Gilbert.
10	Groux ..	M	WS	26	2	13	2	172	66	Groux.
11	Pimoule ..	O	—	—		—		108	66	Pimoule.
12	Massy ..	M	W	35	1	13	10	215	220	Massy.
13	Deshayes ..	M	W	52	6	17	1	236	220	Camard.
14	Chardon ..	B	—	18	5	11	1	161	34	Cuendet.
15	Chardon ..	M	—	36	1	15	9	194	88	Cuendet.
16	Chardon ..	B	—	18	5	11	6	161	28	Cuendet.
17	Thorouss ..	M	W	14	5	11	6	135	110	Thorouss.
18	Montagne ..	M	W	49	3	16	5	194	44	Montagne.
19	Farman ..	M	W	32	10	19	8	129	88	Bossoutrot.
20	Grandin ..	M	W	47	7	26	3	538	176	Grandin.
21	Rollé ..	M	S	29	6	13	2	118	51	Rolle.
22	Rousset ..	M	WS	29	6	13	2	151	88	Rousset.
23	Potez ..	B	W	26	3	29	3	226	242	Douchy.
24	Sablier ..	M	S	29	6	14	9	151	88	Sablier.
25	Detable ..	M	WS	16	5	16	5	247	264	Detable.
26	Peyret ..	M	S	21	8	16	1	156	104	Peyret.
27	Valette ..	M	—	23	0	7	3	86	55	Valette.
28	Bernasconi	M	W	23	0	13	2	108	66	Bernasconi.
29	Griffrath ..	M	S	34	9	17	6	172	84	X.
30	Lefort ..	T	S	27	7	14	9	270	264	Lefort.
31	Vial ..	M	WS	27	10	19	9	140	128	Vial.
32	Trofin ..	T	S	26	3	21	4	258	158	Trofin.
33	Breguet ..	M	S	—		—		215	176	X.
34	Julien ..	M	W	24	8	12	4	107	77	Julien.
35	Aubiet ..	B	W	18	0	15	9	118	88	Aubiet.
36	Caux ..	H	S	18	0	11	6	215	70	Caux.
37	Bellanger-Denhaut	B	W	32	10	26	3	204	198	Fetu.
38	Landes and Derouin	M	S	36	1	14	9	172	110	Landes.
39	Aeron. Eng. Soc.	M	WS	24	8	14	9	118	75	Allen.
40	L. Clement	T	W	18	1	11	6	135	165	Sardier.
41	Dewoitine ..	M	WS	37	1	15	11	124	176	Thoret.
42	Levasseur-Abrial	M	S	40	0	20	0	215	198	Pitot.
43	Dits-Moineau	M	S	39	5	18	1	215	110	Moineau.
44	Paulhan ..	B	WS	23	4	20	1	215	286	Paulhan.
45	Bonnet ..	B	S	28	8	17	5	194	143	Descamps.
46	Gaffner ..	B	WS	23	11	15	9	237	100	Gaffner.
47	Farman ..	B	W	29	6	23	0	269	275	Bossoutrot.
48	Verrimst-Maneyrol	M	W	32	10	13	2	248	330	Maneyrol.
49	Vercruysse	—	W	23	0	9	10	108	110	Vercruysse.
50	Thourel-Boisson	B	—	18	11	18	1	172	55	X.

M = Monoplane. B = Biplane. T = Triplane. O = Ornithopter. H = Helicopter. W = Wheels. S = Skids.

The Dewoitine Monoplane is one of the most carefully designed at the meeting. Of the cantilever type, its wings appear to have a section similar to some of the Göttingen sections, and not unlike the famous Joukowski aerofoil, with the maximum lower camber placed very far back, giving a thin trailing edge. The *fuselage* is built up of four light *longerons*, with struts and wire bracing, and the square section thus formed is turned into a streamline form by the addition of stringers. The nose of the *fuselage* is a hemisphere formed of several laminations of wood. A simple V-undercarriage with two wheels is fitted. The wings taper in chord and thickness, and are very pointed at the tips. The front portion of the upper surface is covered with three-ply, the rest of the wing being fabric covered. With a wing area of 124 sq. ft. and a weight, empty, of 176 lbs., the wing loading, in flight, is about 1.8 lbs./sq. ft. Piloted by Barbot, the Dewoitine No. 5 aroused the admiration of all spectators by hanging almost motionless in the air for about 20 secs., and for nearly 2 mins. the machine cruised about over its starting point. A second Dewoitine monoplane, piloted by Thoret, came to grief in landing, the pilot, fortunately, being unhurt.

The L. Clement Triplane was exhibited at the last Paris Aero Show, and had been shown previously as an aeroplane with 30 h.p. Anzani engine. It will, therefore, be known to readers of this journal, and it suffices to recall that its *fuselage*, is built entirely of steel tube. The machine is somewhat heavy, and this fact may have been contributory to the accident which overtook it.

The Deshayes Monoplane is characterised by very careful stream-lining. Its *fuselage* is built up in the usual fashion, and the monoplane wing is attached, not *en parasol* as are the majority, but to the sides of the *fuselage*, about midway down. An arrangement is incorporated for altering the angle of incidence of the wing, the range being from 0 to 6 degrees. The strength of the wing was tested in a very simple manner, three men sitting on each wing, and no sign of permanent deflection being noticeable. The undercarriage consists of two main wheels, mounted on streamlined Vees (enclosed), and of a third wheel under the centre of the *fuselage*. This wheel is provided with a brake, so that, as the weight on this wheel is naturally considerable, the glider may be pulled up quickly, even on the slope of a hill. Unfortunately, the machine came to grief, a gust striking it shortly after the start and turning it on its nose. The pilot, M. Camard, was but slightly injured.

The de Monge Machines.—Two monoplanes of highly original design were entered by M. Louis de Monge. They are chiefly remarkable for the fact that their *nacelle* is formed by a swelling in the centre of the thick tapered monoplane wing. In front this swelling projects to form the pilot's cockpit, and at the rear it tapers off to a point, the cord of the wing being extended aft behind the trailing edge of the lifting portion of the wing. The tail is carried on two outriggers, each enclosed and forming a vertical panel. Under the wing, these panels are extended downwards to form the skids on which the machine alights. One of the de Monge machines was flown by Jean Casale, the famous Blériot-Spad pilot, but no very notable glides were accomplished.

Henry Potez had entered a biplane glider, which was really an aeroplane with its Anzani engine removed. The machine is entirely on orthodox lines. Piloted by Douchy it made several good flights from the Puy de Combegrasse, but the best flight of all, made, unfortunately, without the sanction of the judges, was made on August 20, when Douchy had his machine taken to the top of the Puy de Dome, and from this starting point made a flight lasting nine minutes. Under the conditions, however, this flight was not eligible for prize awards.

The Bellanger-Denhaut biplane was the only two-seater glider entered for the competition. The designer had made no great attempt at weight reduction, as he was of the opinion that the machine, even if somewhat heavy, would glide well in a high wind. Furthermore, the intention was later to fit a small motor in the machine. M. Fetu made a short flight on the machine, getting well away and gliding normally for a few seconds. Then, without any warning, the machine got into a spin and crashed, the pilot being so severely injured that he died later in a hospital in Clermont-Ferrand. This was the only serious accident which occurred at the meeting.

The Aeronautical Engineering Society of America entered a monoplane which made many excellent flights piloted by Mr. Allen. The machine is a monoplane with underslung body, somewhat after the fashion of the old Santos Dumont Demoiselle. The tail is carried on open tail outriggers, and these extend forward and downwards so as to form the support for the undercarriage and also for the pilot's seat. The machine is very simple in its construction, but probably offers considerable head resistance. During the earlier part of the meeting Allen was leading as regards total duration, but later he was passed by several of the French competitors.

THE ROYAL AIR FORCE

London Gazette, August 22, 1922

Group Capt. A. G. Board, C.M.G., D.S.O., to be Deputy Director of Personnel, Class 1, Air Ministry; August 24. (Vice Group Capt. C. L. N. Newall, C.M.G., C.B.E. A.M.)

General Duties Branch

H. Butlin is granted a short service commission as a Flying Officer with effect from, and with seniority of, August 11. Lieut. C. H. Goring, D.S.O., M.C., Royal Fusiliers, is granted a temporary commission as a Flying Officer, with seniority of April 1, 1918, on seconding for three years' duty with R.A.F.; June 7. Squadron Leader A. W. H. James, M.C., is placed on half-pay, Scale B; August 7. Squadron Leader G. J. Watney, O.B.E. (Paymaster Lieut.-Commander, R.N.), relinquishes his temp. commission on return to Naval Duty; February 13. Observer Officer D. A. Cox is placed on retired list on account of ill-health contracted on active service; August 23. The short service commission of Pilot Officer R. Fisher is terminated on account of ill-health; August 23.

Stores Branch

The following Flying Officers are transferred to Stores Branch from General Duties Branch; July 15:—A. G. Knight, M.B.E., A. E. F. McCreary. Flying Officer W. Rollinson is granted short service commission for Accountant duties, retaining his present substantive rank; June 15. His seniority will be promulgated at a later date. Capt. and Paymaster L. J. Lightfoot, O.B.E., R.A.P.C., is granted temporary commission for Accountant duties as Flight-Lieut., with seniority of April 1, 1918, and to be acting Wing Commander, on seconding for three years' duty with R.A.F.; August 14.

Medical Service

J. F. Carruthers, M.D., is granted a temporary commission as a Squadron-Leader, with effect from, and with seniority of, July 21.

Memoranda

Capt. F. X. Russell, late Royal Munster Fusiliers, is granted permission to retain rank of Major, R.A.F., *on retirement from the Army*. The *permission* granted to Lieut. A. Cox to retain his rank is withdrawn on his joining the Territorial Army.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

Wing Commanders: T. O. Lyons, O.B.E., from R.A.F. Depot (Inland Area) to Half-Pay List. 9.9.22. D. A. Oliver, D.S.O., O.B.E., from R.A.F. Base, Leuchars (Coastal Area) to Half-Pay List. 1.9.22. Actg. Group Capt. R. D. S. Stoney, C.B.E., from Central Pay Office, Woking (Inland Area) to Headquarters (Coastal Area) Supernumerary). 14.7.22.

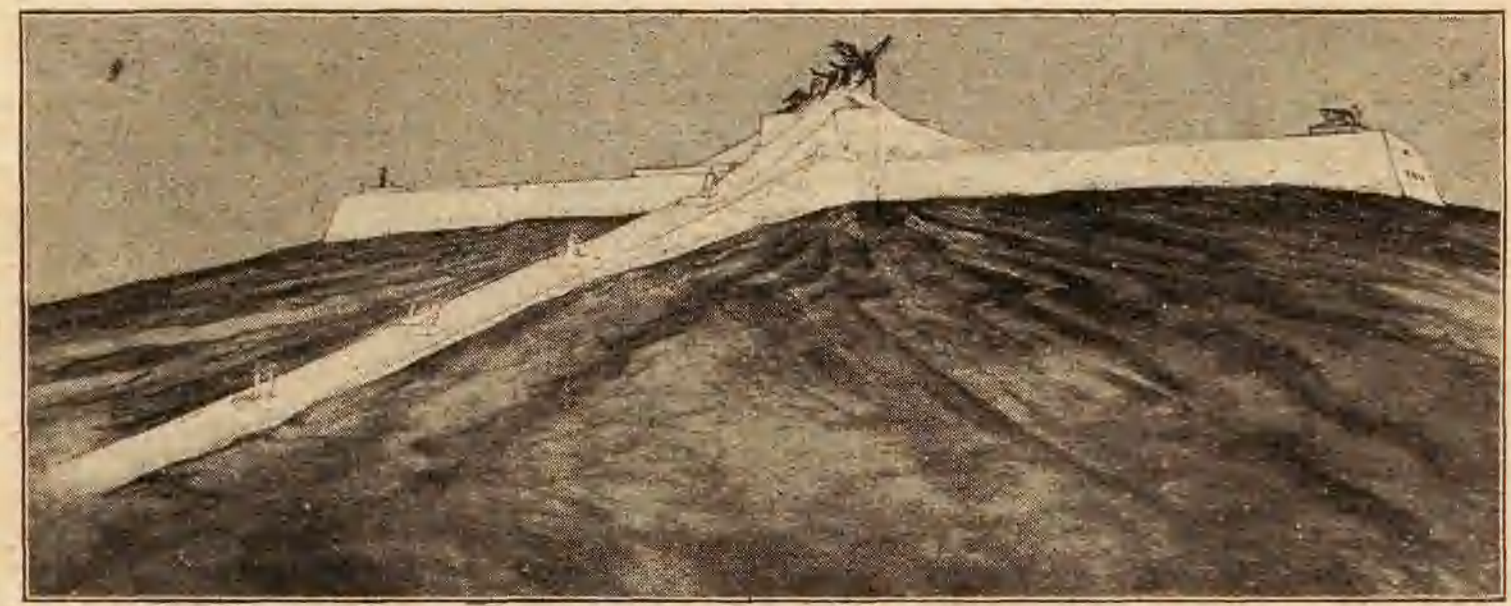
Squadron Leaders: Actg. Group Capt. H. C. Ellis, C.B.E., from R.A.F. Depot (Inland Area) to Palestine Wing Headquarters (Middle East) (Supernumerary). 11.8.22. R. E. Bell, M.B., from R.A.F. Depot (Inland Area) to Headquarters, R.A.F. (Iraq). 10.8.22. J. W. Cordingley, O.B.E., from Air Ministry (D. of P.) to command Record Office (Inland Area). 1.10.22. W. G. W. Prall, from Inspector of Recruiting (Coastal Area) to Air Ministry (D. of P.). 1.10.22. W. Sowrey, A.F.C. The previous notification wherein this Officer was posted from R.A.F. Depot (Inland Area) to No. 207 Squadron (Inland Area) is hereby cancelled. A. W. Tedder. The previous notification concerning this officer which appeared in Intelligence Bulletin No. 73 is hereby cancelled. G. S. Marshall, O.B.E., D.P.H., from R.A.F. Depot (Inland Area) to Research Laboratory and Medical Officers' School of Instruction (Coastal Area). 23.8.22.

Flight Lieutenants: I. M. Matheson, from No. 39 Squadron (Inland Area) to Armament and Gunnery School (Inland Area) (Supernumerary). 21.8.22. Hon. Sqdn. Ldr. W. R. Kemp, B.A., from C. and M. Party, Felixstowe (Coastal Area) to Marine and Armament Experimental Establishment (Coastal Area). 14.8.22. Act. Sqdn. Ldr. F. C. Kempson, M.B., B.A., from C. and M. Party, Donibristle (Coastal Area) to R.A.F. Base, Leuchars (Coastal Area). 14.8.22. J. C. T. Fiddes, M.B., from No. 1 School of Technical Training (Boys) (Halton) to Headquarters, R.A.F. (Iraq). 10.8.22. C. A. Harrison, to Research Laboratory and Medical Officers' School of Instruction (Inland Area) on appointment to Temporary Commission. For short course of instruction. 8.8.22. A. H. Wann, from R.A.F. Depot (Inland Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area) (Supernumerary). 19.8.22. H. M. Daniel, M.B., from R.A.F. Depot (Inland Area) to Central Fying School (Inland Area). 14.8.22. T. H. K. MacLaughlin, from R.A.F. Depot (Inland Area) to No. 2 Squadron (No. 12 Wing Ireland). 19.8.22. O. St. L. Campion, from No. 2 Squadron (No. 12 Wing Ireland) to R.A.F. Depot (Inland Area). 21.8.22. T. L. P. Harries from Central Flying School (Inland Area) to R.A.F. Depot (Inland Area). 16.8.22. G. B. A. Baker, M.C., from Air Ministry (D.T.O.) to School of Photography (Inland Area) (Supernumerary). 1.9.22. W. H. Longton, D.F.C., A.F.C., from Headquarters (Inland Area) to Air Ministry (D.T.S.D.). 1.9.22. H. H. James, from R.A.F. Depot (Inland Area) to Boys' Wing (Cranwell). 22.8.22. W. E. C. B. C. Forsyth, from Aircraft Depot (Middle East) to No. 4 Flying Training School (Middle East). 1.8.22. J. A. Perdrau, M.D., from R.A.F. Depot (Inland Area) to School of Technical Training (Men) (Inland Area). 22.8.22. J. A. Musgrave, to Research Laboratory and Medical Officers' School of Instruction (Coastal Area) on appointment to a Short Service Commission. For short course of instruction. 17.8.22. J. K. R. Landells, M.B., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area) on appointment to a Short Service Commission. For short course of instruction. 16.8.22. M. Coghlan, M.B., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Depot (Inland Area) (Supernumerary). 23.8.22. J. W. H. Steil, M.B., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to Headquarters (Coastal Area) (Supernumerary). 23.8.22.

AIRISMS FROM THE Four Winds.

There is again talk of forming an Aero Club for the north. A meeting of ex-pilots and others interested has been arranged for September 15 in Manchester, when the suggestion will be dealt with. The idea is to keep alive the practical sporting side of aviation, and enable ex-pilots and observers to keep their hands in against the time for more extended developments to materialise. Maj.-Gen. Sir Sefton Brancker is said to look upon the scheme with favour.

A move is being made by the Bulgarian Government through the Ministry of Posts and Telegraphs, for the acquisition, as a start, of a quartette of postal-passenger 'planes. Tenders are being invited, it being specified that the machines, which must be delivered in Bulgaria, must have accommodation for 6 to 10 persons, and the successful firm must undertake the teaching of the local *personnel*, 40 to 50 in number, in the use of the machines.



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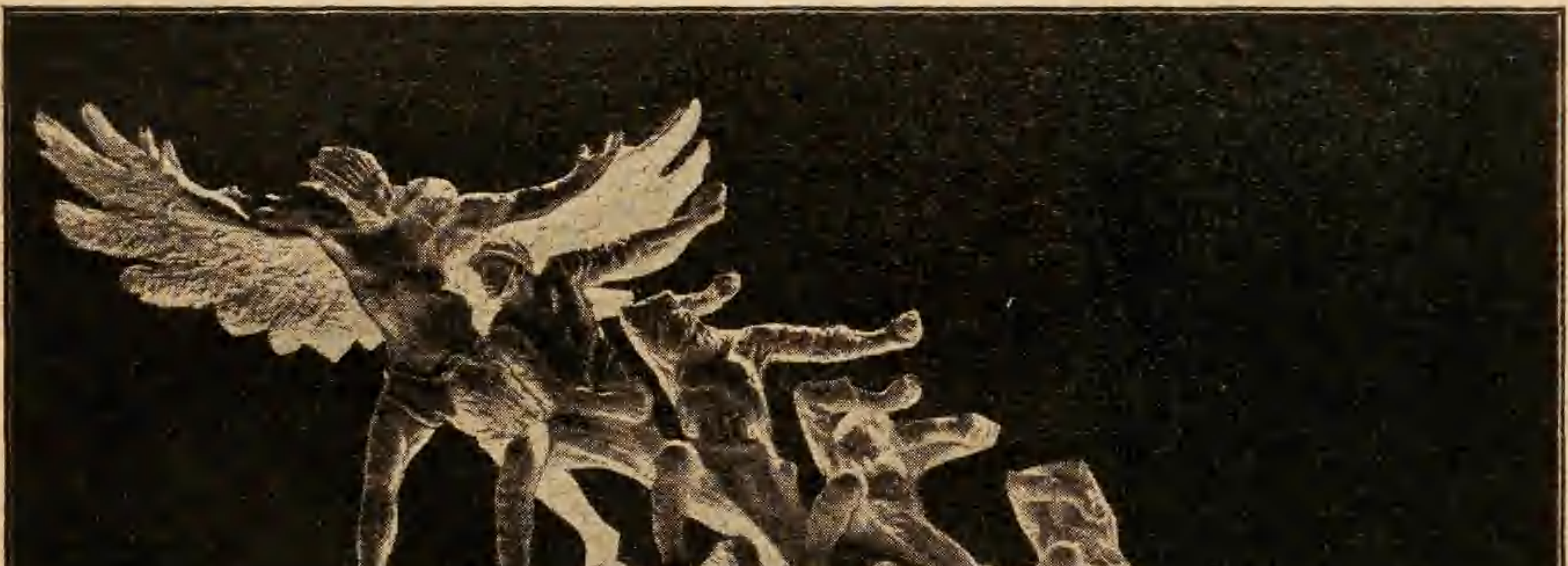
ITALY'S WAR MEMORIAL : A plan view of the scheme for the memorial on the Carso battlefield.



Reproduced by courtesy of "The Times."

ITALY'S WAR MEMORIAL : A beautiful conception by the Genoese sculptor, Eugenio Baroni, which has been accepted by the Italian National Committee for a War memorial to be erected overlooking the battlefield of the Carso. It will take the form of a huge cross (as seen in the other photograph), and at eight points there will be allegorical groups of statuary. The above photograph shows the main group, which is highly suggestive of "winged man" leading the forces, whilst the plan design suggests the form of an aeroplane.

QUITE interesting data ought to result as a natural sequence to the appointment, recently announced, of British Instructional Films, Ltd., to be official cinematographers to the Royal Zoological Society. As a first move, Mr. Oliver G. Pike, F.R.Z.S., is making a trip to the Farne Islands, where he hopes to secure an exhaustive series of pictures of sea-birds in flight, a study of vast interest to aeronautical researchers. The idea is to test a theory that has been put forward by Mr. W. Pycraft, of the British Museum of Natural History, with regard to the similarity between the flight of birds and the swimming of fish.

This theory was first put forward after the exhibition of Mr. Edgar Chance's remarkable cuckoo film, and as a result a special film was taken with an ultra-rapid camera, which slows down the movement on the screen to about a tenth of the normal rate. The evidence gained from this film added support to the theory. It is claimed that both birds and fish resemble the turtle when in motion, and arrangements have now been made to take an extensive series of pictures of turtles at the Zoo. Already a large number of instructive photographs have been taken of fish. There was at first some difficulty in obtaining permission to pay a visit to the Farne Islands, as films have never been taken there before, but the Natural History Museum have managed to make the necessary arrangements.

- \- \-

MR. HOLT THOMAS has a happy knack of putting his finger upon the vitally weak point in any anti-aeronautical controversialists' arguments. His latest effort in this direction, in the case of a letter to *The Times* on "The Decisive Arm," Sir Reginald Bacon appears to be well up to his usual form. The points made by Mr. Holt Thomas are sufficiently self-evident to spare giving Sir Reginald's original communication. Thus Mr. Holt Thomas :—

"Sir Reginald Bacon 'recalls to the minds of non-technical readers fundamental axioms' :—

"(1) 'Airplanes cannot supersede sea transport.' Perfectly true, neither will they supersede railways or motor-cars, but a sufficient aerial attack can prevent all these being of interest by, as the Admiral himself states, 'poisoning whole towns and districts.' It is no use bringing imported food to us when we are dead, as he acknowledges we shall be.

"(2) 'Invasion cannot be carried out by an air force until its units can carry 6-in. guns and ammunition.' Admiral Bacon acknowledges we are already dead. Where do the 6-in. guns come in ?

"(3) 'Supposing aerial invasion possible, sea transport is cheaper.' Food prices cease to interest us when we are dead.

"(4) 'An air force cannot prevent invasion.' It is the *only* thing that can prevent an aerial invasion, which is the first thing we have to fear. If that succeeds, we are dead, and are not particular as to any other invasion which may follow.

"(5) 'Our sea force can operate in distant waters.' Very true, but this will cease to interest us when we are already dead.

"(6) 'Successful attack by aircraft on capital ships is doubtful.' This may be correct or not, but we are dead, and really do not mind whether the capital ships are sunk or not.

"(7) 'Aircraft have improved, and so, therefore, have their defensive powers against aircraft.' Quite true, but we have not got enough of them to prevent attack, whilst other nations are building hundreds.

"(8) 'The protection of our ships has progressed greatly.' They may be quite immune from attack, so far as I am concerned, but they cannot prevent foreign aeroplanes from laying us all out dead.

"I am sorry to enter into a controversy which should never arise—namely, capital ships *or* aeroplanes, as we certainly want a Navy ; but it is quite certain the ship cannot work without the air. It is equally certain that the air can work without the ship, and, if there is not enough money for both, let us first protect ourselves against what everyone knows will be the first, and probably decisive, move in the next war—which God forbid—namely, the most hideous and horrible devastation of life and property from the air."

LONDON TERMINAL AERODROME

Monday evening, August 28

ALARMING and sensational accounts of a mishap to one of the Messageries Aérienne's "Goliaths" appeared in the daily newspapers during the week. All the usual sensational "dives to earth" and "explosions" were featured, together with the survivors' experiences. It is only to be expected that this sort of thing will happen when the chief passenger traffic consists of tourists who are constantly on the look-out for something whereby they can achieve notoriety, and make out that they have had a marvellous escape. Although the machine was badly damaged, there was not much risk for the passengers. What really happened was that one of the engines cut out while the machine was about 500 ft. over a wood, and the pilot was forced to descend on the tree-tops. He told the assistant-pilot to get all the passengers in the rear of the cabin, and then landed as best he could on the tree-tops. According to the account of a passenger who was not wanting any cheap notoriety, the only "damage" to the passengers was sustained as they were getting out of the machine, when one of them tore his clothing.

The weather shut down on the machines in flight on Thursday evening, with the result that quite a crowd of them were forced to land and stay the night at St. Inglevert, Lympne, and Penshurst. All completed their journeys next morning in good time.

Some Fast London-Paris Flights

STRONG north-west winds have been responsible for rapid journeys to Paris, and also for some prolonged flights from Paris. A D.H. 34 of the Instone Air Line flew from Croydon to Le Bourget in 1 hour 41 minutes, and a Daimler D.H. 34 accomplished the same journey in 1 hour 46 minutes. On the same day the incoming machines had in many cases to land at Lympne and Penshurst for petrol. A Daimler 34 which landed at Penshurst had to have petrol sent out, as there is no store there. This is one of the irritating little faults in the organisation of the airway that could very easily be remedied. Surely it is not too much to ask that, say, 50 gallons of petrol should be stored at this emergency aerodrome. I understand that one of the new "T" landing-light signs is to be placed there, but, considering the attitude of the insurance companies towards night flying, 50 gallons of petrol would appear to be of much more practical use and certainly cheaper.

The big fire at Calais docks provided the Surrey Flying Services with more work. They flew a photographer over for *The Daily Mirror*, and also a cinema-man from Pathé's, to take photographs of the fire. It is rather strange that, although the fire could be seen from the English coast, none of the pilots flying along the airways appear to have noticed anything.

French Development of Goods Traffic

THE Messageries Aériennes have taken over the Instone Air Line goods traffic, and are now going "full out" to capture the rest of the goods traffic between London and Paris. Their connections by air beyond Paris place them in a unique position for the handling of goods for places as far apart as Africa and Marseilles on the south, Constantinople in the east, and Amsterdam in the north, as they are able to quote through rates for these places. I understand that they intend to have a Customs' clerk on board their Goliaths next year, in order that the time spent in preparing the necessary papers at either end shall be cut down to a minimum.

The Instone Air Line continue their policy of retrenchment, and have dismissed numbers of their staff. During the week they have been running reduced services, owing chiefly to the slight fall in the traffic.

The control-tower is now in full working order, and has been re-christened the Duty Office, while the old Duty Office now becomes the Communications' Office. In the control tower itself there is now one of the C.A.T.O.'s always on duty, together with a wireless operator. The old wireless hut has been converted into what is virtually a wireless telephone exchange, where the operator in the control tower is "connected" with the machines in flight. Each machine fitted with wireless now "rings up" and reports its position at regular intervals, and this information is immediately passed on to the firm concerned, so that the progress of the machine is known throughout its journey.

In addition, the man who waves the starting flag has been installed on the balcony round the control tower, and has been made look-out man. He now operates the Klaxon horn that announces in Morse the company to whom approaching machines belong. As was to be expected, the new glass roof and sides of the tower have earned for it the name of "The Cucumber Frame." A new arrangement for signalling the priority in which machines are to depart is to come into operation shortly. This consists of a number of discs, on which are painted the registration numbers of the various machines, one of these being exhibited when a machine is ready to depart.

Popularity of the Handley Page W.8's

NEARLY six hundred passengers have again passed through the air station this week, HandleyPage Transport, as usual, carrying the largest number. The W.8's of this Company are running remarkably well, and passengers are loud in their praise of the comfort and roominess of the cabins.

On Friday Mr. Stocken broke the record for a flight to Brussels, accomplishing the journey in 75 minutes. I hear that the Aircraft Disposal Company are to enter two machines for the King's Cup Race round Britain, and that the pilots will be chosen from Messrs. Perry, Piercy and Stocken.

The Grand Express are having considerable success with their service to Switzerland. The other day a lady arrived at Le Bourget after the machine had left for Lausanne, and, although the machine was half-an-hour's flight away, it was recalled by wireless, with the result that one delighted lady arrived at Lausanne three hours afterwards. The return journey from Lausanne to London is accomplished by the Grands Express in one day.

The K.L.M. have had a large increase in passengers, and their machines are now flying with practically full loads, as the goods traffic continues large. The new Rolls-Fokkers are now flying regularly on the service.

On Monday morning the Daimler Airways turned their early morning machine into an aerial cattle-truck, having a pedigree pig and also a sheep consigned by them from Yorkshire to Paris. The Napier engines used exclusively by this line are putting up a magnificent performance. In fact, it is months since they had a forced landing due to engine trouble. Although the wonderful organisation of the Daimler engine repair-shops is to a great extent responsible for this, no amount of organisation will make a "dud" engine into a good one.

Captain Muir and Mr. Youell were both busy with joy-riders over the week-end. The number of people who wish to be "stunted" is steadily growing, a sure indication that the general public is gradually losing its distrust of flying. The Surrey Flying Services are expecting to have an "Avro" ready to replace the one damaged by the involuntary descent in the cornfield last week, and they are also puching forward with the work on the D.H.9, which they are to use for "Taxi" work.

Lieut. Stampe, the pilot who has had the honour of piloting the aeroplanes of the King of the Belgians, arrived at the air-station by air on Monday, piloting a D.7 Fokker biplane of German war-type build, which has been converted into a tourer. Lieut. Stampe is over here to purchase training machines for the flying-school he is starting in Belgium.

⁂ ⁂ ⁂ ⁂

SIDE-WIND

THE social side of many large business houses is often sadly neglected, usually due to lack of support on the part of the directors and management. The other side of the picture was seen on Saturday last, when S. Smith and Sons (M.A.), Ltd., well-known manufacturers of motor accessories, held their Annual Sports. The glorious weather helped to bring a record crowd to the fine playing fields at Neasden belonging to Smiths (M.A.), where sport and merry-making were intermingled from 2 p.m. well into the evening.

One of the principal events of the day—the 100 Yards Race for Directors and Departmental Managers—was won, to the delight of everyone, by the Managing Director, A. Gordon Smith, Esq., with the Works Manager, Mr. B. Haviland, second. Other events included a 60 Yards Blindfold Race and a "Donkey Derby," both causing much laughter and good-humoured chaff. Mrs. Gordon Smith very kindly presented the prizes, and the day ended with dancing in the spacious Pavilion, music being provided by the Orphan Fund Band of the N.U.R.

⁂ ⁂ ⁂ ⁂

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

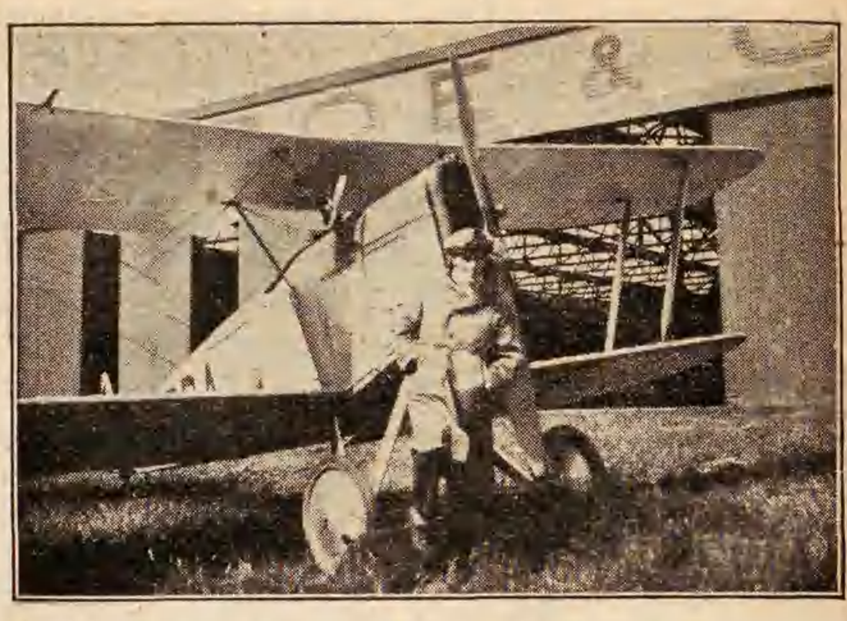
(London Aero-Models Association.)

MR. FELIX KELLY'S CHALLENGE CUP.—The competition for this has been postponed from September 2 to September 16, in order to permit the many competitors to complete their models.

Mr. W. E. Evans has kindly offered a challenge cup for model gliders. The minimum span to be 1 metre, minimum loading 3 ozs. per sq. ft. Full details will be published next week. Mr. D. H. Pilcher has kindly given a challenge cup for enclosed *fuselage* models, to be competed for. Full particulars will be published next week.

Members turned up in good numbers at Headquarters last week to congratulate those members who had successfully broken British records the Sunday previously.

A great deal of useful business was got through, and the prospects of having all business matters settled for the extraordinary general meeting on the first Thursday in October look bright. Suggestions for the improvement of the Society are always welcomed, especially from the country members, and should be addressed to the Hon. Secretary, A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6. Headquarters, 20, Great Windmill Street, Piccadilly, W. 1, every Thursday at 7.30 p.m.



London-Moscow in an Avro Baby, 35 h.p. Green engine: A few weeks ago a very remarkable flight was made from London to Moscow in an Avro Baby. The pilot, a Russian named Gwailer, is seen in the photograph, which was taken just before the start of the flight. The machine was held up for some considerable time in Germany, the strange combination of a Russian pilot in a British machine, alighting on German soil, leading to complications. However, all difficulties were smoothed out ultimately, and the machine reached its goal in safety.

⁂ ⁂ ⁂ ⁂

Petters, Ltd.

THE Government policy of saving at the last moment the complete annihilation of the British aircraft industry must give heart to those firms who have backed their belief in the future by holding on to their aeronautical organisation in spite of the poor encouragement by the Cabinet. Amongst these we are glad to enumerate Messrs. Petters, Ltd., who have been so helpful in the past in furthering the interests of aviation. The directors' report to March last mentions that their aircraft works satisfactorily completed the contract referred to in their last report, and have a certain amount of work on hand for Government, which justifies the directors in retaining this branch of business for the time being. The directors feel that having regard to equipment of aircraft work, with adjacent aerodrome, and high standard of skill acquired by technical staff and the workers, and also to imperative necessity of maintaining aircraft industry in this country, it would be a great misfortune if this branch of the business had to be abandoned, and are hopeful that it will yet prove a useful asset to the company.

⁂ ⁂ ⁂ ⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors.

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

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Sept. 2–17....	**International Concours Aviatique, Rotterdam**
Sept. 8–10....	**1,000 Miles Race round Britain for the King's Trophy**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 30	**Coupe Deutsch (300 kil.)**
Oct. 16–21	**Daily Mail £1,000 Gliding Competition**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

The R.A.F. in India

ATTENTION has recently been called, somewhat dramatically, to the state of ineffectiveness into which the R.A.F. in India has fallen. Letters from pilots, all the more poignant on account of the fact that their writers are now dead, have been published, which throw the strongest light upon the handicaps, not to use stronger words, under which our gallant lads serving on the N.W. frontier are working. Some of these have been able to joke about matters which are tragic enough in all conscience ; that is the spirit which prevails throughout the R.A.F. But between the lines of even such letters can be read the urgent call for remedies, for a realisation of the true state of affairs, and for bare justice at least. The work is sufficiently arduous in itself, and it behoves those in authority to see that it is not made unbearable by want of equipment that is essential.

It is in the matter of allocating the blame that we cannot agree with some of the critics, who appear to have used the opportunity to find fault with departments which have not been responsible for the deplorable state of things, which no one has denied undoubtedly does obtain. The position, stated within the narrow limits of space at our disposal, is this, that the Indian Government indents on the Air Ministry for machines, spares and men, and that when these have been supplied they pass from the control, and logically from the responsibility, of the Air Ministry. Matters such as condition and maintenance of material and operations carried out by the R.A.F. in India are under the control of the Indian Government and the Commander-in-Chief. As a matter of fact, the lack of spares, and other shortcomings, were known to the Air Ministry months ago, and the strongest representations were made to the Government of India. These having proved of no avail, Air Vice-Marshal Sir John Salmond was sent out to India to discuss the matter with the Indian authorities, and the report of his commission is expected to be published next month. In the meantime, it is rather unprofitable to speculate upon details.

In its broader aspects the situation was put very ably, very soberly, and very logically by Lord Montagu of Beaulieu in a letter to *The Times*, in which he points out that Sir John Salmond has no doubt by now fully appreciated the difficulties, even if he has not as yet had time to remedy the defects. "It will be particularly interesting," Lord Montagu says, "if we can learn what his report has been to the Air Ministry, and whether he has told the Government of India in explicit terms that if they want an Air Force to operate in India it must be a real force and not a sham one, that it must have up-to-date equipment, that the *personnel* must be treated better than in the past, and that if the Air Force cannot be properly maintained it is better to have none at all."

Lord Montagu states that, with the financial stringency existing in India there have been considerable difficulties to be overcome. We agree entirely with Lord Montagu when he states, in this connection, that "In the absence of evidence to the contrary, I think we must assume that it is carefulness about the rupees in India rather than carelessness or callousness at the Air Ministry which has led to the recent deplorable casualties on the North-West Frontier."

The example thus provided by India might be taken to heart at home equally well. The R.A.F. has been left to carry on as best it may with obsolete or obsolescent machines, in the interests of economy. At one time the cry was "use the axe," and the Government was abused for not having used the axe sufficiently. It has been used with a vengeance on the R.A.F., with the result that, except for a few experimental machines, the R.A.F. is mounted on four-years-old machines, built of war material, "re-conditioned in the interests of economy." India has shown what sorts of results may be expected from economies of this kind. If the R.A.F. at home is not soon equipped with more modern *matériel*, we shall have similar things happening here. And, curiously enough, the people who are the loudest in their demands for economy are the first to cry out when accidents resulting from such economy occur. But, in all fairness, let us place the blame at the door of the right offenders, and not try to make a scapegoat of a department which is at the very least entitled to the benefit of the doubt.

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The New Air Services

The announcement that new air services are about to be started, or, at any rate, a re-arrangement of services to take place, will be received with satisfaction by all who take an interest in commercial aviation. It has been evident for a considerable time that, although fortunately the traffic on the London-Paris route has been steadily increasing during the last couple of months, there was not, and could not be for a very long time, sufficient to keep three lines running in competition. From the technical point of view also, the continued running of services on the London-Paris route did not teach us anything we did not know two years ago. The ground organisation has been improved, and so have the aeroplanes themselves, but nothing has materialised which could not have been foreseen as a result of Mr. Holt Thomas' 1919 service.

General Sir Sefton Brancker has long realised that the London-Paris line could not be the end-all of our civil aviation. In fact, at the last Air Conference he, as one of the critics, pointed out that the result of continued activity concentrated on that route could only lead to duplication and competition, and that of the latter we already had sufficient from France. In his capacity of Director of Civil Aviation General Brancker has worked for the elimination of competition, and, as a result of his many discussions with operating firms, the announcement can now be made that the three air lines which have been, of necessity, working against one another will now be spread over three entirely different routes.

Handley Page Transport will continue to run the London-Paris service. The Instone Air Line will operate the London-Brussels, with an extension to Cologne inview, and the Daimler Hire Air Service will break new ground by inaugurating a new service, between London and Berlin, whilst a further new service is promised for the spring.

As we have long maintained that the continuance of the London-Paris service by three subsidised companies could lead nowhere, we are naturally gratified at the re-organisation foreshadowed, and we feel certain that this change cannot fail to be of benefit to aviation in general. If and when an air mail service to India is started, it will, if the shortest and quickest route is to be followed, go over Central Europe, and the lines to Berlin may then well prove of great importance. The direct route would pass over Brussels, Frankfurt and Nuremberg to Vienna.

We understand that the new service to Berlin is to be opened shortly, and that a flight will be made each day in each direction, using D.H.34 machines. The fares have not been definitely settled, but it is stated that they will be but little higher than those on the London-Paris service. If that is correct, there should be no lack of support, since it is contemplated to do the journey in seven or eight hours, while the journey by train takes approximately twenty-four hours. We congratulate the D. of C.A. and the operating firms on their decision.

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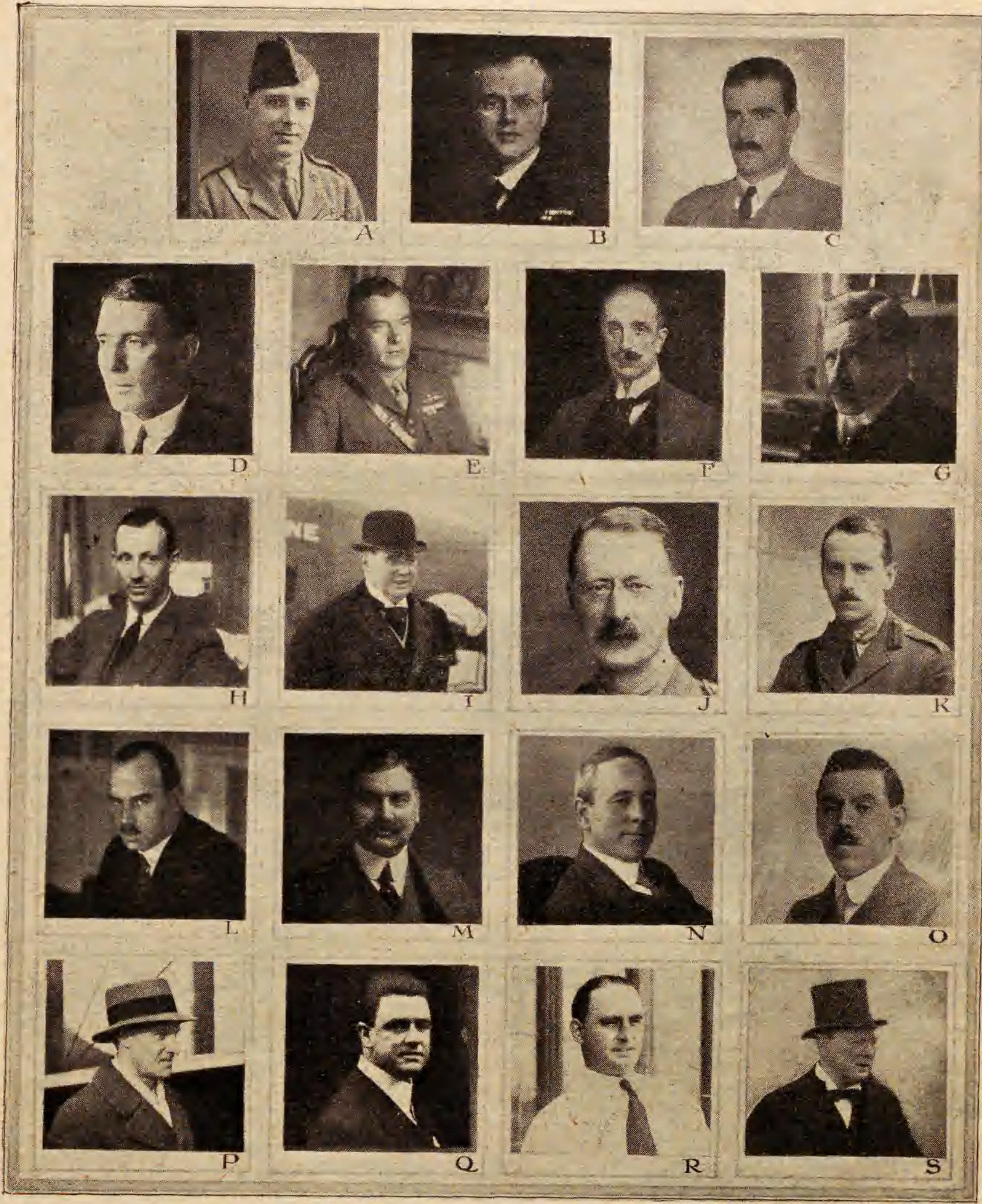
The Circuit of Britain

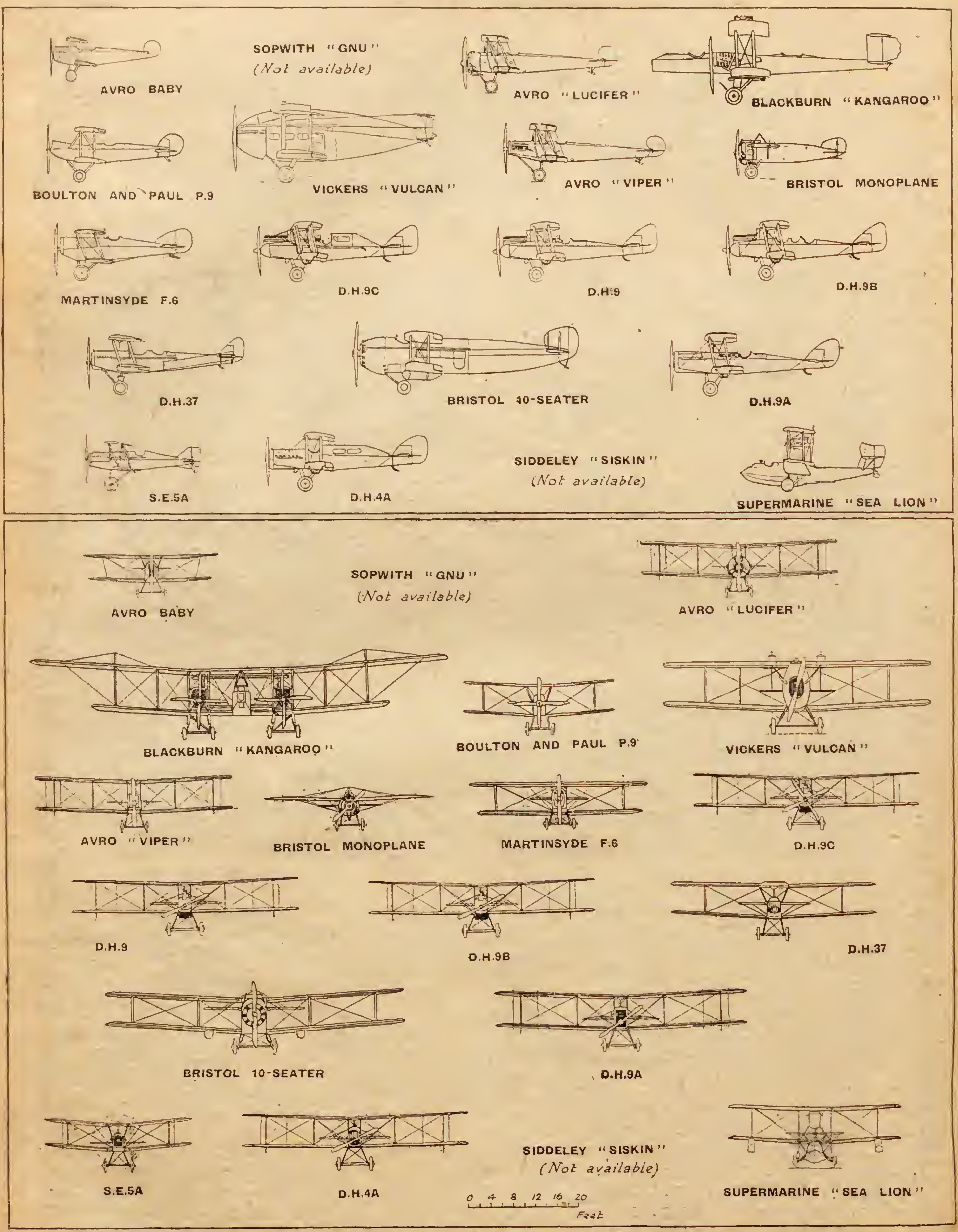
Tomorrow (Friday) morning at nine the first machine, the Avro Baby, will start for the flight around Britain for the King's Cup. It is a matter for congratulation that twenty-three machines have been entered for the race, and the variety represented will be gathered when it is pointed out that these include no less than nineteen different types of machines, ranging from small single-seaters with engines of 35 h.p. only to amphibian flying boats with 450 h.p. and twin-engined machines of 550 h.p. There can thus be no complaint on the score of variety, and the handicapping must have been a matter of the greatest difficulty. We trust that luck may favour the race, and that no untoward incidents will mar the procedings.

In another part of this issue of FLIGHT we publish scale drawings and photographs of the machines. The scale drawings are all reproduced *to a uniform scale*, so that comparison should be easy and readers able to see at a glance which are small machines and which are large ones. Identification is a matter of difficulty when the machines are flying overhead at a considerable altitude, but for this purpose also our small scale drawings should be of assistance, showing as they do the main characteristic features of the different types.

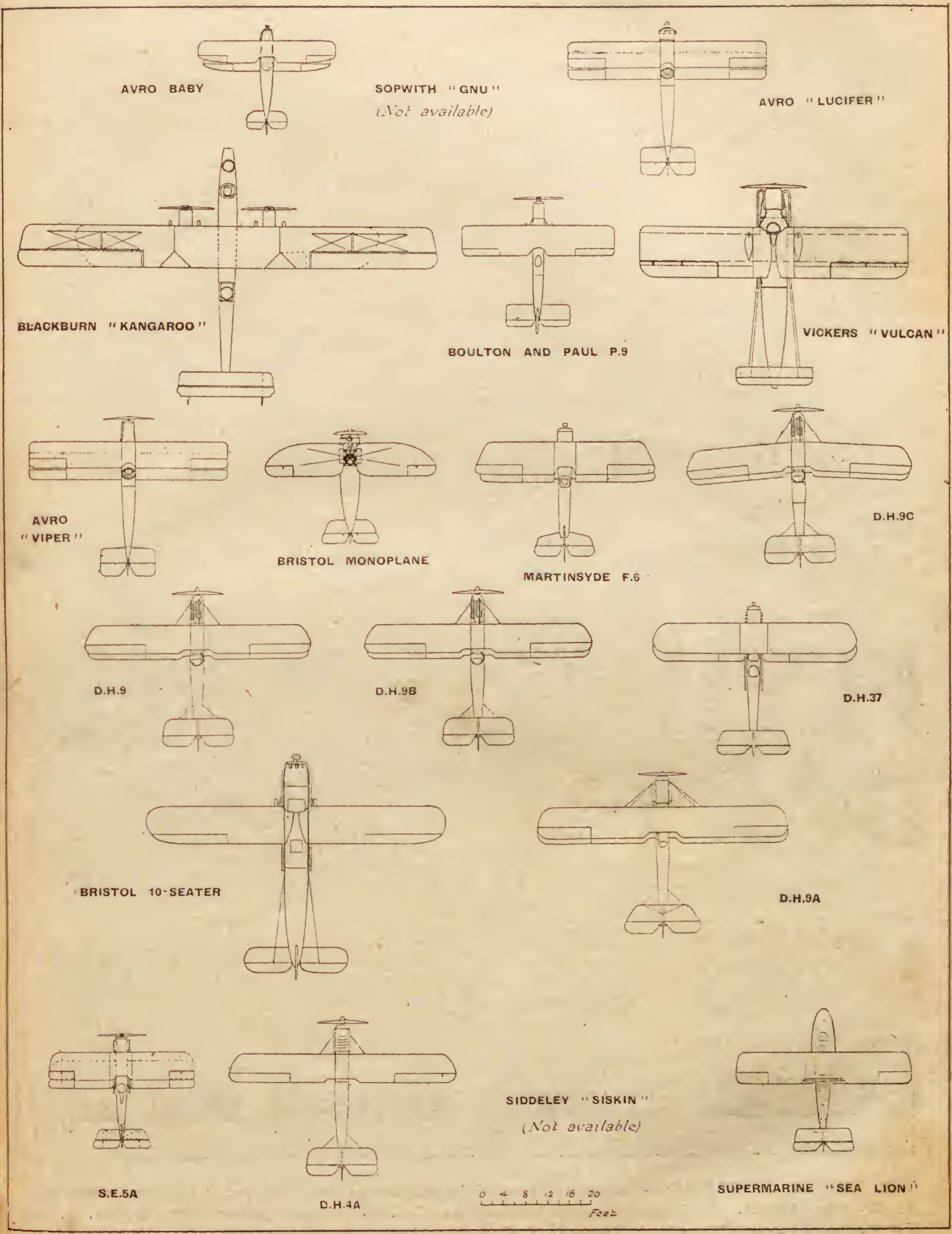
THE KING'S CUP RACE



Some of the entrants of machines for the Circuit of Britain, arranged in the order in which the entries were received. A, Brigadier-General J. G. Weir. B, His Grace the Duke of Sutherland. C, Mr. A. S. Butler. D, Lieut.-Colonel F. K. McClean, A.F.C. E, Lieut.-Colonel J. E. Tennant, D.S.O., M.C. F, Mr. Douglas Vickers, M.P., J.P. G, Mr. J. D. Siddeley, C.B.E. H, Mr. F. P. Raynham. I, Sir Samuel Instone. J, Lieut.-Colonel J. Barrett-Lennard, C.B.E. K, Lieut.-Colonel M. O. Darby, O.B.E. L, Sir Henry White Smith, C.B.E. M, Sir William Letts, K.B.E. N, Mr. A. V. Roe. O, Mr. John Lord. P. Capt. G. de Havilland. Q. Mr. Hubert Scott-Paine. R, Major J. C. Savage. S, The Right Hon. Winston Churchill, M.P.

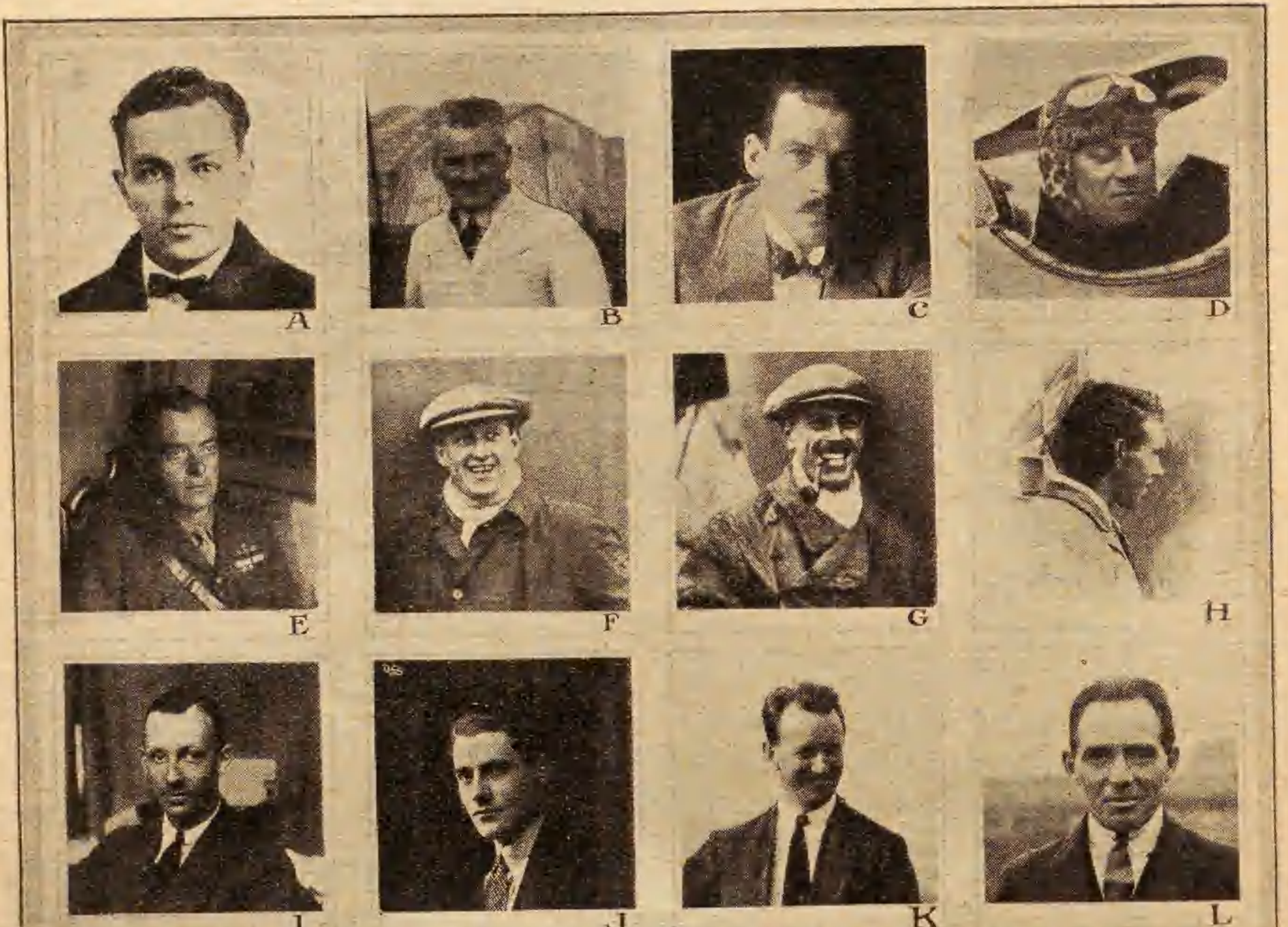


THE CIRCUIT OF BRITAIN.—Side and Front Elevations of the competing machines, drawn to a uniform scale to facilitate comparison. For further particulars see pp. 512–515.



THE CIRCUIT OF BRITAIN.—Plan views of the competing machines, drawn to a uniform scale. For further particulars see pp. 512–515.

THE KING'S CUP RACE



THE CIRCUIT OF BRITAIN.—Portraits of some of the competing pilots, arranged in the order of starting. A, Mr. Bert Hinkler. B, Flight-Lieut. W. H. Longton. C, Lieut.-Colonel Spenser Grey. D, Mr. R. W. Kenworthy. E, Lieut.-Colonel J. E. Tennant. F, Capt. S. Cockerell. G, Capt. F. C. Broome. H, Flight-Lieut. R. A. de H. Haig. I, Mr. F. P. Raynham. J, Flight Officer L. Hamilton. K, Capt. A. F. Muir. L, Mr. M. Piercey. M, Mr. A. J. Cobham. N, Mr. A. S. Butler. O, Mr. C. F. Uwins. P, Mr. H. H. Perry. Q, Mr. C. C. Turner. R, Mr. F. L. Barnard. S, Mr. F. Courtney. T, Mr. H. C. Biard.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

THE KING'S CUP

Circuit of Britain Air Race, September 8-9, 1922.

Entries :

		Entrant.	Pilot.	Machine.	Engine.	Handicap. Sect. I.† h. m. s.	Handicap. Sect. II.‡ h. m. s.
1	EAUM	Henry Fildes, M.P. ..	Squad-Ldr. H. J. Payn	Avro Baby ..	35 h.p. Green	2 21 10	2 29 2
2	EAXL	Sir William Letts, K.B.E.	B. Hinkler ..	Avro Baby ..	35 h.p. Green	2 2 54	2 9 46
3	EAGP	Lt.-Col. F. K. McClean, A.F.C.	Fl.-Lt. W. H. Longton, D.F.C., A.F.C.	Sopwith Gnu ..	110 h.p. Le Rhone ..	1 56 12	2 2 41
4	EADA	John Lord	Major C. R. Carr ..	Avro Lucifer ..	100 h.p. Bristol Lucifer ..	1 46 43	1 52 40
5	EAMJ	Rt. Hon. Winston Churchill, M.P.	Lieut.-Col. Spenser D. A. Grey	Blackburn "Kangaroo"	2-275 h.p. Rolls-Royce "Falcon"	1 26 56	1 31 46
6	EASJ	Brig.-Gen. James G. Weir, C.M.G.	C. T. Holmes ..	Boulton and Paul P.9	90 h.p. R.A.F. 1A ..	1 19 18	1 22 43
7	EAIU	Sir Walter de Frece ..	R. W. Kenworthy	Blackburn "Kangaroo"	2-275 h.p. Rolls-Royce "Falcon"	1 16 52	1 21 10
8	EAWS	Lt.-Col. J. E. Tennant, D.S.O., M.C.	Lt.-Col. J. E. Tennant, D.S.O., M.C.	Boulton and Paul P.9	90 h.p. R.A.F. 1A ..	1 14 29	1 18 38
9	EBEM	Douglas Vickers, M.P., J.P.	Capt. S. Cockerell, A.F.C.	Vickers Vulcan	350 h.p. Rolls-Royce Eagle VIII.	1 6 29	1 10 12
10	EAPR	A. V. Roe	Capt. F. C. Broome	Avro Viper ..	200 h.p. Wolseley Viper ..	1 4 18	1 7 53
11	EAVP	Sir Henry White-Smith, K.B.E.	Rollo Amyatt de Haga Haig	Bristol Monoplane ..	100 h.p. Bristol Lucifer ..	0 57 59	1 1 14
12	EBDK	F. P. Raynham	F. P. Raynham ..	Martinsyde F6	200 h.p. Wolseley Viper ..	0 56 58	1 0 9
13	EBEV	Sir G. Stanley White, Bart.	Cyril Frank Uwins	Bristol 10-seater Biplane	400 h.p. Bristol Jupiter ..	0 53 58	0 56 59
14	EBAX	Lady Anne Savile	Flying Officer Leslie Hamilton	D.H.9C ..	230 h.p. Siddeley Puma ..	0 49 9	0 51 54
15	EAAC	Capt. G. de Havilland ..	A. J. Cobham ..	D.H.9B ..	230 h.p. Siddeley Puma ..	0 45 27	0 47 59
16	EBEP	Duke of Sutherland ..	Capt. A. F. Muir ..	D.H.9 ..	230 h.p. Siddeley Puma ..	0 41 0	0 43 17
17	EBDO	A. S. Butler	A. S. Butler ..	D.H.37 ..	275 h.p. Rolls-Royce Falcon.	0 40 8	0 42 22
18	EBEN	Lt.-Col. M. O. Darby, O.B.E.	M. Maurice Piercey	D.H.9	230 h.p. Siddeley Puma ..	0 39 16	0 41 28
19	EBCG	Lt.-Col. John Barrett-Lennard, C.B.E.	H. H. Perry ..	D.H.9A ..	350 h.p. Rolls-Royce Eagle VIII.	0 35 5	0 37 2
20	EBDU	Major J. C. Savage	Capt. C. Turner ..	S.E. 5A ..	200 h.p. Wolseley Viper	0 24 14	0 25 34
21	EAMU	Sir Samuel Instone ..	F. L. Barnard ..	D.H 4A ..	350 h.p. Rolls-Royce Eagle VIII.	0 23 30	0 24 28
22	EBEU	J. D. Siddeley, C.B.E. ..	F. T. Courtney ..	Siskin	325 h.p. Jaguar ..	Scratch	Scratch
—		H. Scott-Paine*	H. C. Biard ..	Sea Lion II ..	450 h.p. Napier Lion ..	—	—

* Withdrawn.

† Section I.—Waddon–Birmingham–Newcastle–Glasgow. ‡ Section II.—Glasgow–Manchester–Bristol–Waddon.

THE CIRCUIT OF BRITAIN

Race for the King's Cup, September 8–9

THE race for the Cup presented by His Majesty King George will start from Waddon Aerodrome tomorrow morning, when, at 9 a.m., the first machines, the two Avro Babies, will be given the signal to go. Two more entries have been received since the publication of the list in last week's issue of FLIGHT, bringing the total up to 23. It is extremely gratifying to find that so many machines will cross the starting line, and the race will certainly arouse very considerable interest all over the country, not only in the towns where landings are to be made, but also along the route followed, where doubtless thousands of spectators will watch the aeroplanes passing overhead and will try to identify them. We learn from the Royal Aero Club that no numbers will be carried on the machines, as it has been found that numbers are not easily identified unless the machines are flying relatively low. As landings and one-hour stops are compulsory at the intermediate landing grounds, there is no necessity for the machines to be identified *en route*. Since, however, at least as many people will have to be content with seeing the machines pass over as seeing them alight at and take off from the intermediate landing grounds, we have attempted in this issue of FLIGHT to assist identification by publishing plans, side and front elevations of the competing machines, all drawn to a uniform scale.

This system was first introduced in our "Milestones" series, and proved very popular, as it enables the relative size of machines to be seen at a glance. Furthermore, no single view of an aeroplane can adequately convey an idea of all its characteristic features, this being possible only by giving all three views, which we have therefore decided to do. The result is that the views are necessarily small, but in order to illustrate the machines in somewhat more detail we are supplementing the scale drawings by photographs of the machines. The majority will already be well known to readers of this journal, as there are but few really new machines entered, but it is thought that the publication of the scale drawings and photographs may be of assistance to those not intimately acquainted with the various types. In this connection it should be pointed out that the photographs do not necessarily represent the actual individual machines entered, but merely the type to which they belong. Thus the photograph of the S.E.5A is not a photograph of the particular machine which will be flown by Mr. Turner, but merely represents the S.E.5A type.

The Race

As already mentioned, the race for the King's Cup will start from Waddon aerodrome at 9 a.m. on Friday, September 8, the machines after that time being sent off according to their handicap allowance. In above table, under the R.A.C. Notices, are set out the entrants and pilots, the machines and their engines and, in the last column, the handicap allowance which each receives. It is to be regretted that the "Sea Lion" has been withdrawn, as it would have been rather interesting to see one flying boat among so many land machines.

The first compulsory landing will be made at Birmingham

Castle Bromwich), and the machines will spend 1½ hour here before being allowed to start. That interval having elapsed, the machines will be started off, and if not ready any further time spent here will count as flying time. The next "port of call" will be Newcastle, where the Town Moor is the aerodrome selected. Again a stop of 1½ hour is compulsory before the machines leave for Glasgow (Renfrew). At the latter place competitors must stop for the night, the start being given to the first machine next morning (Saturday, September 9) at 9 a.m.

On the second day the first intermediate landing ground is at Alexandra Park, Manchester, and having spent their prescribed time there, machines will leave for Bristol (Filton). Leaving Filton 1½ hour later, the machines will head for Waddon, where the finish takes place, probably some time between 3 p.m. and 4 p.m. At Waddon there is little doubt large crowds will assemble to see the finish of the race, and if the handicapping is good and machines fly reasonably consistently, there should be a close finish, although it will be realised that in a race of this length it is extremely difficult to ensure that several machines come in close together. Nevertheless, it will be very interesting to witness the finish, and we advise as many of our readers as can manage to do so to get out to Waddon in good time, as there is always the possibility of one or more machines making better time than anticipated.

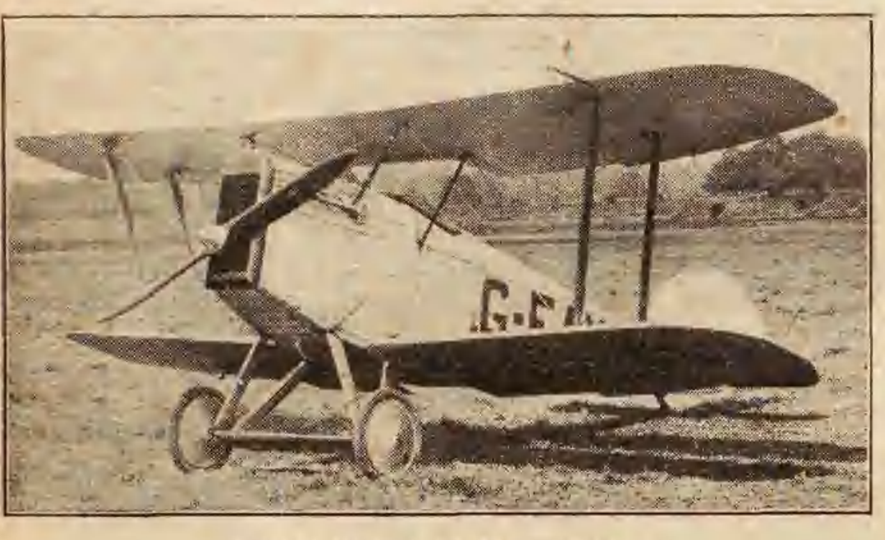
In order to prevent visitors to Waddon on Saturday from getting bored while waiting for the King's Cup machines to come in, the Royal Aero Club has made arrangements for Flying Officer G. R. Scholefield from Farnborough to give exhibition flights during the afternoon, and Mr. Rex Stocken, of the Aircraft Disposal Company, will also assist in keeping visitors amused, ably seconded by Mr. S. H. Hayns. If the race machines should be a little late in coming in there should thus not be any lack of interest, especially as the ordinary business of the aerodrome, arrival and departure of machines for the Continent, will be going on as usual.

THE MACHINES

The scale drawings (see pp. 508 and 509) of the machines entered are arranged according to handicap allowance. Thus the slowest machine comes first, and the fastest, the "Sea Lion," which starts scratch, comes last.*

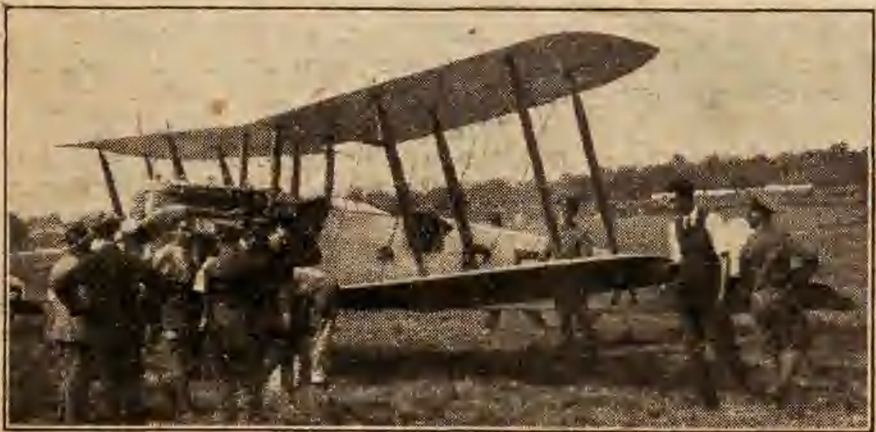
In the following notes the machines are arranged in alphabetical order for easy reference.

The Avro Baby.—Two machines of this type are entered, one by Sir William Letts, K.B.E., to be flown by Mr. Bert Hinkler, and one by Mr. Henry Fildes, M.P., to be piloted by Sqdn.-Ldr. H. Payn. The Avro Babies are fitted with Green engines of 35 h.p. only, but have some remarkable performances to their credit. Thus Mr. Hinkler flew one of these machines from London to Turin non-stop, and in Australia the same pilot on the same machine made a non-stop flight of over 800 miles. Just recently a similar machine flew from London to Moscow—not, of course, without intermediate landings, but nevertheless a very fine performance. The Avro Baby was designed by Mr. Roy Chadwick, Chief Designer of A. V. Roe and Co.



Avro Baby, 35 h.p. Green.

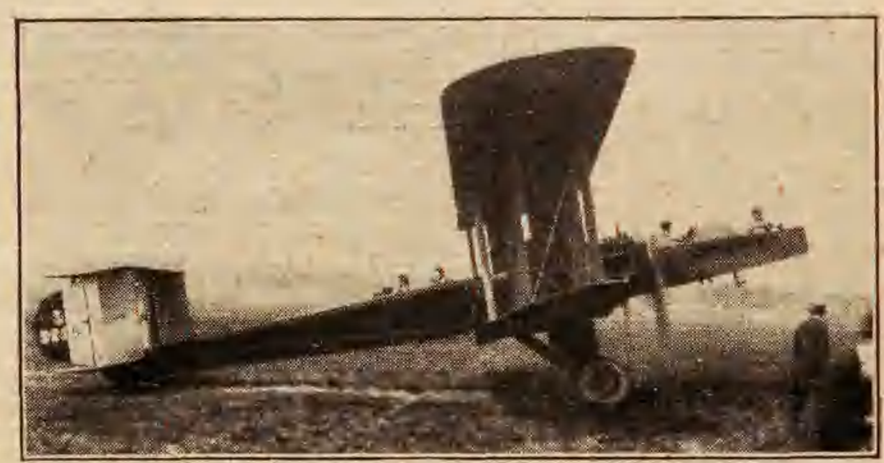
The Avro "Viper."—In its general outlines the Avro Viper resembles the famous Avro 504, except that it is fitted with a 200 h.p. Wolseley "Viper" engine. This naturally changes the nose of the machine somewhat, a nose radiator being placed in front of the engine. The under-carriage is of the Vee type, instead of the wheel-and skid type which is so characteristic of the standard Avro 504. The Avro-Viper has been entered for the race by Mr. A. V. Roe, and it will be piloted by Capt. F. C. Broome, the well-known Vickers pilot. This machine also was designed by Mr. Chadwick.



The Avro-Viper, 200 h.p. Wolseley "Viper."

The Avro "Lucifer."—Except for the fact that it is fitted with one of the three-cylinder 100 h.p. Bristol "Lucifer" engines, this machine resembles the 504, and no detail reference need be made to it except to state that it is another instance of the extraordinary adaptability of the type 504. We can call to mind machines of this type fitted with 110 h.p. le Rhone, 180 h.p. le Rhone, 90 h.p. Renault, 200 h.p. Siddeley Lynx, 200 h.p. Wolseley Viper, and now the 100 h.p. Bristol "Lucifer." No wonder the machine, first designed in 1913, still survives as one of the finest all-round machines in existence. In the race the Avro "Lucifer," which has been entered by Mr. John Lord of A. V. Roe and Co., will be flown by Maj. C. R. Carr, who, it will be remembered, accompanied the late Sir Ernest Shackleton on his antarctic journey, the Avro seaplane which went out with them having, unfortunately, to be left behind at Cape Town, and therefore never getting an opportunity of showing the service it could do.

The Blackburn "Kangaroo."—As far as the Circuit of Britain is concerned, the Blackburn "Kangaroo" has the distinction of being the only twin-engined type entered. Fitted with two Rolls-Royce "Falcon" engines of 275 h.p. each, the machine was designed during the War as a bomber. The type has also been tried fitted with floats for use over the sea, and a later version was fitted with a cabin, for use as a commercial machine. In the race it will be easily distinguished by the long slender fuselage projecting far forward of the wings. Two "Kangaroos" have been entered for the King's Cup race—one by the Rt. Hon. Winston Churchill, M.P., to be piloted by Lieut.-Col. Spenser Grey, the other, which will be flown by Mr. R. W. Kenworthy, the Blackburn pilot, by Sir Walter de Frece.



The Blackburn "Kangaroo," 2-275 h.p. Rolls-Royce "Falcons."

The Bristol 10-Seater.—In its original form, fitted with a Napier "Lion," the Bristol 10-Seater has been in use for several months on the London-Paris service. It is a fairly large machine, with a large cabin, luxuriously finished, accommodating nine passengers. For the race the machine will be fitted with one of the Bristol Company's "Jupiter" engines, of 400 h.p. The 10-seater has been entered by Sir G. Stanley White, and will be flown by Mr. Uwins, the Bristol test pilot. The machine was designed by Mr. Reid, who is now chief designer to the Bristol Company.

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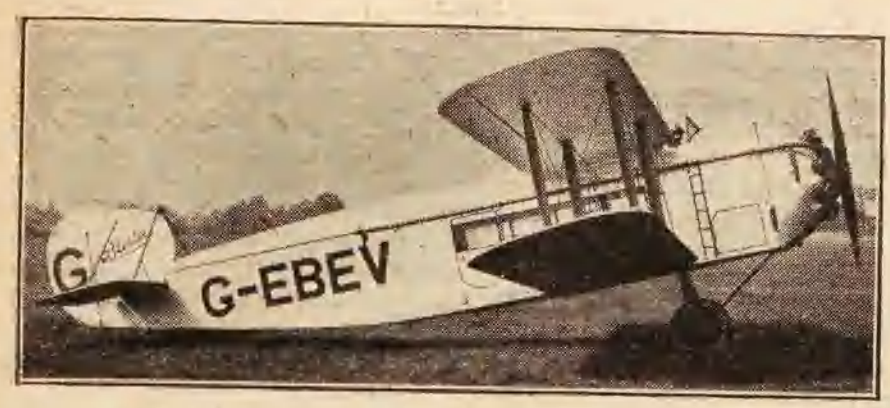
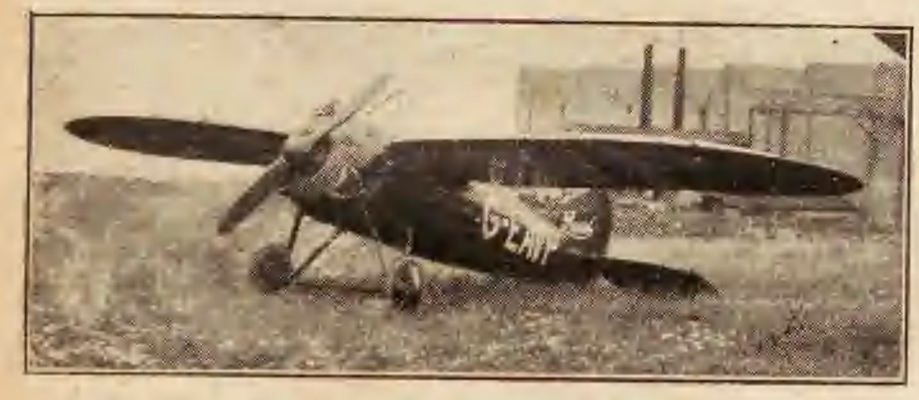
* At the moment of going to press we learn this machine will not start.



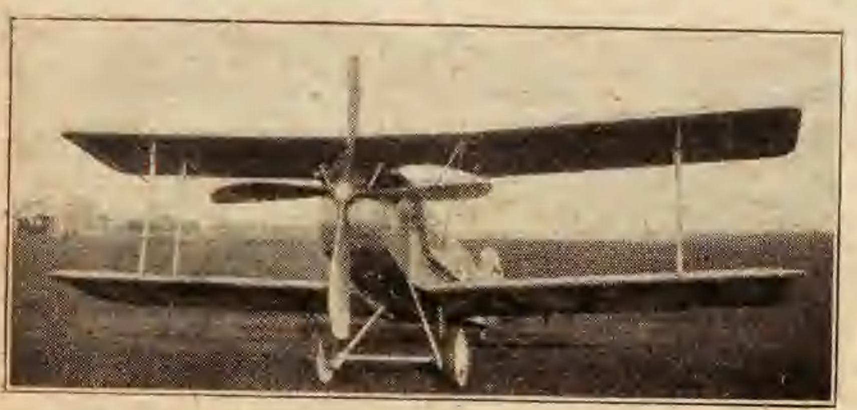
The Bristol 10-seater, 400 h.p. Bristol "Jupiter."

The Bristol Monoplane.—As the winner recently of the Aerial Derby Handicap, the Bristol monoplane with 100 h.p. three-cylinder, air-cooled Bristol "Lucifer" engine will be familiar to our readers. The machine, which was designed by Capt. Barnwell, is characterised by crescent-shaped wings, and should thus be easily identified. It has been entered by Sir Henry White Smith, and will be flown in the race by Flying Officer R. A. de H. Haig, the famous Martlesham test pilot.



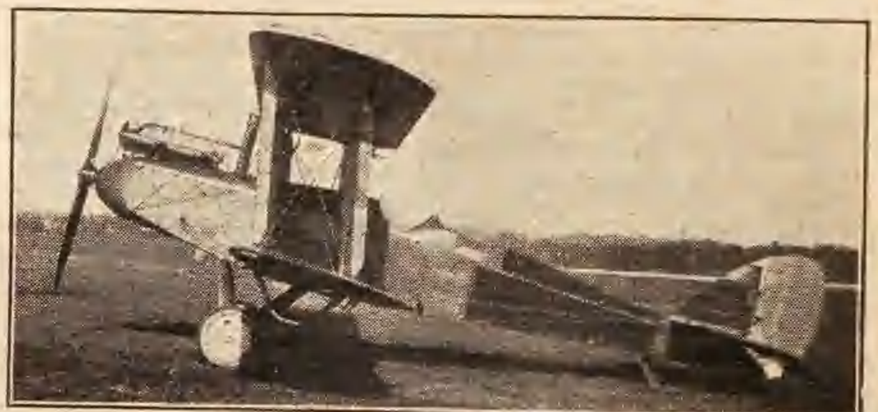
Bristol Monoplane, 100 h.p. Bristol "Lucifer."

The Boulton and Paul P.9.—This machine was designed some years ago as a general utility 'bus, and in order to keep down cost and running expenses it was fitted with an engine of low power, *i.e.*, 90 h.p. R.A.F. 1A. In spite of this the P.9 is reasonably fast, and is, we understand, very nice to handle. Mr. Frank Courtney keeps one at Croydon for his personal use in travelling about the country on testing bent, and finds it not only very convenient, but also cheap to run. Two of the P.9's have been entered for the race—one by Lieut.-Col. J. E. Tennant, who will pilot the machine himself, and the other by Brig.-Gen. J. G. Weir, whose pilot in the race is Mr. C. T. Holmes.

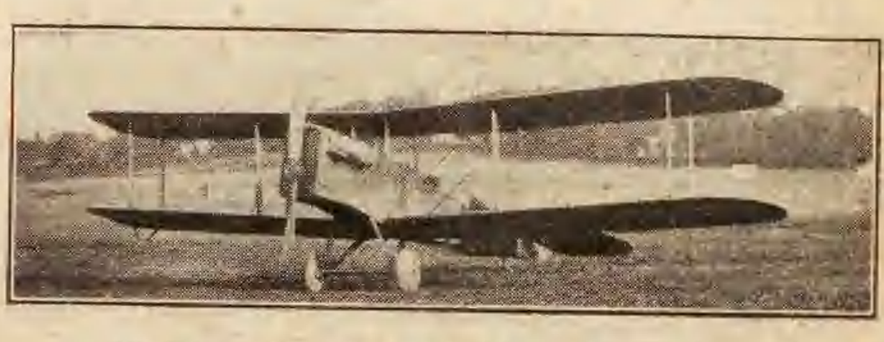


The Boulton and Paul P.9, 90 h.p. R.A.F. 1A.

The D.H.9.—As the prototype of the different variations of D.H.'s, the 9 is of interest in having at one time been turned out in enormous quantities during the War. We have an idea that when production was at its maximum the Aircraft Manufacturing Co. were turning out D.H.9's at the rate of one machine every 40 minutes, or something like that. The type is therefore in existence in large quantities, and for fairly small machines the D.H.9 and its variations have proved as suitable and efficient as it is possible to get a machine of this size. It will be remembered that it was on a machine of this type that Mr. Cobham made all his famous tours in Europe and across to Northern Africa. Two D.H.9's have been entered for the race—one by his Grace the Duke of Sutherland, to be piloted by Capt. Muir of the Surrey Flying Services, and the other by Col. Darby of the A.D.C., to be flown by Mr. Piercey. The engines fitted are Siddeley "Pumas."



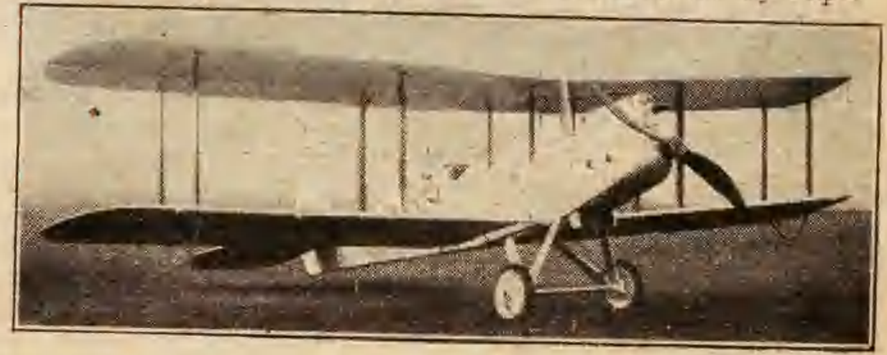
D.H.9, 230 h.p. Siddeley "Puma."



D.H.9A, 350 h.p. Rolls-Royce "Eagle."

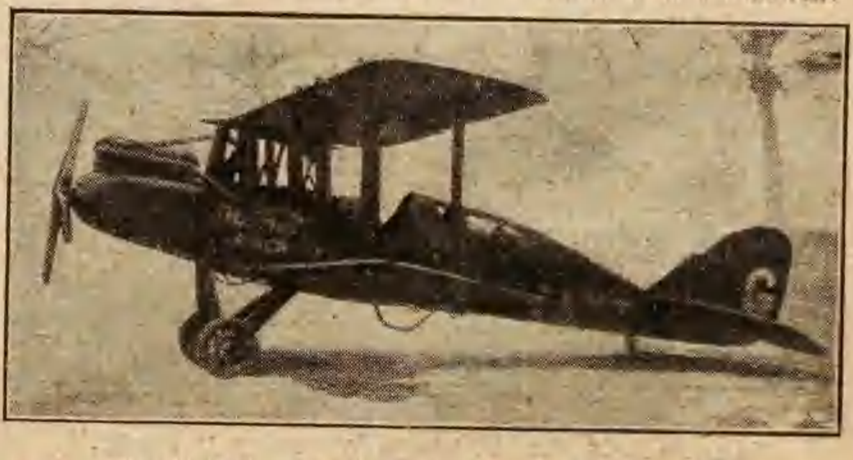
The D. H. 9A is generally similar to the standard D.H.9, but has a Rolls-Royce "Eagle" engine instead of the Siddeley "Puma." As the "Eagle" is of 350 h.p. the 9A is naturally a good deal faster than the 9 with 230 h.p., hence it is placed considerably after the 9's in handicap. The 9A has been entered by Lieut.-Col. J. Barrett-Lennard, and will be flown by Mr. H. H. Perry.

The D. H.9B.—Of the variations of the standard D.H.9, the 9B represents, perhaps, least departure from the original design, the main difference being that whereas the standard 9 has but two cockpits, the 9B has three, an extra seat having been added in front of the pilot, between him and the engine. In other respects the 9B is exactly similar to its prototype. The specimen entered for the race has been entered by Capt. de Havilland, and will be flown by Mr. Cobham. The engine is a Siddeley "Puma."



The D.H.9B, 230 h.p. Siddeley "Puma."

The D. H.9C.—If the Avro 504 has appeared with a number of different engines, it may be said about the de Havilland 9 that this machine has been used in a number of variations.



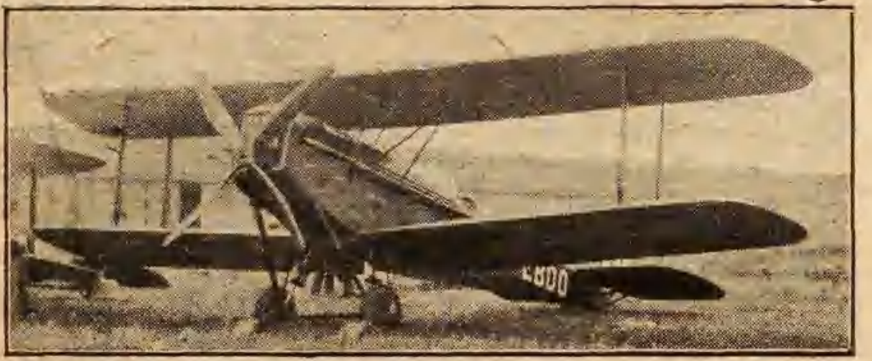
The D.H.9c, 230 h.p. Siddley "Puma."

Of these the 9C is characterised by a small cabin over the aft cockpit, while the wings have been swept back slightly to bring aft the centre of pressure in order to trim for the weight of a passenger so far aft in the fuselage. The engine fitted is a Siddeley "Puma" of 230 h.p. As all the other D.H. machines, the 9C was designed by Capt. Geoffrey de Havilland. The machine has been entered for the race by Lady Anne Savile, and will be flown by Flying Officer Leslie Hamilton.

The D.H.4A.—When Air Transport and Travel was formed by Mr. Holt Thomas after the Armistice, the conversion of military machines into commercial passenger-carriers was taken in hand, and one of the first cabin machines to be turned out was the D.H.4A, which was practically a standard D.H.4, 350 h.p. Rolls-Royce "Eagle" engine, with a cabin top added to the fuselage. The type did very good work on the London-Paris line during 1919, and several specimens are still in existence; one of these is owned by the Instone Air Line, and Sir Samuel Instone has entered it for the race. The machine will be piloted by Mr. Barnard, Commodore of the Instone air fleet.

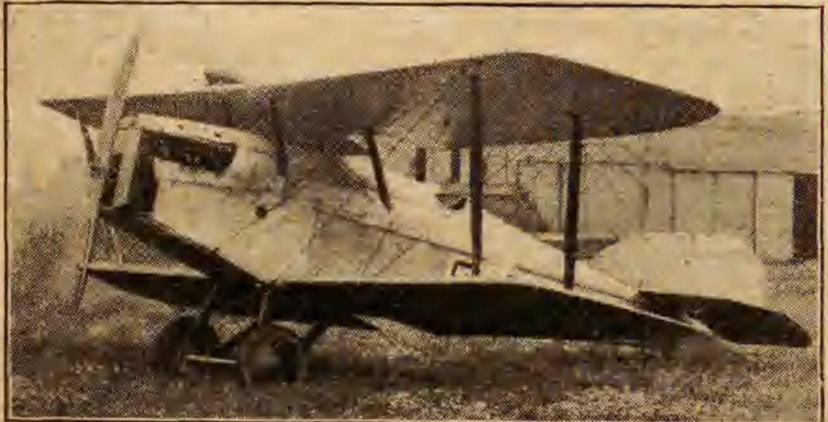
The D.H.4A, 350 h.p. Rolls-Royce "Eagle."

The D.H.37.—Having been described and illustrated in FLIGHT quite recently, the D.H.37 will be well known to our readers. It was designed specially for Mr. A. S. Butler, now a director in the de Havilland Aircraft Co., for his personal use, and the designers had in mind a machine on which the owner could occasionally take part in races and on which he could at all times go touring. Thus the machine has a fair turn of speed, a good range, and will carry two passengers in addition to the pilot. Entered by Mr. A. S. Butler, the D.H.37 will be flown in the race by the owner.



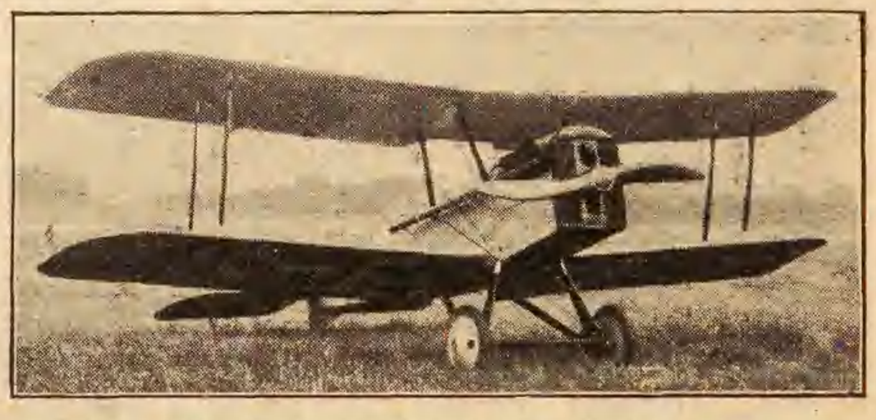
D.H.37, 275 h.p. Rolls-Royce "Falcon."

The Martinsyde F.6.—Similar in general lines to the famous Martinsyde F.4, the F.6 has a 200 h.p. Wolseley Viper engine in place of the 300 h.p. Hispano of the former. It is not therefore, as fast as the higher powered machine, but it is by no means a slow single-seater. The F.6 is the private property of Mr. F. P. Raynham, who will fly it in the race, and as one of our oldest active pilots (as regards number of "ticket," at any rate) every one will wish Raynham the best of luck in the race.



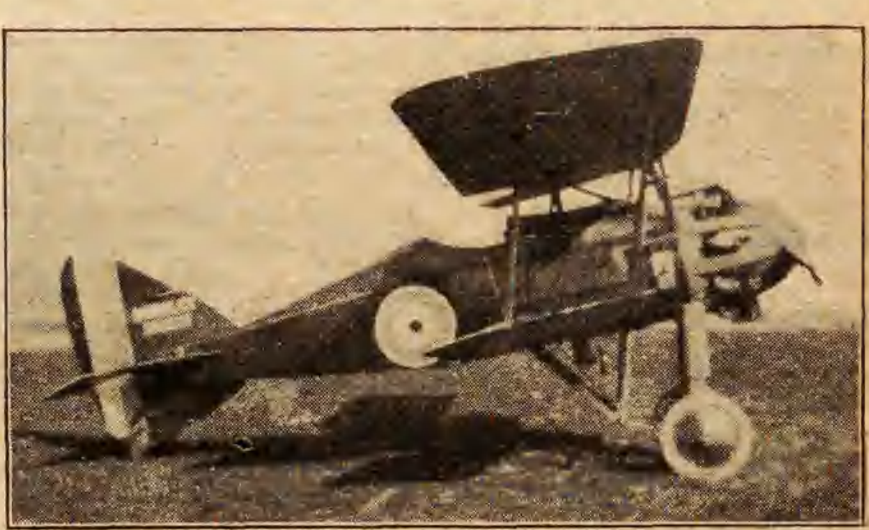
Martinsyde F.6, 200 h.p. Wolseley "Viper."

The S.E.5A.—Although certain alterations have been made to the S.E.5A to be flown by Mr. Cyril Turner, this machine being the one that is used for Maj. Savage's famous "sky writing," no great departures from the original design have been made. The S.E.5A, which has a 200 h.p. Wolseley "Viper" engine, was designed at the Royal Aircraft Establishment, Farnborough, during the War, and was at one time a favourite single-seater fighter. Mr. H. P. Folland, who is now chief designer to the Gloucestershire Aircraft Co., where he designed the famous Mars I, had a hand in designing the S.E.5A also. Although the machine has been made somewhat heavier for the purposes of sky writing, Maj. Savage has very sportingly entered it for the race for the King's Cup.



S.E.5A, 200 h.p. Wolseley "Viper."

The Siddeley "Siskin."—Being designed and built for the R.A.F., the Siddeley "Siskin," with 325 h.p. Siddeley "Jaguar" engine, may not be referred to in detail. For the same reason it has not been possible to include it in our set of scale drawings. The accompanying photograph of an early model shows, however, the general lines of the machine. It may be stated that an oleo landing gear is one of its features, and that metal enters largely into the construction.



Siddeley "Siskin," 325 h.p. Siddeley "Jaguar."

The Sopwith "Gnu."—Designed shortly after the Armistice, the Sopwich "Gnu" is a relatively small cabin machine, fitted with 110 h.p. le Rhone engine. The first appearance of

Sopwith "Gnu," 110 h.p. le Rhone.

this machine in public was probably on the occasion of the aerial reception at Hendon of the American aviators who had crossed the Atlantic *via* the Azores. Mr. Hawker was then flying the "Gnu," and took up as passenger Miss Daisy King of Leeds, who was the highest bidder for a "flip," having paid 50 guineas for the privilege of flying with Hawker. In the race the machine has been entered by Lieut.-Col. McClean, and it will be piloted by Flight-Lieut. Longton.

The Supermarine "Sea Lion."—As the only amphibian flying boat in the race, no less than on account of its recent winning of the Schneider Cup Race at Naples, considerable interest will naturally attach to the performance of the Supermarine "Sea Lion." At Naples the machine was, of course, a flying boat pure and simple, but for the race the amphibian gear will be fitted so as to enable the machine to alight on the prescribed aerodromes. To go across country in a flying boat is a good demonstration of the soundness of the design of the machine, since usually an amphibian is one which is quite at home on one element, but whose alighting on the other is a matter, more or less, of makeshift. The designers of the Supermarine evidently have faith in their machine. It has already demonstrated its seaworthiness, and the race will give it an opportunity of proving what might be termed its landworthiness. Fitted with a Napier "Lion" engine of 450 h.p., the "Sea Lion" is considered the fastest machine in the race and will start scratch. It has been entered by Mr. Hubert Scott-Paine, of the Supermarine Aviation Works, and will be flown by Capt. Biard, the Schneider Cup winner.*

The Supermarine "Sea Lion." 450 h.p. Napier "Lion."

The Vickers "Vulcan."—As a very full description of the Vickers "Vulcan" was given in our issue of May 4, 1922, no detailed reference need be made to it here. The machine is a commercial aeroplane, with a roomy cabin giving seating accommodation for six passengers. The engine is a 350 h.p. Rolls-Royce "Eagle," and the pilot is placed in front of the upper plane. The "Vulcan," which was designed by Mr. Rex Pierson, Chief Designer of Vickers, has been entered by Mr. Douglas Vickers, and will be flown by Capt. Cockerell, the well-known Vickers pilot.

Vickers "Vulcan," 350 h.p. Rolls-Royce "Eagle."

Subsidiary Prizes

IN addition to the King's Cup a number of subsidiary prizes will be awarded, including the following:—£40 (presented by the Corporation of Glasgow) to the first competitor arriving at Glasgow. £25 (presented by the *Manchester Guardian*) to the competitor who accomplishes the fastest handicap time between Glasgow and Manchester. Cup, value £25 (presented by William Kayley, Esq., of Manchester), to the competitor who accomplishes the second fastest handicap time between Glasgow and Manchester. £25 (presented by the *Newcastle Chronicle*) to the competitor who accomplishes the fastest handicap time between Croydon and Newcastle-on-Tyne.

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* At the moment of going to Press we learn this machine will not start.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN AUGUST 6 AND SEPTEMBER 2, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	264	726	82	174	259	3 5	Breguet F-ADBM (1h. 44m.)	B. (8), D.H. 9 (1), D.H. 18 (1), D.H. 34 (7), G. (11), H.P.o-400 (1), W.8B (4), Sp. (6), Vi. (1).
Paris–Croydon	267	1082	43	115	248	2 54	D.H. 34 G-EBBT (1h. 54m.)	B. (8), D.H. 18 (1), D.H. 34 (7), G. (11), H.P.o-400 (1), W.8B (4), Sp. (5), Vi. (1).
Croydon–Brussels ...	40	117	20	20	40	2 21	D.H. 34 G-EBBT (1h. 50m.)	D.H. 18 (1), D.H. 34 (4), Vi. (1), Vu. (1).
Brussels–Croydon ...	40	249	—	7	38	2 52	D.H. 18 G-EAWX (1h. 21m.)	D.H. 18 (1), D.H. 34 (4), Vi. (1), Vu. (1).
Croydon–Rotterdam–Amsterdam.	47	39	46	44	47	2 26	Fokker H-NABM (1h. 56m.)	F. (12).
Amsterdam–Rotterdam–Croydon.	45	73	44	44	44	3 2	Fokker H-NABV (2h. 18m.)	F. (12).
Totals for 4 weeks. ...	703	2286	235	404	676			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys. § Rotterdam.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad. Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

Incidental Flying.—The De Havilland Aircraft Co. maintained a regular bi-daily service between Lympne and Ostend, during the month.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

IN connection with the FLIGHT Designing Competition, particulars of which were published in our issue of last week, we are very gratified to be in a position to announce that two men, very well known in the aviation world, not only in this country, but also abroad, have expressed their willingness to act in conjunction with the Editor, in the capacity of Judges of any designs that may be sent in. Mr. C. R. Fairey, Chairman of the Society of British Aircraft Constructors, and Chairman and Managing Director of the Fairey Aviation Co., has very kindly promised to give up some of his valuable time in order to help forward the cause of gliding; and Mr. F. Handley Page, who needs no introduction to readers of FLIGHT, has also promised to assist us, and to help in any other way in his power. We feel certain that this announcement will be received with satisfaction by all who are contemplating sending in designs for this competition.

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ENCOURAGED by the successes attained this year during the French competition at Clermont-Ferrand, and by the German ones in the Rhön Mountains, several new prizes have been offered by French supporters of the new sport. M. André Michelin has offered a prize of 15,000 francs for the longest glide in a straight line. The prize is to be awarded to the pilot who, before October 31 next, has covered the longest distance, provided that distance exceeds 20 kms. (12.5 miles) and the mean gliding angle is not steeper than 1 in 12. If the prize is not won before the end of October, it will automatically be extended until the end of the following month, and so on, until won.

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M. LOUIS BREGUET, the famous French constructor, has offered a prize of 15,000 francs for the fastest gliding flight. This prize will be awarded to the French pilot who, using a French machine, attains the greatest speed during a flight of at least one hour's duration. The speed must, in order to qualify a pilot, be in excess of 45 km./h. (28 m.p.h.), and the total drop in altitude from the starting point must not exceed 3,300 ft. for each hour of flight. The competition for the Breguet prize will be open until October 31, 1923.

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M. GEORGES DREYFUS has offered a valuable cup, and also a prize of 20,000 francs. This competition is confined to French pilots on French machines, and is divided into two parts. In the first, which is to be completed by April 30, 1923, a prize of 10,000 frs. will be given to the pilot who covers the longest distance in a closed circuit (*i.e.* returning to his starting point). A similar competition is open until April 30, 1924, and for this also a prize of 10,000 frs. will be given. The only difference between the two sets of tests is that for the first a minimum distance of 25 kms. (15.5 miles) is stipulated, while for the second this minimum distance has been increased to 75 kms. (46.5 miles).

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AT the moment of going to press there is no news of any further entries for the *Daily Mail* competition. From Germany it is reported that steps are to be taken to prevent Herrn Martens and Hentzen from participating in the British competition, but nothing definite is known. There is, apparently, a possibility of three of the French pilots coming over for the competition, Bossoutrot with his Farman glider, Barbot with the Dewoitine monoplane, and Coupet with his little cantilever monoplane. We sincerely hope that at least these three French pilots may be able to compete.

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As it appears that several potential constructors of gliders are finding considerable difficulty in obtaining wood, especially spruce, we have approached Col. Darby of the Aircraft Disposal Co. at Waddon, and he has kindly agreed to detail a man off to look after intending purchasers of materials, which will be sold to *bona fide* amateur glider constructors at extremely low prices. It is quite conceivable that wings of standard machines could be taken to pieces and the spars lightened for glider wings. Also such metal parts as fittings, strainers, tie-rods and R.A.F. wire will be obtainable very cheaply, Col. Darby being willing, in order to help matters along, to let amateurs have these things at a fee barely sufficient to cover the expense of having a man looking up the stuff and helping to sort it out.

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MR. CATTLE, of the Central Aircraft Co., Kilburn, informs us that his firm has been asked by several people to construct gliders for them to their specification, and that this it has been arranged to do. If any readers are in doubt as to where a glider can be manufactured, we would advise them to write to this firm.

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IT is rumoured that the de Havilland Aircraft Co. is building a glider of special design, but details are not available at present.

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MR. F. J. CAMM informs us that he would be glad to associate himself with any movement for the encouragement of gliding, and would take an active part in connection with any club formed for building and flying gliders. At Windsor, in the old days, Mr. Camm did a good deal of practical work in this connection. Anyone interested is requested to write to Mr. Camm, c/o FLIGHT, and we will see that correspondence is sent on.

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A CORRESPONDENT wishes to know whether it would be possible to construct a glider out of an aeroplane wing by adding some form of *fuselage*. Although it would certainly be possible, we should not advice this course, as the wing of an aeroplane would be designed for very much greater loads than it would be called upon to carry in a glider. Such a wing would, therefore, be needlessly heavy.

QUERIES, OR OTHERWISE, FROM OUR READERS

PILOT AVIATOR J. J. BLAND, 12, Belle Vue Road, Appleby, Westmorland, writes :—

"The hills and broad moorlands about here are splendidly situated for this new sport. Gliding and soaring could be carried out practically every day. I quite believe that with one or two good machines, tuition, etc., could be easily carried out. I should like to hear from anyone who might be interested in this.

"I should also like to know if anyone has a good glider for sale, or power machine minus engine, the machine to be of an efficient type—if possible, the machine to be of an automatic stable type, such as a Dunne, Handley Page or Weiss glider type. If anyone should know of any such machine, or glider, for sale, I should be very glad if they will communicate with me at an early date."

"G. F." (Vauxhall) makes the following suggestions :—

"It has been recently stated that during the War the German General Staff filled up a large aviary in which all sorts of birds were kept; here, it is said, mathematicians and experts watched and noted the performances of the different types of wings.

"Assuming that data of any value may be obtained from this study, may I suggest a better and not dissimilar form of research which might easily give more valuable results?

"Briefly, then, the idea is simply to stretch a cable at very little height across a space of, say, 200 or 300 yds. The glider to be tried is fitted and suspended beneath a small two-wheeled trolley running along the cable, a take-off platform at each end, and whatever the machine the operator can start off on a down glide with some pleasure, knowing he is safe.

"It seems feasible to expect man.glider research should be directed to the least possible wing area as against the tremendous span of the Hentzen Hanover models. These latter must offer so little danger to the operator that they should be more easily learned than a machine with the least possible wing area, but the latter, once learned, would be much more amenable to catch and take immediate advantage of every favourable breeze. As it is foolhardy to jump in the water and expect to swim, so the analogy might just as well be applied to the glider with small wing area first taking the air.

"Again, in the case of so-called freak machines, some of these may prove quite a different proposition after a period of experiment under safe conditions. If it is admitted that the ultimate best type of glider will have small wing area, it seems, with the present method of trying out, that it will be a long time arriving, whereas by some such cable device as above described elimination of the superfluous square feet would be more rapid."

(In cases where a *nom de plume* only is given, the Editor will be pleased to forward any communication to the writer which is sent c/o the Editor of FLIGHT.)

LONDON TERMINAL AERODROME

Monday, September 4.

As a result of final meetings between the Air Ministry and the managements of the various British air-lines, it is now practically certain that the present competition on the London-Paris airway between these firms will be eliminated. An Air Ministry announcement relating to the new services appears on p. 521.

It is, I hear, intended to make the fare to Berlin so cheap that passengers will be attracted to the airway not only because of the saving of time, but also on the score of economy, and although at the present time, owing to the chaotic state of the various money exchanges, it is not anticipated that there will be much in the way of traffic to be obtained from the Germans, the line is perhaps the most important that British enterprise has so far opened up, and the traffic in normal times should be greater than on any of the other lines.

Homeward Tide of Travellers By Air

Passenger traffic has again been very varied. On the whole, the load from the continent is greater than the outward one, the homeward tide having now, apparently, set in. Handley Page Transport have been carrying good average loads for their two services in each direction daily, and the Instone Air Line have been fetching large numbers of air travellers from Brussels to London.

It would hardly be expected that anyone setting out on a long sea voyage would forget such a large article as a cabin trunk. Yet one of these bulky pieces of personal luggage was left behind by a traveller to India, and its loss was not discovered until it was too late to catch a train connecting with the boat at Marseilles. Some bright person then remembered that there was such a thing as an air service to Marseilles, with the result that the trunk was despatched by the Messageries Aériennes on Friday morning, and arrived in Marseilles the same evening in time to catch the steamer, its owner being already on board.

Mr. Alan J. Cobham was at the aerodrome several times last week, taking special passengers on flights to various parts of the continent. He tells me that the De Havilland Aircraft Co. are building a glider, and that he is to fly it. I have since learned that they are building three, one of them being for Mr. E. D. C. Herne, of the Daimler Airway, and that they have managed to get the gliding angle down to 1 in 17.

Two of the machines for the race round Britain for the King's Cup are being erected at the air-station. These are the Duke of Sutherland's D.H.9, which the Surrey Flying Services are erecting, and the Instone Air Line's D.H.4, which has been re-conditioned by the Central Aircraft Co.

In addition, there are, of course, the machines the Aircraft Disposal Co. are supplying, which are being trimmed up at the Aircraft Factory on the other side of the aerodrome.

Now that Mr. Hay is back at the Meteorological Office from leave, the lectures on weather for pilots, in order that they may pass for their licences, are now being given. They take place in the large building which Trust Houses have for any sudden emergency in the shape of a rush of tea orders, or the visits of societies, and are being well attended.

Quick Work with a "Relief" Machine

The Grands Express did a smart bit of work on Tuesday last, when one of their machines, *en route* from Paris to London, alighted at Beauvais. The pilot, not liking the sound of one of his engines, decided that it would be better to descend at Beauvais than to continue on his journey further away from his base, and telephoned to Le Bourget for another "Goliath" to be sent for his passengers. This was actually at Beauvais within half-an-hour of the first one's alighting, and the passengers were embarked without the engines being stopped, with the result that the delay was practically negligible.

A new light has now been installed on the aerodrome, and on Friday night, representatives of the Air Ministry, and various foreign air officials visited the aerodrome for an inspection of this light. The light takes the form of a portable searchlight, but special lenses have been fitted which flood the aerodrome with light, instead of merely throwing a more or less parallel beam. The light spreads out at an angle of 180° from the searchlight, so that two or three of these at various corners would illuminate the entire landing surface of the aerodrome.

The Instone Air Line are now running one service in each direction daily between London and Brussels and London and Paris. The Paris service leaves at 11.30 a.m., and returns from Paris at 4 p.m.; while the Brussels service leaves London at 4 p.m., and returns from Brussels the following morning at 11.30. Mr. F. Courtney, who has been flying for them, has now transferred his services to the Daimler Airway, and is acting as spare pilot to that line.

Paris to Varne Lightship in an Hour!

On Thursday, one of the Daimler 34's made a rapid return trip between London and Paris. Leaving London at 1 p.m., it landed at Paris and was re-fuelled, and, with a fresh load of passengers, was back at Croydon shortly after 4.30 p.m. Capt. Herne, who was piloting the machine, told me that he was only an hour flying from Paris to the Varne lightship in mid-Channel.

Today, the K.L.M. revert to their old winter service of one machine in each direction daily. The morning machine at 10 a.m. will still leave Croydon, while the return journey will start from Amsterdam at 2 p.m. This arrangement has not been made because of any falling off in passengers or goods, but is part of the policy of the K.L.M., who were cutting down their services for the winter on October 1, but, owing to the aviation meeting at Rotterdam, where they require several machines, they pushed the date of the winter service forward a month.

The Surrey Flying Service had quite a successful day with joy-riders yesterday, after the morning mist had cleared away. This same morning mist, by the way, is beginning to interfere with the early-morning services. On two days this week the aerodrome has been covered in thick fog up to nearly noon, while only a few miles away, beyond Biggin Hill, the weather has been quite good. Those who believe that the aerodrome should be still nearer London might give this fact their earnest consideration.

Mr. Hyat, of the Grands Express, informs me that his company are prepared to run a special Goliath from Croydon to Paris on Saturday mornings, to connect with their service from Paris to Lausanne, providing there are half-a-dozen passengers. Meanwhile, for the odd passenger, there is the 5.30 a.m. Daimler newspaper machine, which arrives in Paris in time to connect with the Grands Express machine from Paris to Lausanne. The early-morning Daimler newspaper machine continues to run with absolute regularity, being in Paris each morning within a few minutes of 7.30 a.m., and I understand that the newspapers are so satisfied with the regularity of the service that it is to be continued through the winter.

JULY CONTINENTAL AIR TRAFFIC

The official report for air traffic during the month of July has been issued by the Air Ministry:—

Traffic on the services operating to and from the London Terminal Aerodrome, Croydon, continued to show an expansion during the month. The number of machines of all nationalities arriving and departing was 711, an increase of nearly one hundred machines over the previous largest monthly figure. The departure and arrival figures were respectively 357 and 354. The three British companies, Handley Page Transport, Ltd., the Instone Air Line, and Daimler Hire, Ltd., operated 446 machines, or nearly 63 per cent. of the total number of aircraft using the aerodrome.

Passengers totalled 1,591, a figure which is considerably less than last year, but the British proportion, which totalled 1,272, is the highest number transported on British machines during any month since Continental services were inaugurated. The total weight of goods carried showed an increase over any previous month, the quantity of newspapers, mails and general goods being 73·3 tons, of which the greater proportion was carried in British aeroplanes. The largest increase is shown in the newspaper traffic, which contributed 34·3 tons of the total. The efficiency of British services continues to be of a high standard—the percentage of flights carried out on the London-Paris route being nearly 96 per cent.

While British companies continue to secure the greater proportion of all classes of traffic, it has to be noted that the machines are still obtaining only a small proportion of the traffic required to operate on a sound commercial basis, the passenger accommodation utilised on British aircraft being only 36 per cent. of the available space and the useful cargo capacity used only 47 per cent.

N.A.C.A. CONTROL POSITION RECORDER*

By F. H. Norton

[It is now a matter of some six or seven years since Mr. (now Comdr.) G. M. Dyott invented and constructed an instrument for recording the movements made by the control lever of an aeroplane during flight. This instrument was fitted on the little Dyott monoplane, and some very interesting records were obtained. The instrument described below is, of course, of a much more refined character than was Dyott's, but already as long ago as 1913 or 1914 Dyott realised the information which could be obtained in this way. As no instrument was available at that time, he set to work and made one for himself. We are pleased to see that the subject is still receiving attention in modern times.—Ed., Flight.]

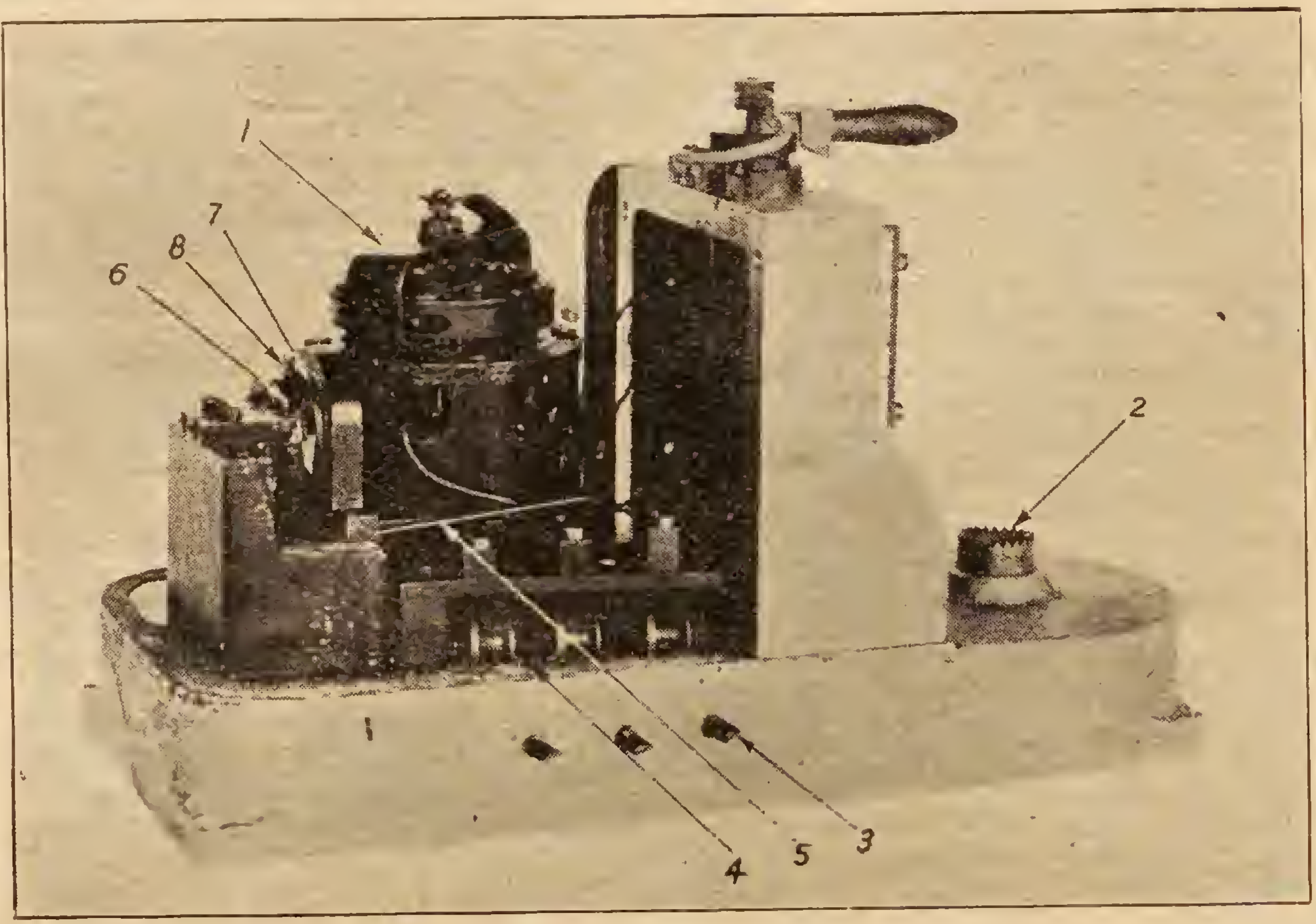
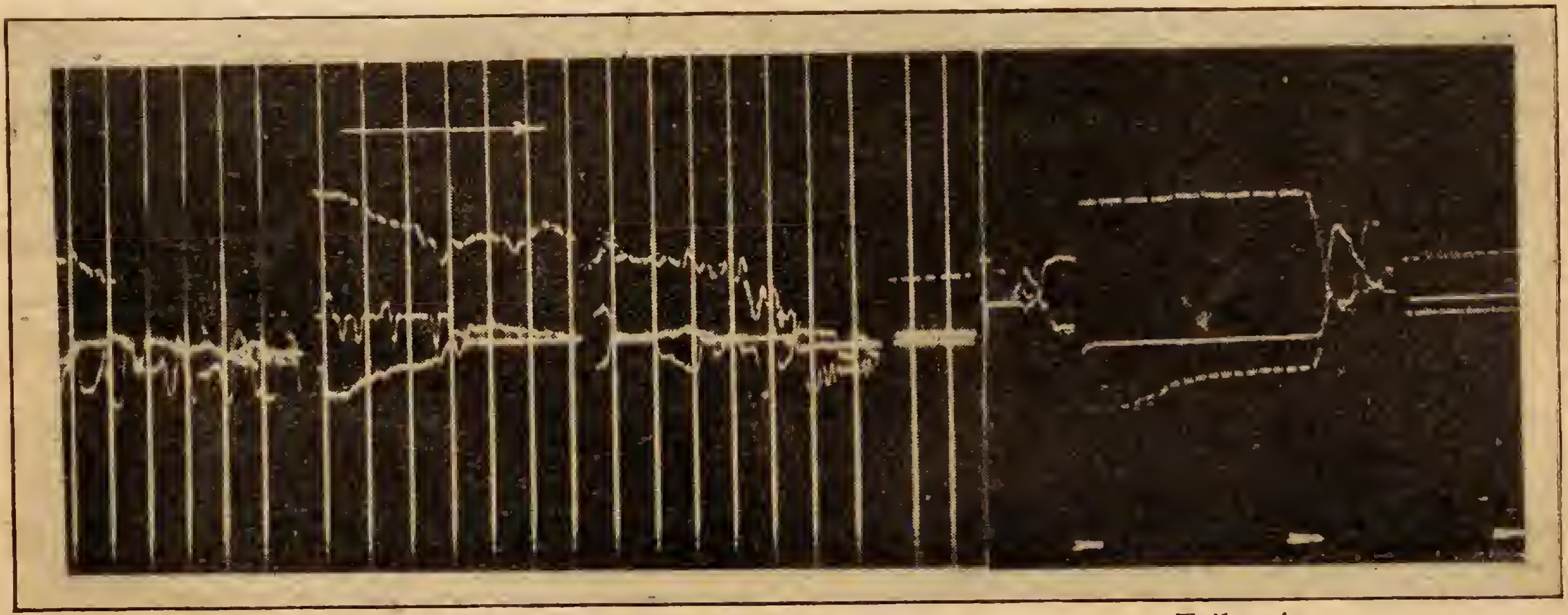


Fig. 1.—The N.A.C.A. Control Position Recorder.



Landing. Tail Spin.

Fig. 2.—Records obtained with the Control Position Recorder.

A new instrument is described which is capable of simultaneously recording the position of the three controls of an aeroplane. The records are taken photographically on a standard N.A.C.A. film drum, and the instrument can be quickly installed in any aeroplane. The instrument is of value not only for scientific research on stability and controllability, but also as a means of checking up the flying of pilots.

The instrument, as shown in Fig. 1, consists essentially of the base-plate and film-drum mounting used on all the N.A.C.A. recording instruments. The constant-speed driving motor (1) rotates the film clutch (2) at a speed of about 1 r.p.m. through worm gearing in the base. The motion of the controls is transmitted to the instrument through the cords (3), which are wrapped around three drums (4). The drums are mounted on a horizontal screw, and contain a spiral spring which keeps the cords wound tightly. Thus a 12-in. motion on the end of the cord is converted into a

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* Technical Note No. 97 of American National Advisory Committee for Aeronautics.

$\frac{3}{16}$-in. lateral motion of the drum. This motion is transmitted by a system of levers (5) to the three mirrors (6), which reflect the light beam on to the film through the lens (7) in the same way as with the other N.A.C.A. recording instruments. As three separate records are superimposed on one film, it is necessary to have some way of distinguishing between them. This is accomplished by revolving slowly in front of two of the mirrors a sector shutter (8). One mirror therefore gives a continuous line, one a dotted line and one a dash line.

The cords can be connected directly to any convenient portion of the control system, but if it is desired to have a high degree of accuracy it is advisable to run small steel wires to the control horns so that any backlash in the control systems may be eliminated. If this is done a precision of $\frac{1}{4}$° can be easily obtained, and this is quite sufficient for any ordinary work. The instrument is calibrated in place by setting the control surfaces to given angles and taking a short record on the film for each setting.

Some records taken by this instrument on a J.N.4h are shown in Fig. 2. Although they are not as clear as the original film, the different records can be distinguished. The curves are usually replotted by measuring the distances on the film from the zero line and then multiplying by the calibration constant to give the true angle in degrees. These angles are then plotted against a time base so as to agree with the records from other instruments. The record of the landing shows the three-second vertical timing lines placed on the film by a light in the instrument case, which is connected, together with timing lights in other instruments, to an electric chronometer.

This instrument has been used mainly by the National Advisory Committee for Aeronautics in the study of stability, controllability and manœuvrability. For this work a knowledge of the position of the controls is essential, but the method formerly used of reading the angle visually was too slow and inaccurate for most of the work. This instrument will obtain more data in a few minutes' flight than could be obtained before in flights of many hours, so that the cost of this kind of research has been greatly reduced by this means. Another use of this instrument is for the study of control movements in various types of manœuvres. This is quite important, as the pilot cannot remember exactly how he moves his controls in order to execute a given stunt. It would also be of considerable value to check up on new pilots and to show them how their execution of a manœuvre differs from that of a skilled pilot.

NOTICES TO AIRMEN

Prohibited Area at Chalais-Meudon

1. In consequence of the dangers resulting from the frequent ascents of and altitudes attained by the captive balloons flown from the Chalais-Meudon establishment (south-west of Paris and east of Versailles), all aircraft are prohibited from flying at any altitude over the area defined by the following points :—

To the South.—The village of Petit Bicestre (on the Versailles-Choisy le Roi road).

To the West.—" La Gareune de Villacoublay," " La Grange Dame Rose " and " l'Etang des Fonceaux."

To the North.—That part of the Paris-Montparnesse-Versailles railway from Bellevue Station to the Meudon viaduct.

To the East.—The north-east edge of the Clamart wood and the road from Chatillon to Le Petit Bicestre.

2. Previous notice affected : Notice to Airmen No. 44 of 1922.

(No. 87 of 1922.)

Belgium : Circuit Rule for Aircraft in the Vicinity of State Aerodromes

1. In future all circuits made by aircraft on departing from public aerodromes owned by the Belgian State shall be left-handed, *i.e.*, anti-clockwise.

In the event of there being an exception to this rule, a further notice will be issued.

2. *Authority.*—Belgian Notice to Airmen No. 12 of 1922.

(No. 95 of 1922.)

NOTICE TO GROUND ENGINEERS

Inspection and Certification of Instruments

1. THE attention of Ground Engineers is directed to Article 11 and Schedule II, para. 8, of the Air Navigation Order, 1922, and to paras. 29, 35, 37, 41, 42 and 43 of the Air Navigation Directions, 1922 (A.N.D. 3), in so far as these relate to the instruments to be carried by British flying machines registered in the British Islands, and to the inspection and certification of such instruments. These publications may be obtained direct from H.M. Stationery Office, Imperial House, Kingsway, W.C. 2, or through any bookseller, at a cost of 11*d*. and 3*d*. respectively.

2. It will be observed that *on and after November* 1, 1922, certain instruments must be carried by all British flying machines registered in the British Islands, and that the inspection and certification of such instruments before flight, in accordance with Schedule II, para. 8, of the Order, must be carried out, except in the case of the instruments specified in (*d*) of para. 35 of the Directions (A.N.D. 3), by a Ground Engineer licensed in Category E.

3. Arrangements have accordingly been made whereby licensed Ground Engineers who are desirous of having their licences extended to cover Category E—inspection of the instruments other than those specified in (*d*) of para. 35 of the Air Navigation Directions, 1922 (A.N.D. 3)—can undergo examination for this purpose. These examinations will be held in London from September 1 onwards. In the case of Ground Engineers operating at the London Terminal Aerodrome, Croydon, arrangements will be made for the examination to take place at that station, while in the case of Ground Engineers operating in the provinces, examinations may be arranged during October if the number of applications received is sufficient to warrant special " Boards " in provincial centres. Applications for examination should be made to the Secretary (D.C.A.), Air Ministry, and should be accompanied by the necessary fee of 5*s*. Candidates will be informed of the date and time fixed for examination.

4. Applicants for licences under this category may apply to be licensed for all the instruments specified in paras. 41 and 42 of the Air Navigation Directions, 1922 (A.N.D. 3), other than those specified in (*d*) of para. 35 thereof, or for such instruments only as the nature of their employment may require them to certify. The minimum requirements for a licence will be ability to pass an examination in the following instruments, which must be carried by all flying machines : Air speed indicator, altimeter, gauges, revolution indicator.

5. The examinations will be based on the following syllabus :—

(1) *Air Speed Indicator.*—General principles of construction and operation—Installation of indicator and pitot head in the aircraft—Pipe lines—Methods of testing—Detection and rectification of defects in installation.

(2) *Altimeter.*—General principles of construction and operation—Installation in aircraft—Method of testing.

(3) *Gauges* (including air and oil pressure gauges and radiator thermometer).—General principles of construction and operation—Installation in aircraft—Methods of test.

(4) *Revolution Indicator.*—General principles of construction and operation—Installation in aircraft—Causes of failure to function.

(5) *Indicator of Wheel Position.*—General principles of operation.

(6) *Compass.*—General principles of construction and operation—Installation in aircraft—" Swinging " of compass—Maintenance and minor adjustments.

(7) *Turning Indicator.*—General principles of construction and operation of the various types—Installation in aircraft—Methods of testing and minor adjustments to instalation.

(8) *Watch.*—Installation in aircraft—Setting and adjustments.

(9) *Lighting Set* (including navigation lights, landing lights and illumination of instruments).—General principles of lay-out and installation in aircraft—Wiring diagrams—Tracing of defects—Care and maintenance of instruments, connections and accumulators.

General knowledge of standard requirements with regard to electrical installation in aircraft.

(10) *Electrical Bonding* (in the case of aircraft fitted with *Wireless Apparatus*).—Methods of jointing—Points where bonding is necessary and position of same—Methods of testing for electrical continuity—External wiring of approved wireless apparatus—General knowledge of standard requirements with regard to electrical installation in aircraft.

(11) *Drift Indicator.*—General principles of construction and correct methods of installation in aircraft.

6. The descriptive handbook issued as Air Publication 388, " General Instrument and Oxygen Equipment " (1921), will be of use to candidates for this examination. This handbook may be obtained direct from H.M. Stationery Office, Imperial House, Kingsway, W.C. 2, or through any bookseller, price 5*s*. net.

(No. 9 of 1922.)

AIRISMS
FROM THE FOUR WINDS

NOTICE that a large portion of the Eastleigh Aircraft Acceptance Park is being acquired by a new company, the Atlantic Park Hostel Co., Ltd., with a capital one pound short of £100,000—to wit, £99,999. And in agreement with this company such small fry are concerned as the Oceanic Steam Navigation Co., Cunard Steamship Co. and the Canadian Pacific Railway Co. As there is mighty little that the company do not take power to carry on with, including being "caterers for passengers by aeroplane or otherwise," there is evidently something in the wind, even if it is not the immediate foundation of an air line across the Atlantic.

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AMONGST many interesting announcements of new books from the house of Hutchinson is "H. G. Hawker, Airman: His Life and Work." The compilation is by Muriel Hawker, and it is to be issued shortly in a single volume. There should be a big demand for the work; Harry Hawker was a much-loved man.

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ONE of nature's fliers the other day came very gracefully to the assistance of man—the invader of the birds' realm. It was the outcome of a mishap off Antibes, in the Mediterranean, when a seaplane on a flight from Corsica, owing to a damaged propeller, was "landed" *hors de combat* in the water. A carrier pigeon whose home was Antibes was released with notification of the trouble, and with great promptitude boats and another 'plane were at the work of rescue. It matters not to our story that in the meanwhile the occupants, M. Orsini and his wife, had been picked up by a British steamer. The feathered partner in the trip had duly justified his place as the third in the boat.

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IT is encouraging to hear that *visas* on passports of pilots of cars, aeroplanes and airships arriving from and going to France and England have been abolished by the Italian Government.

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CAPT. MACMILLAN and Mr. Malins leave Calcutta this week on board the *Nellore*, having sufficiently recovered from their seaplane experiences in the Bay of Bengal. A different route home will, according to the same authority, be taken by Maj. Blake.

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THE evidence adduced and the statement from Major Luard, R.E., in *The Times* recently, as to the deplorable state of the R.A.F. in India is very welcome, as bringing into focus this scandal which has so long been an object of wonder. That it was high time an investigation was made forced itself upon our "rulers" some months ago, and the report of Sir John Salmond upon the whole wretched business, which may be expected in October, should compel an entire reorganisation of the force without a moment's delay. Vast potentialities rest upon adequate action being set in motion. In spite of the tragic facts which have emerged perhaps nothing tells like ridicule in a situation like this, and the happy skit upon the subject which has been sent in by "A Retired Colonel," extracted from a letter from his son in the Indian R.A.F. should appeal to everybody who is of opinion that the Government should play "cricket" with those who are taking their daily risks in maintaining the prestige of our Empire in such a vital section of it as India. The Air Ministry are helpless in the matter. It is the Government plus diplomacy that is to blame. Here is the extract, which bears the date of May 20 last:—

"A really remarkable letter came from Wing H.Q. this morning saying that no engines could be expected from K—— for the present, and that squadrons were to do all their own repairs, but that on no account was one engine to be "robbed" to make another serviceable. As there are no spares available in the country, the answer would appear to be the proverbial lemon. When I saw that letter I sat down and wrote a little skit:—

"SCENE: Any R.A.F. station in India. Time, 1924.

"A group of pilots are talking outside a single hangar.

"Flight-Lieut.-Commander.—Your're to go up next, Jones. As soon as Smith comes down, get the squadron propeller from him and go up. That all right?

"First Pilot.—Nothing doing, I'm afraid. Brown borrowed my elevator for that last show at Wana, and you know he crashed. Anybody lend me an elevator?

"Second Pilot.—Yes I will, if you'll let me have your shock absorber. I find that a couple of handkerchiefs and a bootlace are a poor substitute.

"Flight-Commander.—Well, fix it up among yourselves, only don't borrow my tail skid; it's the only decent one in India.

"Second Pilot.—Hi! steady. You know you promised to lend me the magneto for my machine. Hullo, old Smith's landed. His engine sounded as if it were missing a bit. What's the matter with it, old boy?

"Fourth Pilot.—Oh! she's a bit rough, that's all. I had to send a couple of my cylinders to the squadron at A——, as they haven't got any. Still, petrol tins are nearly as good, you know. And, I say, Jones, you can take your old machine out of that hangar. You know it's my turn today for it.

"All together.—Who wouldn't sell his little farm and come to India? "*Exeunt omnes.*"

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PASSING back from the ridiculous to the tragic side of the problem, the pathetic communication from Mrs. Helen R. Warren, giving an extract from a letter dated "Risalpur, August 10, 1922," from her son, Flight Officer David Chalmers Duncan, 27th Squadron, seven days before he was reported killed, is a fitting indictment of *someone*, however highly placed, who should be counted responsible for such a desperate state of things. The extract is as follows:—

"The tribes around Makin, in Waziristan, have started to cut up rough again, so we have got to bomb them again, and it is to be a ten days' intensive bombing show, so we are moving four machines up to Dardoni just up the Tochi Valley from Bannu. I am taking mine off tomorrow, all being well—that is, if the shock absorber for the wheels arrives tonight, and then we are to stay in tents at Dardoni for ten days and bomb each day, if not twice a day. We are to do our own work, as we cannot take mechanics—there is no room except for our observers.

"It is a disgraceful state of affairs in India. There is no shock absorber for D.H.9A, and it is a vital thing in a machine, as it cannot land without it. Someone has blundered, so we are waiting for some very thin stuff to arrive by the mail tonight from Lahore. This thin stuff will not last long. Still, we must carry on with it just now until someone wakes up. All leave is cancelled. Oh! what a happy family is ours! Eh?

"I have been working all day on my machine as I do not want to come down amongst the Abdul Raheus, as one would not get back; that is certain. Yet one has to trust to a deuce of a lot out of any old machine. Still, it should be good fun, and I pray I am lucky, as I do not want to come down again in tribal country as on Christmas Day, 1919, when I had to run like ——— for my life and then nearly lost it, for snipers.

"Still, all misses are as good as miles, and the papers said then that I did the mile in record time. No, my boat is getting too near for chances. Eh? But don't be anxious.

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AND this is the type of cheery officer which is being sent west by incompetent—not to say worse—bureaucracy. The pathos of it all!

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IN this little island of ours it is difficult for the uninitiated to visualise what forest fires mean in Canada. By way of an item, no less than 1,000 such fires, representing the loss of *millions*, are recorded for this season alone, British Columbia heading the list for numbers. Hitherto one of the greatest difficulties has been to "locate" these devastating conflagrations, and from time to time we have noted cases in which the ever-growing help of the aeroplane has been successfully called in for this purpose—enabling days to be saved in coping with these quickly-spreading fires. Another striking instance is now to hand from Vancouver Island. At the end of July a fire was reported menacing valuable green timber near Buttle Lake. On the evening the report was received an aeroplane left Vancouver for Campbell River, on Vancouver Island, to pick up equipment and men. A crew of seven fire-fighters with a portable gas pump, 2,000 ft. of hose, picks, shovels and axes and saws sufficient to supply a dozen men, were landed at the scene of the fire late the next afternoon. From the time the fire was reported to the time it was extinguished three days only elapsed. Without an aeroplane the journey alone would have occupied three days, and it would have been impossible to have taken the gas pump, which weighed 125 lbs., without making a trail 14 miles long through the forest.

THE ROYAL AIR FORCE

London Gazette, August 29, 1922

General Duties Branch

Lieut. G. D. B. Russell, Royal Dublin Fus., granted temp. comm. Flying Offr. on sec. four years' duty with the R.A.F.; Aug. 16. Sqdn.-Ldr. G. H. Thomson, O.B.E. (Pay Lieut.-Cmdr.), R.N., rem. attch. for further year's duty with R.A.F.; Aug. 1. Flying Offr. E. G. F. Hall, Lieut., R.G.A., resigns temp. commn. return to Army duty; Aug. 15. Flying Offr T. K. Breakell resigns his short service commn.; Aug. 1, 1922.

Stores Branch

Flying Offr. C. H. Pownall transferred to Stores Branch from G.D.B.; July 17.

Medical Service

The following are granted short service commns. as Flight-Lieuts. from dates indicated :—J. K. R. Landells, M.B.; Aug. 16. J. A. Musgrave; Aug. 17 (seny. as dated). C. A. Harrison granted temp. commn. as Flight-Lieut. from (and seny.) Aug. 8.

Chaplains' Branch

The Rev. J. S. Hobson resigns; Aug. 31.

Memorandum

The permn. granted to Lieut. F. W. J. Collier to ret. rank Lieut. withdrawn on his joining Army; July 25.

London Gazette, September 1, 1922

Air Commodore T. C. R. Higgins, C.M.G., to be Director of Training and Staff Duties, Air Ministry; Sept. 1.

General Duties Branch

The following Wing-Comdrs. are placed on half-pay. Scale A :—G. P. Grenfell, D.S.O.; Aug. 14 (substituted for *Gazette*, Aug. 8). D. A. Oliver, D.S.O., O.B.E.; Sept. 1.

Stores Branch

Flying Offr. P. D. Chisholm-Taylor is dismissed the Service by sentence of General Court-Martial; Aug. 17.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified :—

Wing Commanders: J. Mead, C.B.E., M.C., from Inland Area Aircraft Depot (Inland Area) to R.A.F. Depot (Inland Area). (Supernumerary.) 1.9.22. G. P. Grenfell, D.S.O., from R.A.F. Depot (Inland Area) to half-pay list. 14.8.22. Substituted for the previous notification dated 28.8.22, wherein this officer was posted as above stated, with effect from 1.8.22.

Squadrons Leaders: R. E. Saul, D.F.C., from Iraq Group Headquarters (Middle East Area) to Headquarters Iraq Group. 1.2.22. K. C. Buss, from Iraq Group Headquarters (Middle East Area) to Headquarters, Iraq Group. 1.2.22. H. J. Down, from Central Pay Office (Inland Area) to Headquarters (Coastal Area). (Supernumerary.) 14.7.22. T. H. Evans, from Central Pay Office (Inland Area) to Headquarters (Coastal Area). (Supernumerary.) 14.7.22. W. Millett (Stores) to Headquarters, R.A.F. Iraq. 22.4.22. R. H. Peck, O.B.E., to Headquarters, R.A.F. Iraq. 29.5.22. J. C. P. Wood, from R.A.F. Depot (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 25.9.22. T. F. Bullen, O.B.E., from Engine Repair Depot (Middle East) to Command Mechanical Transport Workshop and Pool, Palestine (Middle East). 8.7.22. P. Babington, from Headquarters (Coastal Area) to Air Ministry (D. of P.). 1.8.22.

Flight Lieutenants: P. G. Scott, from No. 31 Squadron (India) to No. 27 Squadron (India). 5.1.22. G. H. Hall, A.F.C., from Iraq Group Headquarters (Middle East Area) to Headquarters (Iraq Group). 1.2.22. R. T. Nevill, from Iraq Group Headquarters (Middle East Area) to Headquarters, (Iraq Group). 1.2.22. E. Drudge, M.B.E., from Headquarters, R.A.F., Iraq to R.A.F. Depot (Inland Area). (Supernumerary.) 9.7.22. J. C. Atkinson, from Aircraft Depot (Iraq) to R.A.F. Depot (Inland Area). (Supernumerary.) 9.7.22. (Acting Wing Commander) L. J. Lightfoot, O.B.E., from Army (R.A.P.C.) to R.A.F Depot (Inland Area). (Supernumerary.) 14.8.22. G. R. A. Deacon, M.C., from Flying Wing, Cranwell to Electrical and Wireless School (Inland Area). 25.9.22. D. R. E. Thompson, from R.A.F. Depot (Inland Area) to Electrical and Wireless School (Inland Area). 25.9.22. S. S. Benson, A.F.C., from R.A.F. Depot (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 25.9.22. E. L. Howard-Williams, M.C., No. 25 Squadron (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 25.9.22. C. H. Awcock, O.B.E., from Electrical and Wireless School (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 25.9.22. C. E. W. Lockyer, from No. 207 Squadron (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 25.9.22. E. B. Mason, from No. 25 Squadron (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 25.9.22. J. F. A. Day, A.F.C., from No. 1 Flying Training School (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 25.9.22. O. C. Bryson, M.C., D.F.C., A.M., from R.A.F. Base, Gosport (No. 210 Squadron) (Coastal Area, to School of Photography (Inland Area). (Supernumerary.) 25.9.22. R. M. Trevethan, M.C., from No. 207 Squadron (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 25.9.22. R. S. Sugden, A.F.C., from Electrical and Wireless School (Inland Area) to Command School of Balloon Training (Inland Area). 11.8.22. M. J. James, M.B.E., from No. 70 Squadron (Iraq) to Egyptian Group Headquarters (Middle East). 22.7.22. D. J. Jones, M.B., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area). 21.8.22. D. Drover, from Air Ministry (D. of R.) to R.A.F Depot (Inland Area). 1.9.22.

NEW BRITISH AIR SERVICES

THE Air Ministry announces that as a result of the experience gained during the past six months the Air Council has decided, with the concurrence of the Lords Commissioners of His Majesty's Treasury, to modify the system under which subsidies are at present granted to approved firms for the operation of the Cross-Channel routes.

The new scheme provides for the elimination of the present competition between British firms by the allocation of a separate route to each Company. The basis on which the subsidy (which is still limited to the sum of £200,000 per annum) will be given is a limited cash payment for the completion of a stipulated number of flights and a contribution in cash or in kind towards the maintenance of a fleet of approved size and value.

The routes to be operated under the new scheme will be :—

London-Paris, by Handley Page Transport, Ltd.
London-Brussels-Cologne, by the Instone Air Line.
London-Amsterdam-Bremen-Berlin by Daimler Hire, Ltd. (subject to further negotiation).
Southampton-Cherbourg and Channel Islands, by a new company (not to be opened till next spring).

The approximate lengths of the different routes are London-Paris, 225 miles; London-Brussels-Cologne, 310 miles; London-Berlin, 570 miles; and Southampton, Cherbourg, Channel Islands, 120 miles. The number of routes operated and the mileage flown by British firms will therefore be greatly increased. It is hoped that services under the revised scheme will come into operation during September.

The R.A.F. Club Eastbourne Cricket Week

THIS fixture—September 20 to 26—at Eastbourne, organised by the R.A.F. Club, promises to be a big success, which is good hearing, as any profit goes to that excellent object the R.A.F. Memorial Fund for the dependents of fallen airmen. Inclusive tickets are available only to members of the club, but a special enclosure will be provided for past or present members of the R.A.F. who desire to attend the festival.

The teams for the first match, beginning Wednesday, September 20, are as follows :—

NORTH: A. W. Carr (Notts), captain, F. W. Musson (Lancs), Hon. F. S. G. Calthorpe (Warwick), Holmes (Yorks), Kilner, R. (Yorks), Waddington (Yorks), Oates (Notts), Gunn, G. (Notts), Tyldesley, E. (Lancs), Parkin (Lancs), Geary (Leicester).

SOUTH: Rev. F. H. Gillingham (Essex), Hon. L. H. Tennyson (Hants), P. G. H. Fender (Surrey), A. E. R. Gilligan (Sussex), A. H. H. Gilligan (Sussex), N. Haig (Middlesex), Hobbs (Surrey), Woolley, F. E. (Kent), Hardinge (Kent), Parker (Gloucester), Livesey (Hants).

On Saturday, September 23, a match will be begun between the following :—

ROYAL AIR FORCE (EX-SERVICE) ELEVEN: P. G. H. Fender (Surrey), captain, A. Jeacocke (Surrey), A. H. H. Gilligan (Sussex), F. W. Musson (Lancs), S. L. Amor (Somerset), Hobbs (Surrey), Woolley, F. E. (Kent), Hardinge (Kent), Geary (Leicester), Parker (Gloucester), Waddington (Yorks).

REST OF ENGLAND: Hon. L. H. Tennyson (Hants), captain, A. E. R. Gilligan (Sussex), A. W. Carr (Notts), Rev. F. H. Gillingham (Essex), N. Haig (Middlesex), M. Howell (Surrey), Tyldesley, E. (Lancs), Parkin (Lancs), Kilner, R. (Yorks) Gunn, G. Notts), Livesey (Hants).

Cricket in Fairey Land

A VERY successful cricket match was played on Wednesday, August 30 last, between the Hayes and District Works' Cricket League (President, C. R. Fairey, Esq.) and J. W. Hearne's XI team, the match being held on the Fairey Aviation Ground. A large number of people were present, and some very fine play on both sides was witnessed. P. E. Nye batted splendidly for the League team, which made 105, whilst Hearne's total was 327, out of which N. Haig made 118. After the match Mr. C. R. Fairey took both teams over the Fairey Aviation Works, the visitors showing great interest in the large flying boat which is being constructed. Both teams were then entertained to dinner, at which Mr. Fairey presided, and a string band helped to finish off the day in a most happy and enjoyable manner.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association.)

ON Sunday, August 27, at Wanstead Flats, Mr. C. Hersom's twin-pusher model made a flight of 210 secs.—out of sight. This proves with the previous performances of same that the model is very consistent, and puts away all suggestions that the record of 247 secs. put up on August 20 was a fluke performance.

On September 3, at Wimbledon Common, Mr. D. A. Pavely put up a new record for a compressed-air driven model, $63\frac{4}{5}$ secs., beating his previous record of 53 secs. The following is the report received from the Competition Secretary, who witnessed the performance in conjunction with Mr. F. de P. Green :—"Weather fine, light wind. First performance : Left-hand circle, good climb ; pressure in tank, 173 lbs. per sq. in. ; duration, $53\frac{4}{5}$ secs. Second performance : Straight and good climb ; pressure in tank, 176 lbs. ; duration, $59\frac{3}{5}$ secs. Third performance : High climb, right-hand circle ; pressure in tank, 179 lbs. ; duration, $63\frac{4}{5}$ secs. The weight of Mr. Pavely's machine is 4 lbs., the loading 12 ozs. per sq. ft. and the span 7 ft."

Mr. F. de P. Green also reports that he witnessed on Parliament Hill Fields, on September 3, Mr. Rippon and Mr. Burchell put up a gliding performance of 30 secs., each with ordinary tractor models with propellers and rudders removed.

The Research Committee have been working on various matters recently, and their Secretary will have some useful data to put before the Society at an early date.

Members' attention is directed to General Rule No. 3 and Competition Rule No. 3.

September 16 competition for Mr. Felix Kelly's Cup will be held on Wimbledon Common. Please let the Competition Secretary have details of your entry.

Hon. Sec., A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, every Thursday, 7.30 p.m. Anyone interested in aeronautics is invited to attend.

⁂

London-Holland Daily Air-Mail

THE Postmaster-General announces that the dispatch of letters and parcels from London to Holland by afternoon aeroplane has now ceased. The dispatch by the morning aeroplane, both of letters and of parcels, will be maintained.

British 'Planes Cross the Andes

FROM Valparaiso it is reported that two Chilean military airmen, Capt. Aracena and Capt. Barahona, using British machines, left Santiago de Chile on August 29 to fly to Rio de Janeiro, 1,825 miles across the Continent, there to deliver a message of congratulation to the Brazilian Army on the occasion of the Brazilian Centenary celebrations. They crossed the Andes successfully ; the temperature was 15° below zero.

Bad weather then drove them down. Capt. Aracena landed at Mendoza, 112 miles from Santiago. Capt. Barahona, losing sight of his companion, alighted at San Juan, 186 miles from Santiago.

Exploring New Guinea from the Air

CAPT. FRANK HURLEY is reported from Melbourne as the leader of an exploring party, including an ethnologist and a naturalist, which has left Sydney for Port Moresby to explore New Guinea from the air. A wealthy resident of Sydney, Mr. L. Hordern, it is stated, has provided two seaplanes, one of which is already in New Guinea, while the other is being conveyed in the steamer with Capt. Hurley.

It is proposed to leave Port Moresby towards the end of September for the Fly River and to make a four months' air survey of the western portions of British New Guinea. The scientific section will navigate the Fly River in a ketch. The party has further plans, but they will depend upon the behaviour of the seaplanes.

Successful Cleveland–Detroit Air Service

A DAILY (Sundays excepted) service between Cleveland and Detroit has been run by the Aeromarine Airways, Inc., from July 17 last, and from this date up to August 17 624 passengers were carried, in addition to 150 passengers on other extra flights, outside the regular service. The big Aeromarine flying boats employed on this service crossed the lake 114 times. In addition to this regular service 16 special-charter flights were made during this period. On these latter flights the following places were visited by air : Toledo, Eire, Pa., Put-in Bay, Ponchartrain Hotel on Lake St. Clair, and the Old Club on St. Clair Flats.

On some of the flights the boats were equipped with radio, and the passengers were entertained by music, baseball scores, and the regular broadcasting programme.

Strengthening Anglo-American Friendship

SIR CHARLES WAKEFIELD sailed for America on Saturday last on board the *Adriatic*, at the head of an influential delegation from the Sulgrave Institution. The mission of this delegation, which includes amongst others Lady and Miss Wakefield, Sir Arthur Haworth and Lady Haworth, Sir Wm. Letts, Mr. Harold Spender, etc., is to promote Anglo-American friendship and understanding throughout the United States and Canada.

⁂

PUBLICATIONS RECEIVED

Annual Report of the Smithsonian Institution, 1920. Smithsonian Institution, Washington, U.S.A.

Premier Congrès International de la Navigation Aérienne, Paris—15–25 Novembre, 1921. Chambre Syndicale des Industries Aéronautiques, 9, rue Anatole-de-la-Forge, Paris. Price 60 fr.

Aeronautical Research Committee Reports and Memoranda, No. 785 (*Ae*.38). *Experiments with Model Flying Boat Hulls and Seaplane Floats. 22nd Series Report.* By E. M. Keary, A.I.N.A. London : H.M. Stationery Office, Imperial House, Kingsway, W.C. 2. Price 1s. net. By post 1s. 1d.

"Aluminium Sections." Calendar, September, 1922, *to August*, 1923. The British Aluminium Co., Ltd., 109, Queen Victoria Street, London, E.C. 4.

Technical Note No. 88. *Test of Oil Scraper Piston Ring and Piston Fitted with Oil Drain Holes.* By H. S. McDewell. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 102. *Skin Frictional Resistance of Plane Surfaces in Air : Abstract of Recent German Tests, with Notes.* By W. S. Diehl. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 103. *Simple Formula for Estimating Airplane Ceilings.* By Walter S. Diehl. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 104. *Notes on Aerodynamic Forces. I. Rectilinear Motion.* By Max Munk. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note, No. 105. *Notes on Aerodynamic Forces—II. Curvilinear Motion.* By Max M. Munk. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

Catalogue

Small Tools for Engineering and Workshop Use. T. C. Jones and Co., Ltd., Shepherd's Bush, W. 12.

⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : **cyl. = cylinder ; I.C. = internal combustion ; m. = motors.**

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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1,285. E. OEHMICHEN. Screw propellers. (174,090.)

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xiv.)

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Goldsmiths & Silversmiths Co., 112, Regent Street, W. 1. Gerrard 9091 (3 lines).

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MACHINING—

Monk Engineering Co., Ltd., Coventry. Coventry 807; "Assistance," Coventry.

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METALS (Anti-Friction)—

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D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5. Dalston 1893.

PETROL—

Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.

PROPELLERS—

Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds. Roundhay 601 (5 lines); "Propellers," Leeds.

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.

Lang Propeller, Ltd., Weybridge, Surrey. 520-521, Weybridge; "Aerosticks," Weybridge.

PUTTEES—

Fox Bros. & Co., Ltd. (Dept. R), Wellington, Somerset.

RADIATORS AND RADIATOR REPAIRS—

Serck Radiators, Ltd., Warwick Road, Greet, Birmingham. Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—

Rubery, Owen & Co., Darlaston. Darlaston 87; "Roofs," Darlaston.

SPARKING PLUGS—

Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15. Putney 2132, 2133. "Kaalgee," Phone, London.

SPRAYING PLANT—

Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1. Holborn 2041; "Aerography," London.

STABILIZERS—

Auto Controls, Ltd., 19, Regent Street, Piccadilly Circus, London, S.W. 1. Regent 3649.

TAPES AND WEBBING—

MacLennan, John, & Co., 115, Newgate St., E.C. 1. City 3115; "Vanduara," Cent. London.

TIMBER—

Owen, Joseph, & Son, Boro' High Street, S.E. Hop 3811; "Bucheron," London.

TUBES, ALUMINIUM—

British Aluminium Co., Ltd., The, 109, Queen Victoria St., London. City 2676; "Cryolite," Cent. London.

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Palmer Tyre, Ltd., Shaftesbury Avenue, W.C. 2. Gerrard 1214; "Tyricord," Westcent, London.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

1922.	
Sept. 2–17....	**International Concours Aviatique, Rotterdam**
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 30	**Coupe Deutsch (300 kil.)**
Oct. 16–21	**Daily Mail £1,000 Gliding Competition**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

The Race for the King's Cup

THE Circuit of Britain, the first since 1913, has been flown. Twenty-three machines were entered; twenty-one started, and eleven finished the course. This, in the briefest possible form, is the statistical account of the Race. And looked upon from the point of view of figures only the great race must be judged a failure. That one-half of the machines should have fallen by the way might certainly be used by the disbelievers in aviation as proof of the unreliability of modern flying. And just as certainly the critics would be wrong. The aviation community, now as in the early days of flying, is to be regarded as a band of pioneers. In 1909 or thereabouts they had to demonstrate to a doubting world that flying was possible. Today they are faced with the no less difficult task of proving to a sceptical world that flying is safe, that it is reliable and that it is commercially useful. But, above all, they are faced with the problem of persuading the world to take an interest in flying. Once that is accomplished, the way has been paved for infusing into the general public, the man in the street, a clearer understanding of the problems involved and a greater appreciation of the possibilities offered by vigorous and consistent development of flying. Viewed from this angle, the race for the King's Cup has been a great success, stimulating as it has the interest in flying, not only among Londoners, but all over the country. And after all, as some one pointed out at the Air Conference, although it is a fact that is sometimes apt to be overlooked, Britain does not consist of London only. The North, the Midlands and the West must each play their part if our future aviation policy is to be pursued with the vigour and determination which is necessary.

At all the turning points the public have crowded to the aerodromes in their thousands, and everywhere the enthusiasm has been tremendous. We have had our Aerial Derbys, our Schneider Cup races, our holiday race meetings at Waddon and our Aerial Pageant; but these have not, we are quite certain, aroused such general and widespread interest as has the race for the King's Cup. Without personal, and fairly frequent, observation of flying, interest is apt to become somewhat lukewarm, even if total indifference does not result; but once have aeroplanes, numbers of them, flying over the head of the man in the street, and he would be a dullard indeed who could remain indifferent. And it is for reasons such as these that we have no hesitation in saying that the King's Cup Race has been a success, and for the same reasons we welcome most heartily the announcement that in the future the race will be an annual one, His Majesty having generously intimated his willingness to present another Cup next year, to be retained by the winner until the following year.

One fact stands out very clearly from the numerous minor mishaps: no single serious accident occurred during the whole of the race around a course of over 800 miles, and this in spite of the fact that the machines which took part were of a great variety of types and ages, ranging in size from small single-seaters of 35 h.p. to twin-engined bombers and large passenger-carrying commercial aeroplanes, and in ages from five years to a few months. Also the weather was certainly not ideal, although it might easily have been a great deal worse, and in spite of all these considerations no single forced landing resulted in serious damage to machines or occupants.

Considered purely as a race, without regard to any other considerations, the Circuit of Britain stands out prominently in the history of our flying for the soundness of the organisation, the excellence of the handicapping and the unfailing courtesy of every one concerned. The Air Ministry provided the wireless organisation which enabled news of the progress of competitors quickly to be available, and which materially assisted the Press in keeping the public constantly and reliably informed. And last, but by no means least, the airmen, aircraftsmen and others from Kenley Air Station, who gave their services without pay, simply for love of the sport, helped in no small measure in looking after competitors at the start and in keeping order on the aerodrome at the finish. Thanks to all.

◆ ◆ ◆

Honouring the Schneider Cup Winner

In some ways it was unfortunate that the Schneider Cup Race at Venice should have taken place such a short time before the holding of the Circuit of Britain, inasmuch as it prevented the Royal Aero Club from finding the time, what with the numerous tasks connected with the organisation of the Circuit, to honour in fitting manner the victor of the Schneider race. It is, of course, realised that this British victory was something far more than the mere winning of an ordinary race. Had it not been for the very sporting spirit which provided the Cup challenger and its engine, the Italian teams would have won again this year, and the Schneider Cup would have remained in Italy as the property of the Italian Aero Club. The Supermarine-Napier victory brought the Cup to this country, and, what is far more important, it won for Great Britain the privilege of holding the Schneider Cup race in this country next year, under the organisation of the Royal Aero Club. To those who appreciate the vast possibilities of the seaplane this fact is of the utmost importance, as an international seaplane race, held at one of our seaside towns, cannot fail greatly to stimulate the general interest in this type of craft.

We therefore strongly urge the Royal Aero Club to hold, as soon as it can be arranged, a banquet in honour of the winner of the Schneider Cup Race and those associated with him in his great achievement, as a fitting appreciation of what they have done in the interests of British aviation.

◆ ◆ ◆

Next Year's Schneider Cup

While on the subject of the Schneider Cup Seaplane Race, the thought occurs to us that, as this is an international race, why not make it so in the widest possible sense, by so choosing the course that not only we, but our neighbours across the Channel may have the opportunity of seeing the race in progress. Unless there is some clause in the rules governing the race which prevents it, why should not the course be one across the Channel between an English and a French town? Or, if a triangular course be essential, the turning points could be two English towns on the South Coast and one French town on the other side.

As regards the suitability of the open sea for such a race, if the summer months were chosen, the Channel should not be too rough even for racing seaplanes, and if a few fast motor-boats were stationed at intervals along the route there should be no great danger, certainly no greater than in the case of a cross-country race, such as the Coupe Deutsch, on modern projectiles flying at about 200 m.p.h. and landing at somewhere around half of that speed. Personally we would rather cross the Channel in a very fast racing flying boat than go across country in a racing land machine.

We offer the suggestion for what it is worth, and it may be that the fundamental rules will not allow of the suggestion being acted upon. Otherwise we think a race from country to country would be likely to attract far greater attention than one held in any one country.

◆ ◆ ◆ ◆

The King's Cup Race

THE following is the text of the King's message to the Royal Aero Club:—

"His Majesty thanks you for keeping him informed of the progress of the racing, and will be glad if you will convey to Mr. Barnard his warm congratulations on winning the King's Cup. "HARDINGE."

It is proposed to hold the race annually for a second Royal trophy, to be retained by the winner for twelve months.

The subsidiary prizes given in connection with the Circuit of Britain Race have been awarded as follows:—

£40, given by the Corporation of Glasgow, for first arrival at Glasgow, F. L. Barnard.

£25, presented by the *Manchester Guardian*, for the fastest handicap time between Glasgow and Manchester, A. S. Butler.

£25, presented by the *Newcastle Chronicle*, for the fastest handicap time between Croydon and Newcastle, F. L. Barnard.

Cup, valued at £25, presented by Mr. William Kayley, of Manchester, for the second fastest handicap time between Glasgow and Manchester, F. L. Barnard.

£52 10s., presented by the Manchester City Council, for the fastest handicap time between Croydon and Manchester, F. L. Barnard.

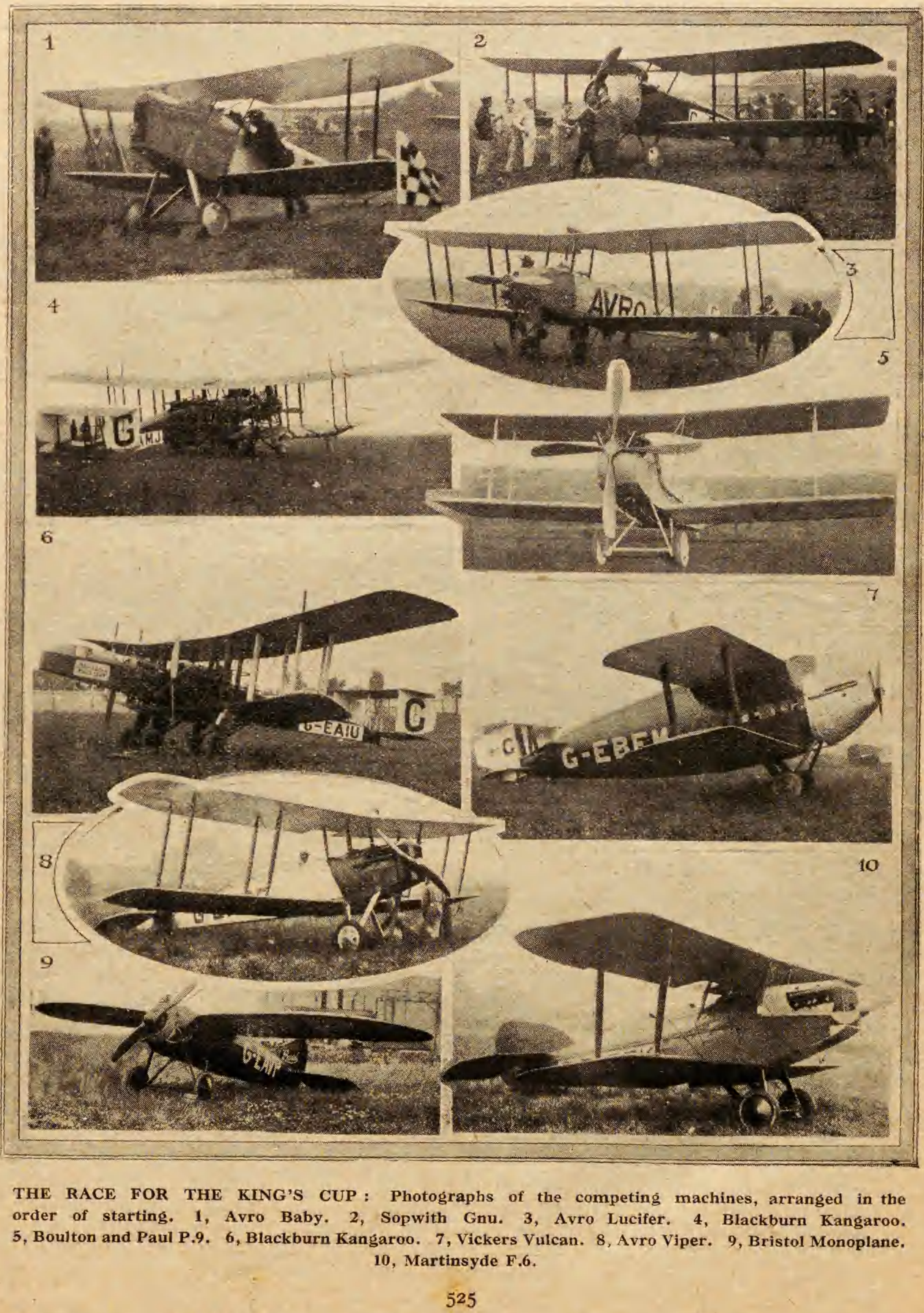
£50, given by the Bristol Aeroplane Co., for the fastest handicap time from Croydon to Bristol, F. L. Barnard.

Piece of plate, presented by the Bristol Rotary Club, for fastest time from Croydon to Bristol with engine of over 200 h.p., F. L. Barnard.

Bristol Stock Exchange plate, for fastest handicap time between Croydon and Bristol, with engine of 200 h.p. or under, F. P. Raynham.

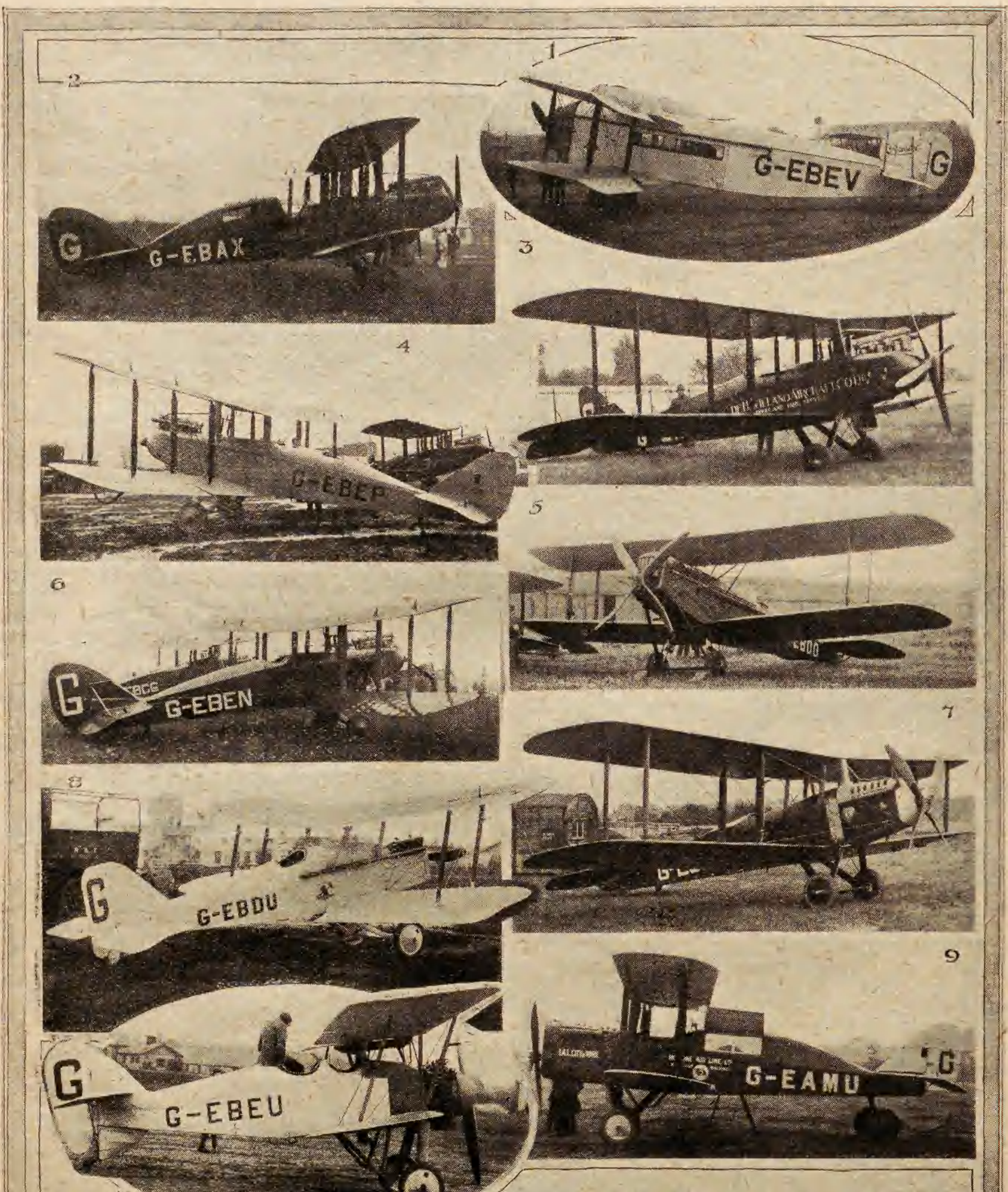
Piece of plate, given by Mr. Featherstone Whitty, of Bristol, for fastest handicap time between Glasgow and Bristol, A. S. Butler.

THE CIRCUIT OF BRITAIN



THE RACE FOR THE KING'S CUP: Photographs of the competing machines, arranged in the order of starting. 1, Avro Baby. 2, Sopwith Gnu. 3, Avro Lucifer. 4, Blackburn Kangaroo. 5, Boulton and Paul P.9. 6, Blackburn Kangaroo. 7, Vickers Vulcan. 8, Avro Viper. 9, Bristol Monoplane. 10, Martinsyde F.6.

THE CIRCUIT OF BRITAIN



THE RACE FOR THE KING'S CUP : Ten of the faster machines, arranged in the order of starting : 1, Bristol 10-Seater ; 2, D.H.9C ; 3, D.H.9B ; 4, D.H.9 ; 5, D.H.37 ; 6, D.H.9 ; 7, D.H.9A ; 8, S.E.5A ; 9, D.H.4A (winner of the race) ; 10, Siddeley Siskin (scratch).

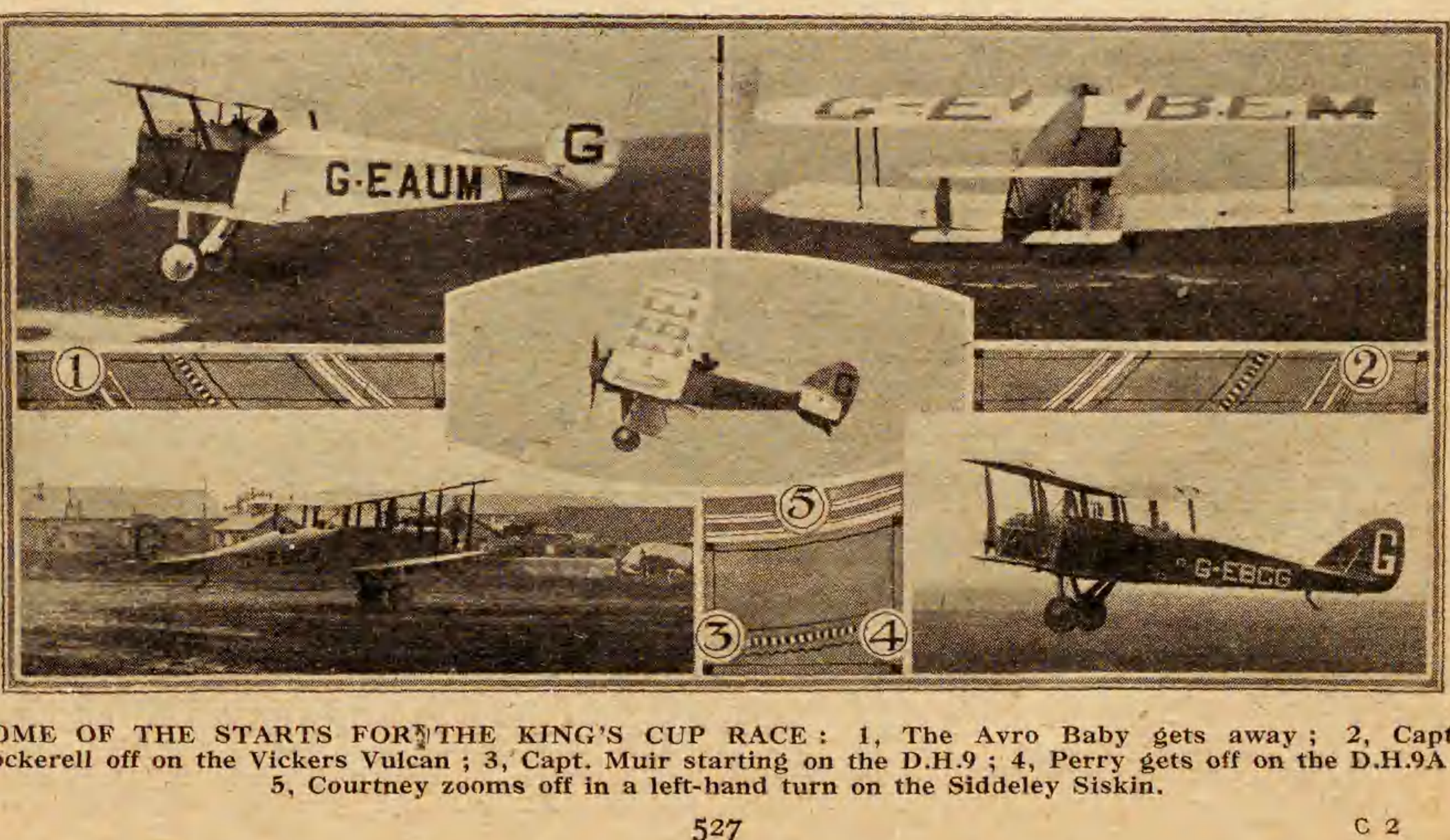
THE KING'S CUP RACE

Line-up of the machines on the morning of the start.

A BITTERLY cold wind was blowing across Waddon Aerodrome when, in the early morning of Friday, September 8, the machines began to line up for the start of the race around Britain (more or less) for the Cup presented by His Majesty the King. The visibility did not promise to be very good over the first part of the course, but wireless reports promised better conditions on the other side of London. It had been hoped that the weather would not be too favourable, as it was desired to make the race a real test of the pilots' skill as well as a test of the machines, and in this respect the race was favoured. The weather conditions, although far from being ideal, were not so bad as to cause very serious trouble, yet sufficiently difficult to render careful piloting and navigation necessary. By 8.30 a.m. most of the machines were on the starting line, and shortly afterwards the little Green engine of the Avro Baby was started for its preliminary warm-up, the Baby being the limit machine. Promptly on the stroke of nine our old friend Reynolds dropped his red flag, and Squadron-Leader Payn got away in fine style, the Green humming merrily.

Next on the list for getting away was Bert Hinkler on the racing Avro Baby, but owing to an unfortunate accident a couple of days previously he was a non-starter. It appears that Hinkler had just taken off from the Avro aerodrome at Hamble, and that, just as he was some little distance out over Southampton Water, his engine cut out suddenly and without warning. Hinkler at once commenced a sharp turn in an attempt to reach the beach, but his altitude was too low, and the machine struck the sea while still on the turn. Hinkler was somewhat cut about the face, but otherwise none the worse for his experience, in spite of a very cold ducking in Southampton Water. The machine, however, was a total write-off, and no other Baby was ready, otherwise Hinkler would have started in the race on that. Knowing how very keen Hinkler is on his flying, we can imagine how he must have taken the accident to heart, and we sincerely sympathise with him. He goes into these races heart and soul, and his disappointment at being unable to start in the race was shared by many. The cause of the engine stopping has not been definitely ascertained, but it is thought that magneto trouble may have been responsible.

Having seen Payn off we wander about among the machines, chatting to pilots, entrants and visitors, the latter having turned up in considerable numbers in spite of the early hour. One of the machines, the Bristol ten-seater, is reported to have alighted at Netheravon with engine trouble, and there is some doubt as to whether it will arrive in time to take part in the race. In the meantime the hour of Flight-Lieut. Longton's start on the Sopwith "Gnu" approaches, but the engine appears to be obstinate. Mechanics work like



SOME OF THE STARTS FOR THE KING'S CUP RACE: 1, The Avro Baby gets away; 2, Capt. Cockerell off on the Vickers Vulcan; 3, Capt. Muir starting on the D.H.9; 4, Perry gets off on the D.H.9A; 5, Courtney zooms off in a left-hand turn on the Siddeley Siskin.

heroes " swinging the prop.," but nothing happens. Repeated attempts succeed in coaxing a consumptive cough from the engine, but in the meantime the minutes and seconds are being frittered away, and finally Reynolds drops his flag. Officially the " Gnu " has started, and any further time spent in getting the engine going counts as flying time. However, Longton keeps smiling, remarking that it is a long race, and that much may happen before the finish. Capt. Cockerell volunteers for a spell of prop. swinging, and the engine begins to fire, spitting flames out of its exhaust ports and setting some petrol on the ground on fire. This necessitates wheeling the " Gnu " back a few paces to avoid fire on board.

Gen. Sir Sefton Brancker, D. of C.A., discussing the prospects with Comdr. James Bird.

Major Carr, while this little incident is taking place, has got his Bristol " Lucifer " engine going, and is warming-up preparatory to his start. In spite of its three cylinders the " Lucifer " ticks over very slowly, and when being opened out on the drop of the flag it runs wonderfully smoothly as Carr soars off on the Avro. Whether it is the cowling or due to some other cause, the " Lucifer " does not appear to have that " tinny " sound which is so often heard in air-cooled engines, although with but three cylinders it naturally has a more staccato exhaust than the multi-cylinder engines.

Lieut.-Col. Spenser Grey is due to start next on one of the Blackburn " Kangaroos," and his Rolls-Royce engines are being warmed-up. In spite of a bandaged foot Col. Grey hopes to put up a good show, and awaits the drop of the flag, while Longton, his engine at last having come to life, gets away some 25 minutes late. A few minutes later the " Kangaroo " receives the signal and follows Longton into the haze.

The Boulton and Paul P.9, entered by Gen. Weir and piloted by Holmes, gets away next. Although not very fast the P.9 comes in for favourable comment on account of its sensible and business-like design, and many express the opinion that it should be a very useful machine for economical and safe flying by private owners. With an engine of but 90 h.p. the running costs should be low.

A D.H.6 is seen to circle the aerodrome, and finally alights behind the line-up of racing machines. The pilot turns out to be Capt. de Havilland, who has flown over from Stag Lane, accompanied by one of his sons, who objects to crossing through London by motor-car. We learn that on the return journey a younger edition will take his place in the D.H.6. Capt. de Havilland does quite a good deal of flying on his old " 6," which, fitted with wings of somewhat less " clutching hand " propensities, is reasonably fast and yet can be landed almost anywhere.

A machine is seen to approach the aerodrome from the west. This turns out to be the Bristol ten-seater, whose engine trouble has been temporarily remedied at Netheravon during the night, and it now looks as if it will be able to start after all.

The second Blackburn " Kangaroo " by now has its engines running and soon takes the air with a good complement of passengers, Kenworthy making quite a zoom as he leaves the aerodrome. Although designed a good many years ago, the " Kangaroo " still seems able to put up a very respectable climb.

The second Boulton and Paul P.9, piloted by Col. Tennant, gets away a couple of minutes behind Kenworthy, and soon both machines are lost in the haze.

In the meantime Capt. Cockerell has started the Rolls-Royce " Eagle " of his Vickers " Vulcan," and as he waits for the engine to warm-up he finishes a cigarette. Through the cabin windows may be seen the faces of his several passengers, who, protected from the icy wind, appear to look forward to a comfortable journey. On the drop of the flag the " Vulcan " slowly gathers way, and, after a very short run, she is in the air and passing over the enclosures. As one of the most recent commercial machines, her behaviour is watched with interest.

Capts. Cockerell and Broome, the two Vickers pilots, who are affectionately known as the " heavenly twins," are not usually very far separated, and, possibly bearing this fact in mind, the handicappers have placed them next to one another in order of starting, Capt. Broome getting away on the Avro " Viper " about two minutes after Cockerell has left.

The pretty little Bristol monoplane gets away very cleanly, piloted by Haig, and is followed a minute later by Raynham on his Martinsyde F.6. This machine has been considerably renovated since its appearance in the Aerial Derby, and now appears in bright yellow, with the edges of the wings and *fuselage* painted in black. Raynham has been working like a Trojan on the machine, and has done all the doping and painting, as well as tuning-up of the engine, himself. As one of our few owner-pilots, and one of our oldest pilots, Raynham, who is popular everywhere, carries with him the good wishes of everybody, and not least of his rivals in the race. He gets away in his usual irreproachable style, and many think highly of his chances in the race.

The Bristol ten-seater is on the line with its engine running, and Uwins in the pilot's cockpit. The engine does not sound quite as smooth as is its wont, and when Uwins opens out to take off it is noticed that the " Jupiter " is missing badly. However, Uwins manages to take off, although not at his usual angle, and as the machine fades into the haze we are not without misgivings as to its chances of completing the course.

Attention is now devoted to the D.H.9C, which is being piloted by Flying Officer Leslie Hamilton, and which will carry as passenger its entrant, Lady Anne Savile (Princess Loewenstein-Wertheim), who, very sportingly, has decided to make the flight in the cabin of the 9C. This machine is of interest on account of the fact that it is fitted with one of the new Aveline stabilisers, which are a great improvement on the older model, especially in the matter of weight, which has been reduced to about 50 lbs., complete. The machine is also provided with telephone so that the passenger can be

Lady Anne Savile in the cabin of her D.H.9C, piloted by Flying Officer Leslie Hamilton.

in constant communication with her pilot. In the gusty wind prevailing it is expected that the Aveline stabiliser will assist materially in avoiding violent movements of the machine. At the start, which takes place at 10.32, the stabiliser is not, of course, operating, but as soon as well clear of the ground it is thrown into gear and one looks forward to the pilot's account of it on his return the next day.

Cobham, on the old D.H.9B G-EAAC, is away next. This machine is an old-timer truly, as its identification letters show, the beginning being made, when these letters were first introduced, with G-EAAA, so that the 9B was the third machine to be registered under the new scheme. Since that time Cobham has flown it many thousands of miles, and has used it on nearly all his European tours. We understand it is the intention of the de Havilland Aircraft Co. to keep it going as long as at all possible, so as to get an idea of how long an aeroplane really can be used before it becomes worn out.

From the appearance of the machine in the race, and the way it got away, it would seem that it still has a good many years to live, barring accidents.

Mr. A. S. Butler, on the D.H.37, "Sylvia," makes a very clean start, and with its golden wings the machine looks very pretty, although at anything but low altitudes the gold paint appears merely as a yellow. His Rolls-Royce "Falcon" appears to be running extremely well, and all hope that Mr. Butler, good sportsman that he is, will have better luck than he had in the Aerial Derby.

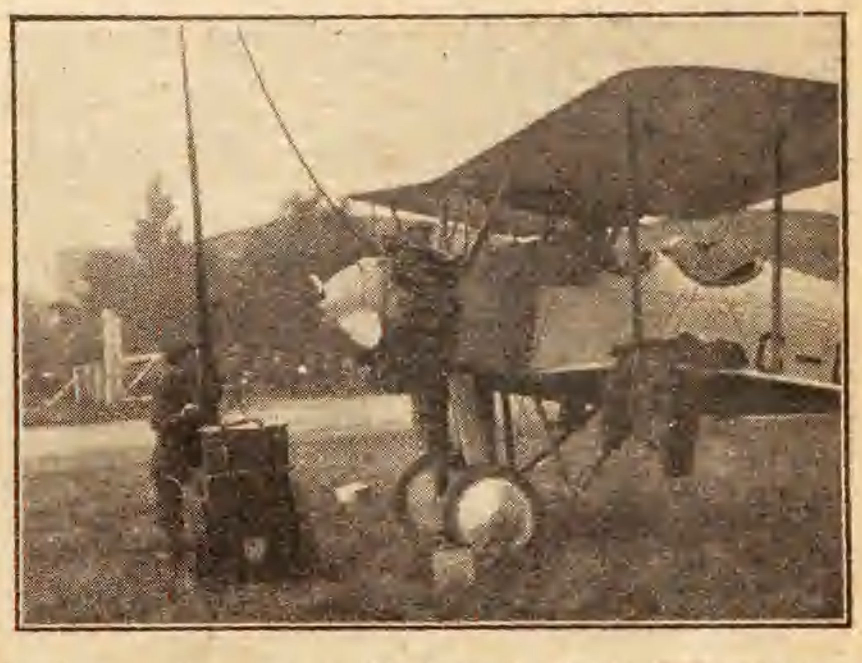
The D.H.9 flown by Mr. Piercey, and entered by Col. Darby, looks very spick and span. A streamline fairing has been fitted behind the pilot, and gives the machine quite a racy appearance.

We learn from Col. Darby that a special set of deck fairings have been standardised for this type by the A.D.C., so that customers can convert, in a very short time, the D.H.9 from a two-seater fighter with gun ring to a single-seater with streamline back and space inside for loads of various sorts. The Siddeley "Puma," as usual, runs as smooth as a clock when the machine starts.

Perry on the A.D.C. 9A, with Rolls-Royce "Eagle" engine, takes off next. Several alterations have been made to this machine, notably the suppression of the nose radiator and the fitting of side radiators instead. The original radiator was intended for the "Liberty" engine, and was somewhat too large for the Rolls-Royce "Eagle." The alteration has resulted in better running of the engine, and has added considerably to the speed of the machine.

Mr. Cyril Turner, on "The Sweep," Major Savage's S.E.5A, which is used for "sky writing," starts off several minutes after the D.H.9A. "The Sweep" looks anything but what its name might lead one to expect, being finished entirely in white, a colour which makes the machine look even smaller than the usual S.E.'s. Just before Turner starts, Mrs. Savage hands him a bunch of flowers to cheer him on his long journey and to bring him luck.

F. L. Barnard, Commodore of the Instone Air Line, is starting second to scratch. His D.H.4A, also an old-timer, is on the line, waiting the signal. This machine was, we believe, owned by Instones before they started their air services—in fact, before the old A.T. and T. commenced operations on the London-Paris route, when it was used for conveying important documents, or for personal calls, between the various Instone offices. The addition of the cabin top was, we believe, carried out at the Avro works at Hamble. Thus this machine is probably, next to Cobham's D.H.9, the oldest in the race. However, to return to the start, Mr. Reynolds raises his red flag, and Barnard mistakes this for the signal to start, opens out his engine and sails away. As a matter of fact he should, of course, have waited until the flag dropped, it being the usual procedure for Mr. Reynolds to raise the flag a few seconds before the starting time, by which competitors know that they have but a short time before the signal to go is given.



Filling up Courtney's Siddeley "Siskin" before the start.

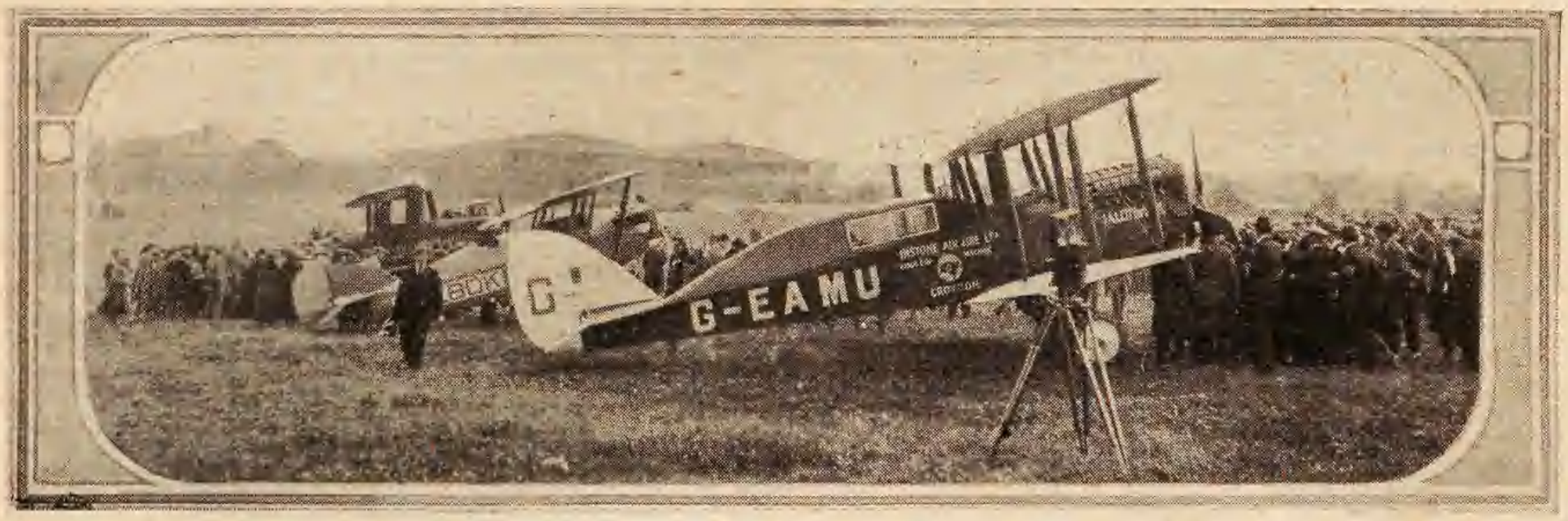
Once he had got away it was out of the question to recall Barnard, and the judges decided to delay his start from Birmingham by the 10 seconds he had "gained" by his faulty start.

In the absence of the Supermarine "Sea Lion," which was delayed in the Mediterranean owing to the steamer bringing it back to England from Naples (where it has just won the Schneider Cup) having to call at various ports, the Siddeley "Siskin," piloted by Courtney, is to start scratch. He gets his engine going without trouble, and with its 14 cylinders the Siddeley "Jaguar" appears to run extremely smoothly. We learn from Courtney that the absence of vibration when the engine is running all out is remarkable, and there is an overlapping of explosions which makes the "Jaguar" sound quite different from other radial engines.

As mentioned in our issue of last week, the "Siskin" is built for the Air Ministry, and no particulars are therefore permitted to be published, beyond what may be gathered from an external examination. The machine is a two-seater, in which it differs from the original "Siskin," and the mechanic appears to have some difficulty in wriggling into his cockpit. However, with the assistance of Courtney, he manages it a few seconds before the flag drops, and the "Siskin," after a very short run, soars into the air in a slight left-hand turn, and the last of the machines is on its way towards Birmingham, the first control.

The winning machine comes to a standstill. Capt. Barnard greeted by admirers.

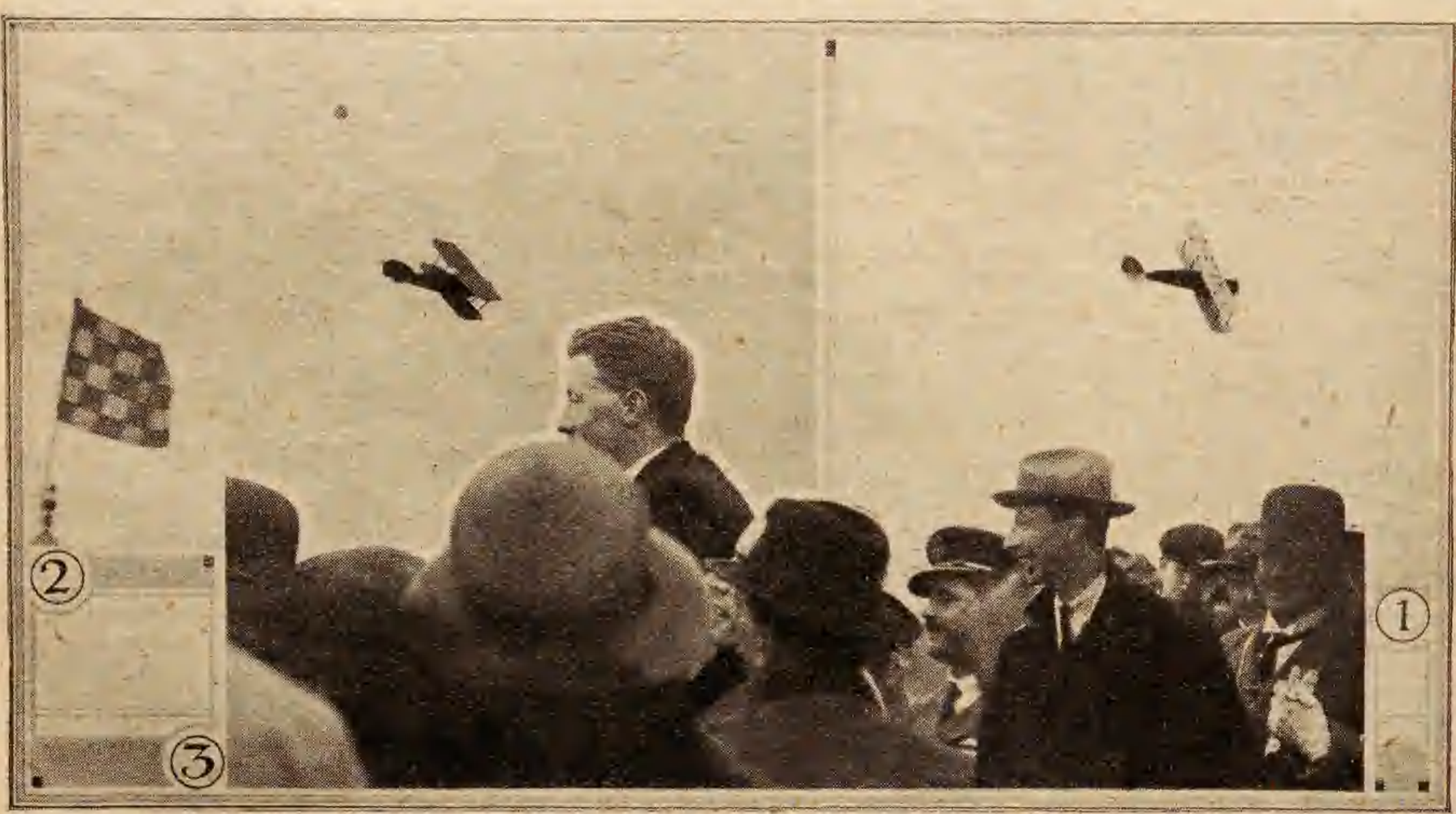
THE FINISH



THE FIRST THREE MACHINES HOME : Barnard's D.H.4A (the winner) ; Raynham's Martinsyde F.6 ; and Cobham's D.H.9B, lined up in front of the enclosures.

Again on Saturday the weather was anything but mild, a strong northerly wind blowing masses of cloud across the sky at a rate which promised a speedy journey for the machines which, that morning, would leave Glasgow and make their way, *via* Manchester and Bristol, back to Croydon. The Royal Aero Club had made arrangements for the accommodation of numerous visitors, and towards three o'clock in the afternoon the enclosures began to present an animated spectacle, people coming in in thousands, by motor, by tram from West Croydon and from Waddon Station. The threatening aspect of the weather no doubt kept a great number of visitors away, but by 3.30 the crowds in the enclosures showed that, in spite of the cold and the relative uncertainty of the exact time at which one might expect the first man back, the public still takes an interest in flying.

It had been arranged that two or three pilots were to give exhibition flights, but the organisers of the race went one better than that by arranging, in addition to the exhibition flights that had been promised, an impromptu race over the usual circular course between four machines. The machines flying in this race were piloted by Flying Officer Scholfield, Rex Stocken, S. H. Hayns and H. H. Perry (who had returned to Waddon after being out of the great race). The race was won by Perry, on the red S.E.5A, Scholfield having to retire owing to some slight indisposition on the part of his engine. While waiting for the arrival of the first man home, speculation was naturally lively as to who would be the winner. Barnard had been doing extremely well the whole way, but so had some of the other competitors, especially Raynham and Cobham. With regard to Barnard opinions were, apparently, approximately evenly divided. One side maintained that he ought to have been disqualified for starting before his time, and that he should have been recalled from the first control (Birmingham) so as to make a fresh start. This would, of course, have meant that he would have had to abandon the race, as the leeway would have been far too great to make up. The other side expressed the opinion that, in a race of over 800 miles, a start of 10 seconds, especially when so obviously caused by a *bona-fide* misunderstanding, could not possibly make any difference, compared with the number of other things which could happen during such a lengthy race. One thing, however, is quite certain : having once let Barnard carry on, and sanctioned his doing so by delaying his start from Birmingham by an amount equal to that "gained" by his faulty start, the officials could do no other than accept his other stages.



FINISH OF THE RACE FOR THE KING'S CUP : 1, Barnard crossing the finishing line. 2, Raynham finishes two minutes later. 3, Chairing the winner. Towards the right-hand side of the picture Raynham may be seen smiling good-humouredly at the hoisting of his successful rival.

KING'S CUP CIRCUIT OF BRITAIN AIR RACE

Race as Received by Air Ministry Wireless

PROGRESS OF FLIGHT

OUTWARD

Order of Start	Regn. Mark.	Machine.	Pilot.	Time Allowance, Out.	Croydon–Birmingham.		Birmingham–Newcastle.		Newcastle–Glasgow.		Net Flying Time.	Position.
					Depart.	Arrive.	Depart.	Arrive.	Depart.	Arrive.		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	
1	EAUM	Avro Baby ..	H. J. Payn ..	2 21 10	9 0 0	10 43 50	13 39 44	16 46 50	18 4 50	19 45 0	7 45 0	13
2	EAXL	Avro Baby ..	B. Hinkler ..	2 2 54	9 18 16	Non-sta	rter.					
3	EAGP	Sopwith Gnu	W. H. Longton	1 16 52	9 24 58	11 11 51	12 44 51	15 16 17	16 56 17	18 32 8	6 7 10	9
4	EADA	Avro Lucifer	C. R. Carr ..	1 46 43	9 34 27	11 8 26	12 38 26	Landed	Halifax.	—	—	—
5	EAMJ	Blackburn Kangaroo	Spenser D. A. Grey	1 26 56	9 54 14	11 25 48	12 55 48	15 55 18	Returne	d Newca	stle.	—
6	EASJ	Boulton and Paul P.9	C. T. Holmes	1 19 18	10 1 52	11 29 1	12 59 1	15 35 59	17 5 59	18 42 50	5 40 58	10
7	EAIU	Blackburn Kangaroo	R. W. Kenworthy	1 16 58	10 4 18	11 49 52	13 19 52	16 30 48	Returne	d Newca	stle.	—
8	EAWS	Boulton and Paul P.9	J. E. Tennant	1 14 29	10 6 41	11 28 3	12 58 35	15 44 11	17 14 11	18 54 1	5 47 20	11
9	EBEM	Vickers Vulcan	S. Cockerell ..	1 6 9	10 14 41	11 34 7	13 3 7	15 14 6	16 44 6	18 7 44	4 53 3	8
10	EAPR	Avro Viper	F. C. Broome ..	1 4 18	10 16 52	Landed	Halidon.	—	—	—	—	—
11	EAVP	Bristol Monoplane	R. A. de H. Haig	0 57 59	10 23 11	Landed	Aylesbur	y.	—	—	—	—
12	EBDK	Martinsyde F.6	F. P. Raynham	0 56 58	10 24 12	11 27 23	12 57 23	14 47 0	16 17 52	17 22 0	3 57 37	2
13	EBEV	Bristol 10-seater	C. F. Uwins ;	0 53 58	10 27 12	Landed	Northolt	—	—	—	—	—
14	EBAX	D.H.9c ..	L. Hamilton ..	0 49 9	10 32 1	11 40 46	13 10 46	15 4 21	16 34 21	17 51 20	4 19 19	6
15	EAAC	D.H.9b ..	A. J. Cobham	0 45 27	10 35 43	11 36 30	13 6 30	14 48 8	16 18 48	17 25 53	3 50 10	3
16	EBEP	D.H.9 ..	A. F. Muir ..	0 41 40	10 40 10	11 50 30	13 20 30	16 6 28	17 36 28	18 55 35	5 15 25	12
17	EBDO	D.H.37 ..	A. S. Butler ..	0 40 8	10 41 2	11 38 17	13 8 17	15 20 51	16 50 51	18 5 3	4 24 1	7
18	EBEN	D.H.9 ..	M. M. Piercey	0 39 16	10 41 54	11 40 15	13 18 27	15 7 46	16 37 46	17 47 24	4 5 30	5
19	EBCG	D.H.9a ..	H. H. Perry ..	0 35 5	10 46 5	Landed	Northolt	—	—	—	—	—
20	EBDU	S.E.5a ..	C. Turner ..	0 24 14	10 56 56	11 55 25	13 15 25	Returne	d Birmin	gham.	—	—
21	EAMU	D.H.4a ..	F. L. Barnard	0 23 30	10 57 40	11 50 57	13 20 57	14 52 17	16 32 17	17 19 53	3 22 13	1
22	EBEU	Siskin ..	F. T. Courtney	Scratch	11 21 10	12 11 10	13 31 17	15 8 15	16 38 15	17 43 0	3 21 50	4

HOMEWARD

Order of Start	Regn. Mark.	Pilot.	Time Allowance, Home.	Glasgow, Depart.	Manchester, Arrive.	Manchester, Depart.	Bristol, Arrive.	Bristol, Depart.	Croydon, Arrive.	Net Flying Time.	Total Net Flying Time.	Position.
			h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	
1	EAUM	H. J. Payn ..	2 29 2	9 58 10	13 10 44	Returne	d Manch	ester.	—	—	—	—
2	EAXL	B. Hinkler ..	2 9 46	—	—	—	—	—	—	—	—	—
3	EAGP	W. H. Longton	2 2 41	9 7 36	11 18 3	12 48 25	14 15 19	15 45 19	17 13 57	5 6 21	11 13 31	8
4	EADA	C. R. Carr ..	1 52 40	—	—	—	—	—	—	—	—	—
5	EAMJ	Spenser D. A. Grey	1 31 46	—	—	—	—	—	—	—	—	—
6	EASJ	C. T. Holmes	1 22 43	9 58 16	12 5 28	13 35 28	14 54 45	16 24 45	17 41 50	4 43 34	10 24 32	9
7	EAIU	R. W. Kenworthy	1 21 10	—	—	—	—	—	—	—	—	—
8	EAWS	J. E. Tennant	1 18 38	10 13 32	12 22 30	13 52 30	15 9 35	16 39 35	17 56 35	4 43 3	10 30 23	11
9	EBEM	S. Cockerell ..	1 10 12	9 35 41	11 43 24	13 13 24	14 27 30	15 57 30	17 6 52	4 31 11	9 24 14	7
10	EAPR	F. C. Broome ..	1 7 53	—	—	—	—	—	—	—	—	—
11	EAVP	R. A. de H. Haig	1 1 14	—	—	—	—	—	—	—	—	—
12	EBDK	F. P. Raynham	1 0 9	9 0 0	10 50 0	12 20 0	13 21 56	14 51 56	15 46 6	3 46 6	7 43 43	2
13	EBEV	C. F. Uwins ..	0 56 59	—	—	—	—	—	—	—	—	—
14	EBAX	L. Hamilton ..	0 51 54	9 37 35	11 37 46	13 5 46	14 13 25	15 43 25	16 48 52	4 11 17	8 30 36	6
15	EAAC	A. J. Cobham	0 47 59	9 16 3	10 50 0	12 20 0	13 27 34	14 57 34	15 55 40	3 39 37	7 29 47	3
16	EBEP	A. F. Muir ..	0 43 17	10 50 27	12 38 21	14 8 21	15 15 15	16 45 15	17 46 40	3 56 13	9 11 38	10
17	EBDO	A. S. Butler ..	0 42 22	10 0 50	11 32 29	13 2 29	14 2 50	15 32 50	16 27 5	3 26 15	7 50 16	5
18	EBEN	M. M. Piercey	0 41 28	9 44 5	11 24 23	12 54 23	13 56 16	15 56 16	16 23 10	3 39 5	7 44 35	4
19	EBCG	H. H. Perry ..	0 37 2	—	—	—	—	—	—	—	—	—
20	EBDU	C. Turner ..	0 25 34	—	—	—	—	—	—	—	—	—
21	EAMU	F. L. Barnard	0 24 28	9 33 14	10 57 30	12 27 30	13 23 0	14 53 30	15 43 51	3 10 37	6 32 50	1
22	EBEU	F. T. Courtney	Scratch	10 21 10	11 38 39	Returne	d Manch	ester.	—	—	—	—

Nevertheless, feeling ran high between the "laws is laws" party and those who were inclined to look more upon the spirit of the rules than on strict compliance with the words. There is a good deal to be said for both sides, although we rather incline to think that when rules are made they should be strictly adhered to, even if the penalties may appear unduly heavy for the offence committed. Certainly in the case of Barnard it would have been very bad luck to have been disqualified, but, on the other hand, once one begins to relax the rules, where is the line to be drawn ?

Just before a quarter to four a speck appeared to the west of the aerodrome, rapidly increasing in size. Through powerful glasses it could soon be seen that the machine was the D.H.4A, and as no other machine was in sight it became evident that the race had been won by Barnard. With a banked right-hand turn the machine swept across the finishing line, going a great pace down wind, and after circling the aerodrome Barnard landed and taxied towards the judges' tent in front of the enclosures, greeted by loud cheers. In the meantime another machine was seen to approach, which soon turned out to be Raynham's yellow Martinsyde F.6. Crossing the finishing line at high speed, Raynham swung round into the wind and alighted, taxying rapidly up behind Barnard and coming to a standstill by his wing tip.

The Race for the King's Cup : Our picture shows the cheering following the presentation of the Cup to Mr. Barnard by Col. Moore-Brabazon. Between Barnard and Col. Moore-Brabazon may be seen Sir Samuel Instone, entrant of the winning machine.

Barnard was chaired by admirers and carried in triumph up to the railings of the enclosures amid ringing cheers. His flying had been consistently good over the entire route, and if one grants that the original mistake should be overlooked, he thoroughly deserved his win. Even as it was, Raynham might have won the race but for the fact that his compass got into a spin and he had to make somewhat of a detour in order to get it steadied again. He was only two minutes and a few odd seconds behind Barnard, so that he lost the race by the smallest margin. The handicappers are to be congratulated upon having secured such a close finish after a race of over 800 miles.

While Barnard was being congratulated upon his victory Cobham came in third, and then followed at intervals Piercey, Butler, Hamilton, Cockerell (whose descent *à la* lift caused great admiration), Longton, Holmes, Muir and Tennant. That the handicapping was good will be realised from the fact that the first five men finished within 45 minutes. Considering that the race was over a distance of 810 miles and through very varied weather conditions, this is distinctly good. The slower machines had the worst of it, naturally, as they would be affected to a greater extent by the strong wind.

Payn had to return to Manchester with magneto trouble, after having gamely fought his way through high winds. To those who know the Avro Baby and its Green engine this was particularly disappointing, as but for this fact the machine would undoubtedly have given a good account of itself. That a similar trouble should have put Hinkler out of the running is even more regrettable, as the new racing Avro Baby was "some" 'bus and showed an excellent turn of speed. However, both the Avro Baby and the Green engine have far too well-established reputations for such minor mishaps to affect them adversely, and one can but regret the ill luck which prevented them from showing once more what they can do.

As to the fate which overtook the other machines that dropped out, this is referred to under the section dealing with the race as seen from the various controls. The Bristol 10-seater came down at Northolt, the news of which did not come as a surprise to those who heard the engine at the start on the Friday, and who had heard of the troubles that had been experienced at Netheravon. As is generally the case with forced landings, this one was not due to the engine itself, but to other parts of the installation. Perry on the D.H.9A also alighted at Northolt (with ignition trouble, we believe). Haig landed at Aylesbury and Broome at Halidon. The cause of their trouble we have not yet been able to ascertain. The two Blackburn Kangaroos got to Newcastle and made a start for Glasgow, but as it was getting dark they decided to return to Newcastle. A fresh start was made next morning, but the time that had been lost was too great to enable them to make it good, and they returned from Manchester to Waddon, arriving just after dark.

Carr on the Avro Lucifer lost his way, owing to the compass card dropping into the bowl of the compass, and descended to find out where he was. A tyre had been punctured previously, and as the field in which he had alighted was too small to get out of with mechanic and full load on board, he had to fly the machine off solo and pick up his passenger and certain spare parts in another field some three miles away. All this naturally took considerable time, and Carr decided to abandon the race. On alighting at Manchester he was loudly cheered by the spectators, who were under the impression that he had flown the proper course. He then made for Waddon, where he arrived during the afternoon. The Bristol Lucifer, he stated, had run splendidly throughout, and he had nothing but praise for this wonderful little three-cylinder air-cooled engine.

Turner returned to Manchester on his S.E.5A, his particular trouble being dirt in the carburettor, and Payn, as has already been stated, had to return to Manchester owing to magneto trouble.

Altogether the race must be judged a success, although many machines which had been expected to finish the course with flying colours were prevented by minor troubles from doing so. Curiously enough, the machines which did best in the race were of fairly old type. The winning D.H.4A is a War-time type, but its Rolls-Royce Eagle engine has a reputation for reliability. The de Havilland machines, of which a great number were entered, did well almost without exception, and Raynham's Martinsyde F.6 was within two minutes of the winner. The Vickers Vulcan, a commercial machine of recent type, completed the course without difficulty, although it was hampered by the high wind, and both the Boulton and Paul P.9's finished the course, in spite of the fact that they have engines of 90 h.p. only. Even the old Sopwith Gnu entered by Col. McClean, and flown by Longton, stuck it to the bitter end, once it did get going.

One lesson which, it appears, can be drawn from the race is that if it is possible for pilots to find their way around Britain without the assistance of directional wireless, it should be possible to run aeroplane services to towns in the north and Midlands, at any rate during many months of the year, if the necessary ground organisation were established.

At the close of the day the King's Cup was presented to Barnard by Lieut.-Col. Moore-Brabazon, and it was announced that His Majesty had intimated that he intended to present another Cup next year, the event to be an annual one henceforth. This announcement will be received with satisfaction by all interested in aviation, and the thanks of all are due His Majesty for his generous offer.

FROM THE CONTROLS

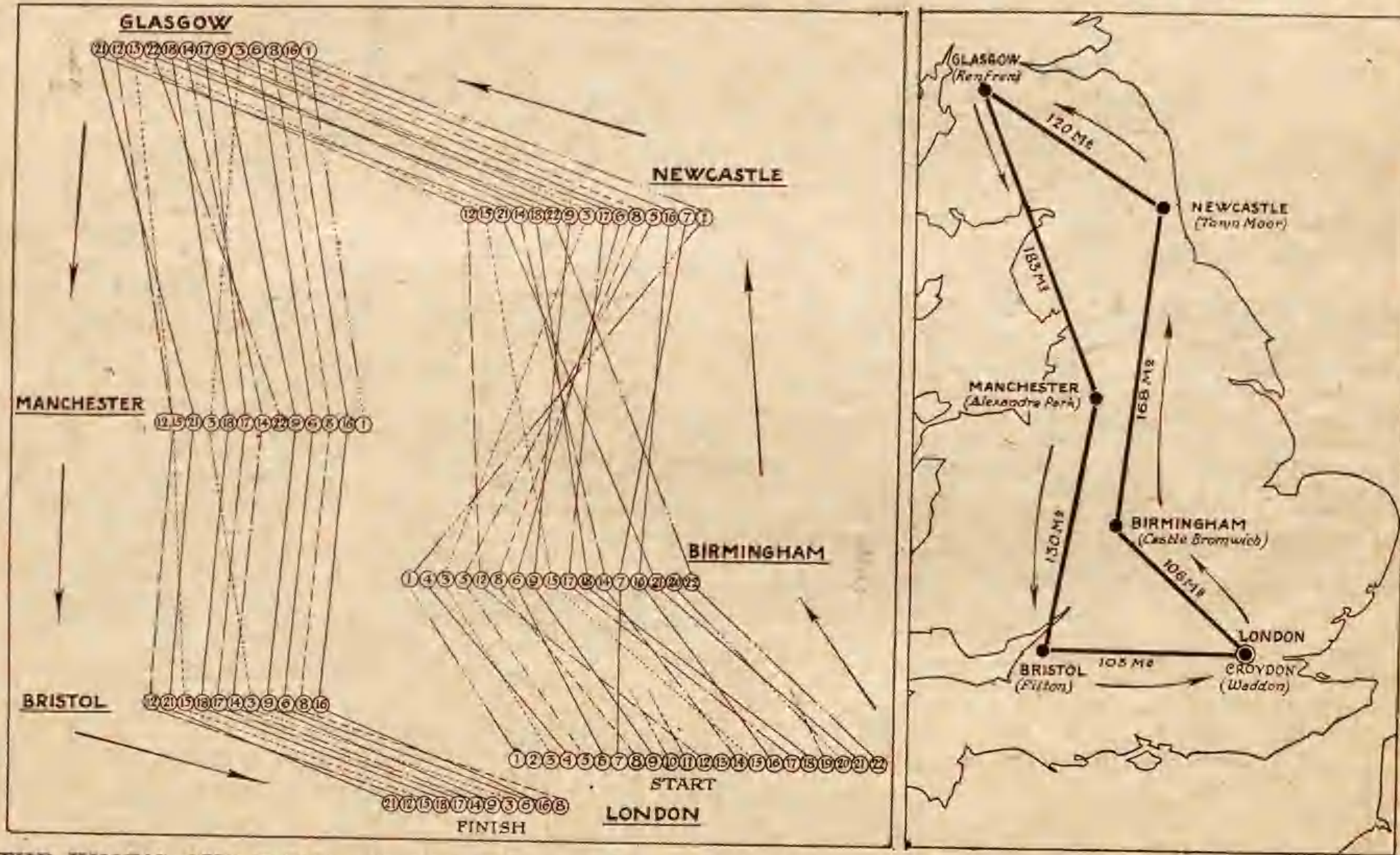
Croydon–Birmingham

SOME 6,000 people assembled at Castle Bromwich Aerodrome, Birmingham—the first control on the outward journey—to witness the arrivals. During the early part of the morning the weather was poor and visibility was bad, but by about 10 o'clock the sun came out and conditions were much brighter. The first to arrive was the limit man, Maj. Payn, on the Avro Baby, who crossed the line at 10.43.50, and reported a troublesome journey due to magneto trouble and thick weather conditions over Coventry. Some twenty-four minutes later Maj. Carr landed, followed in four minutes by Flight-Lieut. Longton. After this a bunch of competitors arrived within a few minutes as follows: Spenser Grey (11.25), Raynham (11.27), Tennant (11.28), and Holmes (11.29).

At 11.34 Cockerell arrived, with Cobham two minutes behind. Hamilton, with Lady Anne Savile, arrived next at 11.40, and both reported an enjoyable trip, having flown at about 500 ft. and made 115 m.p.h. Piercey and Butler were the next two to arrive, at 11.46 and 11.48 respectively. Then Muir and Barnard followed at 11.50, the former only 17 seconds ahead of the latter. Turner came in some five minutes later, and the last to arrive was Courtney, at 12.11.

The best time for this section was made by Courtney, whose speed was 127·2 m.p.h. Barnard was next with a speed of 120 m.p.h. Cobham and Raynham were both just on the 100 m.p.h. mark. Of the non-arrivals Broome was forced to descend at Daventry, owing we believe to plug trouble; Haig landed at Aylesbury, having experienced some minor engine trouble, to remedy which no spares were available; whilst Twins met with engine trouble from the start and descended at Northolt, but was not able to put things right in time to make it worth while continuing. Perry also landed at Northolt.

All who had arrived at Birmingham got away according to schedule, except Payn, who lost some 87 minutes owing to magneto trouble, and Piercey, who was delayed 9 minutes. After leaving Birmingham Turner experienced dirt-in-carburettor trouble, and had to land in a small field near Uttoxeter, where he unavoidably made a somewhat "rough" landing. Just before he did, however, the engine picked up, and believing the "all clear" had sounded, decided to make a fresh start. He had not gone far when he noticed that sundry bracing wires looked a bit "wonky," and wisely decided to return to Birmingham, and on arriving found that the rough landing had rather upset things a bit, so there was nothing for it but to retire.



THE KING'S CUP RACE: On the right a sketch map of the course. On the left a diagram of the progress of the race, showing the manner in which the various competitors changed positions. The figures, read from left to right, indicate the order in which competitors arrived at the various controls, and by following the lines the position of any competitor can be traced.

Birmingham–Newcastle

At Newcastle nearly 30,000 people gathered on Town Moor to see the competitors arrive. Weather conditions were none too good when the first man, Raynham, arrived at 2.47.52. About a minute later Cobham arrived. The third man in was Barnard, who arrived at 2.52.17. At four minutes past three, Hamilton and Lady Savile arrived, with another D.H.9, Piercey's, about three minutes behind. The scratch man, Courtney, was the next to arrive, one minute later. Cockerell, Longton, Butler, Holmes, Tennant, Spenser Grey and Muir then arrived in the order given at intervals of a few minutes. The last two to arrive were Kenworthy and Payn. Several of the competitors experienced troubles during this second stage. Courtney ran out of petrol just outside Newcastle, but managed to glide into the aerodrome. Raynham had compass trouble, and lost time in straying off the route a little. Longton had to land at Bakewell to change a plug, whilst Muir was forced to land at Chesterfield with valve trouble. Tennant ran out of petrol five miles from Newcastle, whilst Butler and Spenser Grey lost their bearings and had to land—the former at Middlesbrough, and the latter at Jarrow—to inquire their way. Carr also had compass trouble, and landed at Halifax in a rough field, and retired from the race, as previously reported.

Before the last two machines arrived at Newcastle four of the competitors were started on the final stage of the day's journey to Glasgow. These were, in the order of starting, Raynham, Cobham, Barnard and Hamilton. After this the others all got away on time. At 7.45 p.m. Spenser Grey and Kenworthy returned to Newcastle on the Kangaroos, as they decided they would not be able to get to Glasgow before dark. They continued their journey next day, however, and left Glasgow for Manchester in the afternoon. From Manchester they flew direct to Croydon, arriving late in the evening.

Newcastle–Glasgow

This last section was, perhaps, the most exciting of the day, as the leading machines kept very close together. Here also large crowds gathered at Renfrew Aerodrome and waited for the arrivals, whilst some R.A.F. pilots kept them amused with exhibition flights. It was not until 5.19 p.m. that the first man landed. This was Barnard on the D.H.4A, who was received with a great outburst of cheering, and on alighting he was welcomed by Lord-Provost Paxton, Lord Weir, and Sir Hugh Trenchard.

Two minutes later Raynham arrived on his "Martinsyde" having lost the leading position when only 20 miles from Glasgow. The third man in was Cobham, three minutes behind Raynham. Courtney came in fourth at 5.43, and then three D.H.'s arrived in the following order: Piercey (D.H.9) 5.47, Hamilton (D.H.9C) 5.51, and Butler (D.H.37) 6.5.

Two minutes after Butler came Cockerell on the Vulcan, and then there was a wait of nearly half an hour before the ninth man arrived, this being Longton. Eleven minutes later, and with eleven minutes between them, the two B.P.'s came in, Holmes leading, and Muir hustling in one minute behind them. Nearly an hour elapsed before the brave little Avro Baby and its plucky pilot, Payn, came in last *and* least.

Glasgow–Manchester

On Saturday morning, out of the 21 machines that started from Croydon, 13 had reached Glasgow, and were ready to make the homeward journey. Raynham, the first starter, was sent off at 9 a.m. in glorious weather, and the others started according to their times, Hamilton being delayed by engine trouble.

At Manchester an exciting race for first in took place between Raynham and Cobham, the former leading at first, only to be beaten at the last moment by a second or two. Barnard came in third, 7 minutes later, and Longton fourth at 11.18. The others followed at intervals of a few minutes in this order: Longton, Piercey, Butler, Hamilton, Courtney, Cockerell, Holmes, Tennant, Muir and Payn—the latter arriving at 1.10. It was greatly regretted by all that Payn was forced to retire at this stage, owing to magneto trouble. Courtney was also obliged to retire, as a centre-section fitting broke shortly after leaving Glasgow. After their one and a half hour's stop the remaining 11 competitors all got well away to time.

Manchester–Bristol

Raynham once again obtained the lead at the end of the second stage, with Barnard only a little over a minute behind. Cobham was next, four minutes later, and Piercey followed in about half an hour. The fifth man, Butler, and sixth, Hamilton, arrived 6 and 17 minutes after respectively, with Longton two minutes behind the latter. In about 12 minutes Cockerell arrived, and after a wait of 27 minutes No. 9, Holmes, came in—his reflection, Tennant, following 15 minutes later. Muir brought up the rear six minutes after. All eleven competitors arrived between 1.21 p.m. and 3.15 p.m., and all got away to time on the final stage to Croydon.

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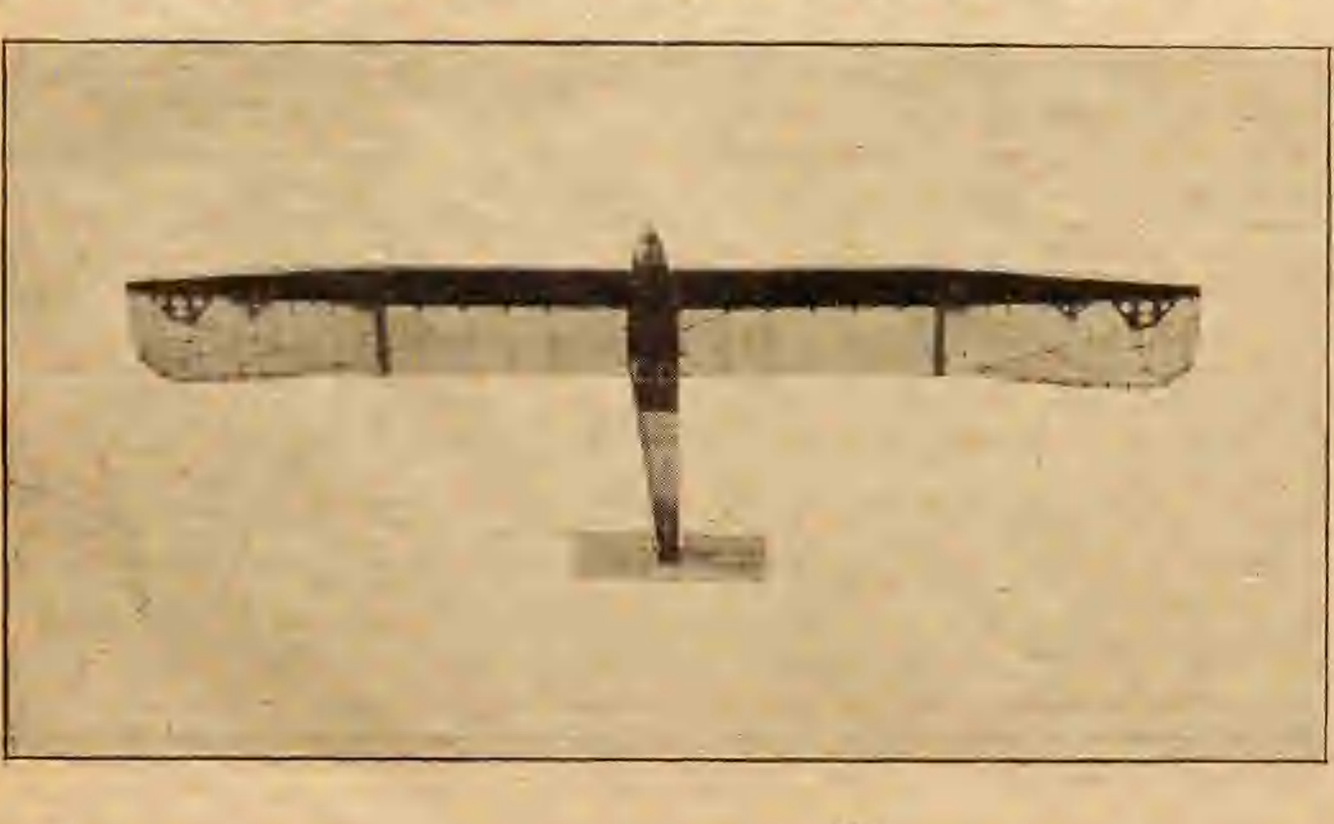
GLIDING, SOARING AND AIR-SAILING

IN connection with our Designing Competition, particulars of which were announced in our issue of August 31, the question has been raised what procedure should be adopted by intending competitors who wish to make certain enquiries regarding details of the competition. They should write us in their own name, as later on the designs will be submitted under a *nom de plume*, and the judges will thus not be aware of the identity of competitors. The fact that certain names of possible entrants thus come to our notice can therefore in no way influence the judging of designs submitted.

* * *

OWING to the very considerable amount of space occupied by our report of the race for the King's Cup, it has not been possible to include in this week's issue particulars of all the German gliders which took part in the Rhön competition in Germany. A great deal of descriptive matter, as well as a table of data and several photographs have therefore had to be held over until next week, when we can promise our readers a lot of interesting and valuable information relating to the German machines. In the meantime, we publish this week a photograph of the Hannover glider on which Herr Hentzen made a flight of over three hours. The scale drawings of this machine were published in our issue of August 31, and from the accompanying photograph, taken from underneath the machine, the alterations are fairly clear. Thus it appears that at the tip the trailing edge has been swept back, being now parallel with the leading edge. The span has, we believe, been slightly reduced, but otherwise the machine remains practically as it was in last year's competition.

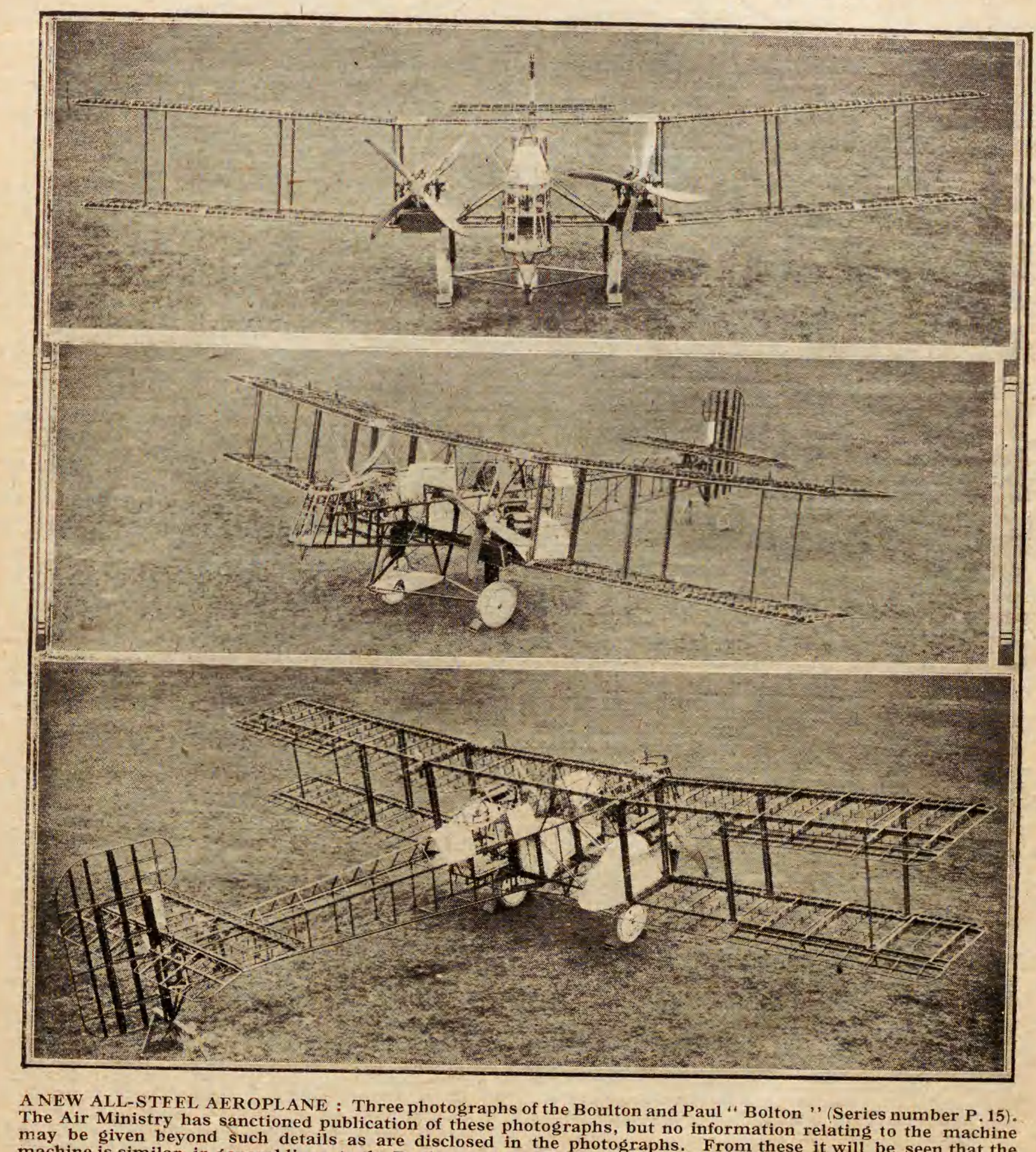


The Hannover Glider "Vampyr," on which Herr Hentzen remained aloft for over three hours.

AIRISMS FROM THE FOUR WINDS

When compared with the experiences and the distances achieved recently by competitors in the Gordon-Bennett Balloon Race, the following extract from *The Times* of August 1, 1822—one hundred years ago—is an interesting and striking contrast :—

" Cheltenham, Tuesday, July 30.—This afternoon at half-past three o'clock, Mr. Green, the aeronaut, with a gentleman named Griffith, made an ascent with a large and very beautiful balloon, from a yard at the back of the London Hotel in this town, amidst a more numerous assemblage of nobility, gentry, and fashionables, than was ever witnessed in this place on any former occasion. The weather was very favourable, and by three o'clock the balloon was filled, and displayed a most delightful transparent globe, quartered in alternate colours of blue, red and yellow, in size beyond anything ever before seen in England. At half-past 3 o'clock the gentlemen entered



A NEW ALL-STEEL AEROPLANE : Three photographs of the Boulton and Paul " Bolton " (Series number P. 15). The Air Ministry has sanctioned publication of these photographs, but no information relating to the machine may be given beyond such details as are disclosed in the photographs. From these it will be seen that the machine is similar, in general lines, to the Boulton and Paul " Bourges," but the detail construction is, of course, quite different. The power plant, it will be seen, consists of two Napier " Lion " engines.

the car (which was of most costly and elegant structure) apparently in high spirits; they both displayed the utmost coolness and intrepidity. . . . The balloon ascended in the most majestic manner amid the plaudits of thousands. Bets amounting to many thousands of pounds were depending upon the ascent. The course of the balloon was due east; it passed over Northleach and Lord Sherborne's park, and we hear the aerial voyagers descended near that place, after being half an hour in the trackless space."

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FOLLOWING this up, on the next day, August 2, 1822, the narrative was continued, and concluded as follows:—

"We inserted yesterday a letter from Cheltenham, giving an account of Mr. Green's ascent, and mentioning that some miscreant had contrived to cut one of the ropes which attached the car to the balloon. The consequence of this rope being cut was, that an arch was formed in the network, which from the unequal pressure continued to give way several times during the flight. We have to add the following particulars:—

"Within little more than a mile and a half of Salperton, they determined to descend, the car being at that time only upheld by one side of the balloon; their grappling irons came in contact with a wall, into which it was fastened by some country people near the spot, but it was speedily torn away, and they were dragged for a distance of four fields, knocked from hedge to hedge, till at length the balloon carrying them over a large grove up into the air, the car got entangled in a tree, and the inhuman means taken for their destruction proved, under the goodness and mercy of Heaven, the cause of their preservation; the ropes, which had been partly cut, gave way; freed from all control the balloon ascended, and they were flung in Nutgrove-field, from a tremendous height to the ground, Mr. Green insensible and nearly lifeless, and with his companion, lay for some time apparently senseless."

LONDON TERMINAL AERODROME

Monday evening, September 11.

ARRANGEMENTS for the opening of the new British air-lines to Berlin and Cologne are going steadily forward. It is expected that next week will see the start of the Cologne service, while the first section of the London-Brussels route should be opened by October 1.

Owing to the shorter period of daylight some of the late and early services will be altered in time during the week. On Wednesday the Daimler Airway will cancel their 2.30 p.m. service to Paris and the return service leaving Paris at 5.30 p.m., while the 11.30 a.m. from Paris will be changed to 9.45 a.m. The early morning newspaper service, which has been leaving Croydon at 5.30 a.m., will in future depart as soon after dawn as is practicable.

The popularity of "air-taxis" is growing rapidly, and the De Havilland Hire service have now quite a fleet of both three and four-seater "taxiplanes" which are always fully occupied.

Mr. Loader, of the Lep Aerial Travel Bureau, informs me that a Mr. William Ziegler, who had hired an "air-taxi" to fly him to Vienna, was so pleased with the trip that he extended his air tour to Trieste, Venice, Rome, Milan and Lyons, the "air taxi," which was piloted by Mr. Barnard, of De Havillands', landing him at Le Havre, where he caught a liner for America.

Mr. Young, one of the K.L.M. mechanics, accompanied Lieut.-Col. Tennant in his P.9. in the round-Britain air race, and his particular job was to see that there was plenty of petrol in the tank while the machine was in flight. It appears that the tanks of this machine did not hold sufficient petrol to complete some of the stages, and Mr. Young carried in his seat several two-gallon tins of petrol, which he poured into the tank while in flight. He tells me that this was a ticklish business, especially over the Lake district, where it was extraordinarily bumpy.

Mr. Bradley had an amusing adventure with a herd of bullocks, when he was compelled to alight at an old German aerodrome, about 30 miles out from Brussels, owing to bad weather. When he had "taxied" up to one corner of the aerodrome the bullocks made a rush for his machine and, evidently inspired by curiosity, commenced to nose round the machine. Before Mr. Bradley could drive them away, one of them had stuck his horns through the wing, and another had performed a similar action on the tail. They were driven off before any further damage was done, but when the weather cleared, and Mr. Bradley started to "take off," they again caused trouble by following the machine round the aerodrome as he tried to get into position head-to-wind.

The facilities that were embodied in the design of the D.H.34's for carrying spare engines were brought into use during the week by the Daimler Airway. One of their machines, when it arrived at Paris, was found to have developed engine-trouble, and it was decided to install a new engine. As there was no spare engine in Paris a wireless message was sent to Croydon, and a new engine was loaded into one of the 34's. The peculiar shape of the door allows this to be done with ease. In fact, it was for this particular purpose that the door was made that shape, while on the opposite side of the cabin is a removable port which allows the propeller boss to project out of the machine, thus allowing the entire engine to rest across the cabin.

The engine was flown over to Paris in 2 hours 10 minutes, and was installed, ready for the machine to return, by the following day.

The K.L.M. are now running a single service in each direction daily between London and Amsterdam, and are making increasing use of the Rolls-Fokkers.

A Joy-Riding "S.O.S." from Rotterdam

I AM informed that the aviation meeting at Rotterdam is attracting a large crowd of people who are desirous of making aerial "joy-rides," and that the K.L.M. machines took over 1,000 of these up in the course of a day or two. In fact, they were unable to cope with the demands of joy-riders, and sent telegrams to the British firms at Croydon asking if they would send over machines to give a hand with this rush. Owing to the demands of the regular services, however, it was found impossible for any of the companies to spare a machine. So it is possible that the German commercial machines at this meeting will be doing good business in this direction.

The Sports' Club have acquired a new site for their football ground, and had it all laid out for the opening match of the season on the 2nd inst. The ground is alongside the wireless hut, and, in spite of a slight ridge in the centre, running from goal-post to goal-post, is the best in the neighbourhood.

The Football club is now going strong, having won their first two matches. There seems to be far more enthusiasm for football than for cricket on the aerodrome, and the club seems assured of a successful season, with plenty of players to choose from.

Mr. Cogni, the general manager of Handley Page Transport, has returned from a motoring holiday, and tells me that he had the greatest difficulty in getting away from "shop." Not only was he pursued by letters and telegrams, but his companion would insist on talking "shop." Next year Mr. Cogni intends to travel to some unknown destination on the continent, and to go alone.

Handley Page Transport continue to carry good loads of both passengers and freight on all their services, and are getting ready for the rush of traffic when they become the only British service on the London-Paris route.

With the prevailing wind from the north the aerodrome has again been shrouded in mist most mornings during the week. On one particular day machines were arriving, and circling round overhead, entirely hidden from those on the ground by the mist. The aerodrome officials were anxious as to the ability of the pilots to see where they were; but the machines alighted quite as usual, the pilots declaring that, though they themselves were invisible from the earth, they could see down through the mist quite distinctly.

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Aero Golfing Society

THE first Autumn Meeting of the Aero Golfing Society will be held, by the kind permission of the St. George's Hill Golf Club, on the latter's links at Weybridge on Wednesday, September 20. In the morning there will be the Medal Round for the Aero Golfing Society Autumn Challenge Cup (presented by Cellon, Ltd.). Runner-up, prize from the Society. The afternoon will be devoted to Bogey Foursomes: 1st prizes presented by Mr. C. R. Fairey, 2nd prizes from the Society. Members may select their partners for the Bogey Foursomes, and it is understood they play together in the Medal Round in the morning. Couples fixing up should notify the Secretary beforehand. Members requiring partners should also notify the Secretary. The first couples will tee off at 10 o'clock.

The Committee has decided that this being the first meeting of the Society an Informal Dinner shall be held at the Royal Aero Club on the evening of the meeting. Price 5s. each.

THE ROYAL AIR FORCE

London Gazette, September 5, 1922

General Duties Branch

The following are granted short service commns. as Pilot Officers on probation, with effect from, and seny. of, Aug. 21 :—J. O Barnes, C. A. Cole, C. E. N. Guest, G. G. Hopkins, A. Malone, D. G. Pinnell, A. M. Rowe, F. R. D. Swain. Flying Officer R. L. McK. Barbour, D.F C., is placed on half-pay, Scale B, from August 30 to September 8, inclusive. Flying Officer L. G. Harrison is transferred to Reserve, Class C September 4. Flying Officer J. E. Arnott relinquishes his short service commn. on account of ill-health and is permitted to retain the rank of Lieut, September 6. Flying Officer A W. Scott (Sub-Lieut., R.N.) relinquishes his temp. commn. on retirement from R.N. ; August 8. The short service commn. of Flight. Lieut. R. M. Bankes-Jones is terminated on appt. as Chaplain ; September 7.

Medical Service

D. J. Jones, M.B., is granted temp. commn. as Flight Lieut., with effect from, and seny. of, August 21. Flight Lieut. J. C. Smyth is transferred to Reserve, Class D 2, August 26.

Chaplains' Branch

The Rev. R. M. Bankes-Jones is granted short service commn., with relative rank of Squadron Leader, for purposes of precedence, administration and discipline ; September 7. The Rev, H. Marshall, M.A. resigns his perm. commn. ; September 7.

London Gazette, September 8, 1922

Wing Commander G. Laing, O.B.E., is appointed Deputy Director of Equipment, Class 2, Air Ministry (August 1).

General Duties Branch

Wing Commander T. O. Lyons, O.B.E., is placed on half-pay, scale A, (September 6). Flight Lieutenant P. G. N. Ommanney is placed on half-pay, scale B, for six months from August 11.

Stores Branch

Flying Officer S. H. Atherly is dismissed the service by sentence of General Court Martial (August 19).

NOTICES TO AIRMEN

Holland : Height of Flight

1. The Netherlands Government have amended as follows the regulations as to the height of flight over inhabited areas in Holland :—The minimum height of flight over closely inhabited areas is 400 metres (1,312 ft.), but aircraft must always fly at such a height over towns or public gatherings as will permit of their landing outside such areas in case of engine failure. No trick flying may be carried out above closely inhabited areas or public gatherings."

2. *Previous Notices.*—Para. 1 of Notice to Airmen No. 138 of 1920 is hereby cancelled.

(No. 96 of 1922.)

France : Marseille Aerodrome

THE following is now available :—*Marseille* (*Marignane*) Civil Customs Aerodrome.

Position.—Lat. 43° 26′ N., Long. 5° 13′ E. Situated on the S.E. side of the "Etang de Berre," 2 kms. N. of Marignane and 21 kms. N.W. of Marseille.

Dimensions for landing.—500 × 400 metres (to be increased later).

Markings.—A circle with the name "Marseille" is marked on the ground.

Accommodation, Etc.—Hangars and supplies, but no repair facilities, are available.

Telephone.—A telephone has been installed—No. Marignane 20.

Note.—This aerodrome is designed as a combined aerodrome, seaplane base, and airship station. Seaplanes can alight on the adjoining lake. One seaplane shed is at present available, and a slipway is under construction.

Further particulars regarding the seaplane and airship facilities will be notified as they become available.

(*No. 98 of 1922.*)

Personals

Married

Flight-Lieut. LOUIS HENRY PAKENHAM-WALSH, D.F.C., R.A.F., third son of the late Louis Henry Pakenham-Walsh, "Old Vicarage," Neston, Cheshire, was married on August 9 at St. Andrew's Church, Uxbridge, to DOROTHY EVA, eldest daughter of Mr. and Mrs. W. R. GREVES, "Laurenny," Bourne End, Bucks.

To be Married

A marriage has been arranged, and will shortly take place, between Maj. HERBERT G. BRACKLEY, D.S.O., D.S.C., R.A.F. (Lieut.-Commander, attached I.J.N.), eldest son of Mr. and Mrs. Brackley, of Harringay, and FRIDA H. MOND, elder daughter of Mr. ROBERT MOND, J.P., of Combe Bank, Sevenoaks, and of 50, Wimpole Street, W., the elder brother of Sir Alfred Mond. Maj. Brackley joined the R.N.A.S. in June, 1915, at the age of 19, and a month later took his pilot's certificate. The following year he was in command, at Dunkirk, of a Handley Page bombing squadron which alone dropped 540 tons of bombs on enemy objectives. His conspicuously good work as pilot won him both the D.S.C. and the D.S.O. in 1917. On one occasion Maj. Brackley returned from a bombing flight with forty holes in his machine. Maj. Brackley was one of the heroes of the Handley Page Transatlantic flight in 1919.

ROYAL AERONAUTICAL SOCIETY

"*R.38*" *Memorial Research Fund.*—The following donations to the "R.38" Memorial Research Fund have been received since the publication of the last list :—Officers, R.A.F., Peshawar, £7 5*s*. 2*d*., Capt. E. G. Walker £2 5*s*., and the Officers on the Staff of the British Aviation Mission, Japan, £20, bringing the total amount received to £1,240 12*s*. 10*d*.

Library.—The following book has been received and placed on the Library shelves : "A Dictionary of Applied Physics," Vol. 11, Electricity.

W. LOCKWOOD MARSH, *Secretary*.

A Spad 58 for Coupe Deutsch

AMONG the French entries for the Coupe Deutsch is one which in the official announcement of the entries is styled Bleriot-Casale. Some speculation has been caused as to the design of this machine, and our readers will therefore probably be interested to learn that the racer is a Spad-Herbemont, similar in all respects to the "Monoplace de Chasse, Spad 41," with the exception that the engine is one of the new 12-cylinder "broad arrow" type 450 h.p. Lorraine-Dietrichs. The racing machine is, we believe, known as the Spad 58. Owing to the absence of armament, etc., the total weight has been considerably reduced, so that with an increase of 50 per cent. in horse-power the new machine should be very fast.

In its general lines the machine is a typical Spad-Herbemont, having the characteristic single interplane struts, backswept top plane, and monocoque Tulip wood *fuselage*. The whole of the wings, however, with the exception of the fabric covering, is built of metal, Duralumin being used for the spars, ribs, inter-plane struts, etc., and steel for such fittings as wiring plates, etc. The undercarriage also is all-metal, with all joints pin-jointed so as to avoid heavy bending stresses under deformation.

The main characteristics of the Spad 58 are : Length, 21 ft. 3 ins. Span, 28 ft. 1 in. Chord, 5 ft. 4 ins. Height, 9 ft. 2 ins. Wing area, 278 sq. ft. Weight loaded, 2,530 lbs. Wing loading, 9.1 lbs./sq. ft. Power loading, 5.7 lbs./h.p.

Cairo-Baghdad Air Mail

THE Postmaster-General announces that the air mail for Baghdad which left London on August 24 reached Baghdad on September 2. The air mail for London which left Baghdad on September 2 reached Cairo the next day, and should arrive in London about Monday next.

The next air mail for Baghdad will leave London on Thursday, September 21.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association.)

AT the Meeting held on Thursday, the 7th inst., at Headquarters, important business was carried out.

In future meetings will be held on Fridays at 7.30 p.m. instead of Thursday as heretofore.

An important discussion was held with reference to *fuselage* models. It was decided, in order to define *fuselage* models as distinct from freak models, to settle upon a formula giving a definite minimum ratio of between maximum cross section of *fuselage* and its length. All machines having a smaller ratio than this will, in future, not be considered *fuselage* models, either for the purpose of competition or record breaking.

The formula eventually decided on is as follows :—

$\frac{\text{Length of body in inches}}{5}$ = Minimum Area of maximum cross section in square inches. Mr. Felix Kelly's Challenge Cup for best duration in a single flight by compressed-air-driven model aeroplane will be competed for on Wimbledon Common, Saturday next, the 16th inst., at 5 p.m. punctual. Members who are not competing are specially requested to give a demonstration with their ordinary models for the edification of the general public.

An Extraordinary General Meeting will be held at Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, on the first Friday in October, at 7.30 p.m., for the purpose of electing officers for the ensuing twelve months, and other business. Hon. Secretary: A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

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SIDE-WINDS

IN connection with the King's Cup Race, over a distance of 810 miles around Britain, it is of interest to note that the winner, Capt. Barnard, ascribes much of his success to the perfect functioning of his compass. This is designed on a principle patented by Dr. Bennett, and is made by Hughes, S. Smith and Sons (M.A.), Ltd., of Cricklewood, being the sole concessionaires for Great Britain. In a race such as the Circuit of Britain a good compass is a most valuable companion, and the consistently good flying of Barnard seems to indicate that he must have flown a most excellent course. With regard to the other machines in this race, we were not able to make a definite list of those which carried Smith's instruments, but from rapid glances into a great number of cockpits we certainly received the impression that a very large percentage of instrument boards showed the well-known black dials.

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CAPT. BARNARD's Rolls-Royce "Eagle" engine, which pulled him through to victory, ran, we learn, without a hitch throughout the 810 miles' race. That was to be expected, of course, but the fact that the engine was running on "Shell" Aviation Spirit may have had something to do with it. Another aerial triumph added to the long list of "Shell" achievements. The "Eagle" was, we learn, running full throttle most of the time, and at a full throttle of 1,930 r.p.m. at that, which is 130 r.p.m. above the normal speed for which it was designed. Yet at the end of the race there was no sign of engine trouble, and the "Eagle" seemed fit to do the whole trip a second time.

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THE D.H.4A, winner of the King's Cup, was, we learn, doped with "Cellon," as was also Raynham's Martinsyde F.6. The yellow and black colour scheme of the latter is very distinctive, and was chosen by Raynham after examining the large range of colours which are available with the Cellon doping schemes. Incidentally it is of interest to learn that Cellon (Richmond), Ltd., always well to the fore in anything new, have produced a special dope for gliders. Anyone interested should apply to Cellon (Richmond), Ltd., 22, Cork Street, London, W.1, for particulars and prices.

- - -

THE record of the Daimler Airways' D.H.34 keeps going up. This machine has now completed a distance of over 80,000 miles during a period of four months, which speaks volumes not only for the machine, but also for its Napier Lion engine.

- - -

THE Schneider Cup Race at Venice, which was won by Capt. Biard on a Napier-engined Supermarine flying boat, was flown in almost unbearably hot weather, so much so that all the pilots were in fear of getting sunstroke. The problem of adequate cooling of the engine was therefore a difficult one, but we learn that the Serck radiator with which the Napier "Lion" was fitted functioned excellently, and that never during the race, in spite of the strenuous conditions, did the engine show signs of overheating. Serck Radiators have already made their name a household word in the motoring world, and the performance of the radiator fitted on the "Lion" seems to indicate that on aircraft also Serck is, literally, well ahead.

⁂

PUBLICATIONS RECEIVED

The Professional Photographer. September, 1922. Kodak, Ltd., Kingsway, London, W.C. 2.

Technical Note No. 106. *Notes on Aerodynamic Forces—III. The Aerodynamic Forces on Airships.* By Max M. Munk. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 126. *Aeronautic Instruments, Section II. Altitude Instruments.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 132. *Aeronautic Instruments, Section VIII. Recent Developments and Outstanding Problems.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xx.)

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. or Oct.	**R.Ae.C. Race Meeting, at Waddon**
Sept. 30	**Coupe Deutsch (300 kil.)**
Oct. 16–21	**Daily Mail £1,000 Gliding Competition**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

OCTOBER 1, 1922, will go down in history as the first date on which an air force has ever been in supreme command over other forces in their duties of policing a province or district. To Air Vice-Marshal Sir John Salmond falls the honour of being the first Air Force officer to be placed above the officers in command of units of the other fighting arms. When it was first announced,

R.A.F. in Irak

nearly a year ago, that the Government's policy in Mesopotamia was to be based upon maintenance of peace by the R.A.F., instead of by Army units, we received the announcement with satisfaction, because we believed that in this way the work of policing a country of such a nature could be more efficiently and expeditiously done by the new arm. Since then we have had no occasion to change our views, and we therefore again express our satisfaction with the decision to hand over Irak to the R.A.F., in the firm conviction that this service will worthily carry out the task imposed upon it, a task which will be by no means an easy one, and which will demand from every one—from Sir John Salmond downwards—the best of which he is capable. Let the R.A.F., Irak, remember that the eyes of the country—the eyes of the world, for that matter—will be focussed upon Irak during the coming months, and that by the results obtained the question will be largely decided of whether or not in the future such duties shall devolve in increasing degree upon the R.A.F. We have no hesitation in saying that in Air Vice-Marshal Sir John Salmond (who will probably take over as Air Marshal) the R.A.F., Irak, has probably the best chief it would be possible to find, and if all officers and men under him give of their best and remain loyal to their chief, we have not the slightest doubt that all will be well.

At the same time, we think it our duty to offer a word of warning. There have been very strong criticisms of the way in which the R.A.F. in India have been wasted, and, from some uninformed quarters, such shortcomings as have been manifest have been used in proof of the unsuitability of an air force for work of this nature. Nothing could be farther from the truth, but lack of spares and other essentials, caused by a desire for "economy," has so hindered the work and impared the efficiency that the R.A.F. has not had a fair chance of showing what it can do. Although the R.A.F., Irak, will be in a much more favourable position, inasmuch as it will be in direct contact with the Air Ministry and the Government, and not rely upon the Indian or other Government, the tendency to "economise" is present at home no less than in India, and from the list of equipment published elsewhere in this issue it will be seen that the majority of machines going out with the squadrons are of fairly old type. It is true that so long as these machines are maintained in first-class condition, by good supplies of spares and by adequate ground staffs, they are as good, probably, as those of any other country at the present time, but it should be kept in mind that progress is rapid, and that, in all fairness to the gallant officers and men of the R.A.F., we should not—must not—continue to expect the R.A.F. to do its work on old war stock. There are now in existence British designs far in advance of anything which is being sent out to Irak, and gradually these must replace the older types with which the start is being made.

* * *

Glider or Aviette?

In the midst of the enthusiasm for gliding which has been aroused during the last few months, there is already signs of a division of opinion as to whether gliding is, after all, likely to carry us much further, or whether we should not do better by devoting our energies to the evolution of a type of power-driven aeroplane which will fly with engines of a few horse power only. The two schools are both emphatic in their views, but we think that, as usual in such cases, the truth lies somewhere between the two extremes. We have always held that gliding can provide excellent sport, but have never shared the optimistic view that its practice will lead to the development of types of aircraft which will be commercially useful and will be able to make long trips, to a fixed time table and over given routes, by the aid of the energy in the wind only, without other motive power.

The opposite view, that gliding cannot possibly teach us anything, is, to our way of thinking, equally incorrect. Gliding can undoubtedly teach us a good deal about best wing forms, best fuselage shapes, effective controls, and so on. In other words, it provides an opportunity of carrying out, for a very small capital outlay, full-scale experiments which would, if conducted with power-driven machines, cost considerable sums of money. The machine of ultra-low power is certainly a possibility. In fact, it is possible to predict with fair accuracy, without introducing uncertain features, that a small, lightly-loaded, single-seater machine can be built which will fly level—that is to say, will just be able to remain in the air without descending—for a power expenditure of about 4 or 5 horse power. Such a low-powered machine would, however, have no reserve power for climbing, and might easily, we think, be more dangerous than a pure glider in which the pilot would know that no other power was available than that obtainable from the wind.

It has been suggested that progress might be made by fitting a very low power engine in a glider, and merely using the power when the wind dropped or when the machine got out of an ascending current. We very much doubt if such a procedure would be satisfactory. As soon as an engine is fitted the elements of an ordinary aeroplane are introduced, such as noise, vibration, propeller draught, etc., and it appears to us doubtful whether pilots would be able to change over from gliding to propelled flight, and *vice versa*, sufficiently quickly and at the correct instant to make such a compromise successful. The very presence of an airscrew would detract considerably from the gliding angle of the machine, and then there is the difficulty of starting the engine, should it, as would frequently happen, stop altogether while running throttled down. To re-start would mean a steep dive, with consequent loss of altitude.

To us it seems that the best policy will be to learn as much as we can from pure gliding, and then, with the knowledge thus accumulated, attack the problem of low-power flight afterwards. In that way much more is likely to be learned than if we start off straight away with "Aviettes." That it will ultimately be possible to fly at a speed of 50 or 60 m.p.h. with a power expenditure of about 10 h.p. we are quite prepared to believe, but before the really satisfactory machine can be evolved which will do this we think a thorough study of gliding and soaring should be made.

* * *

The R.Ae.C. "Coming of Age"

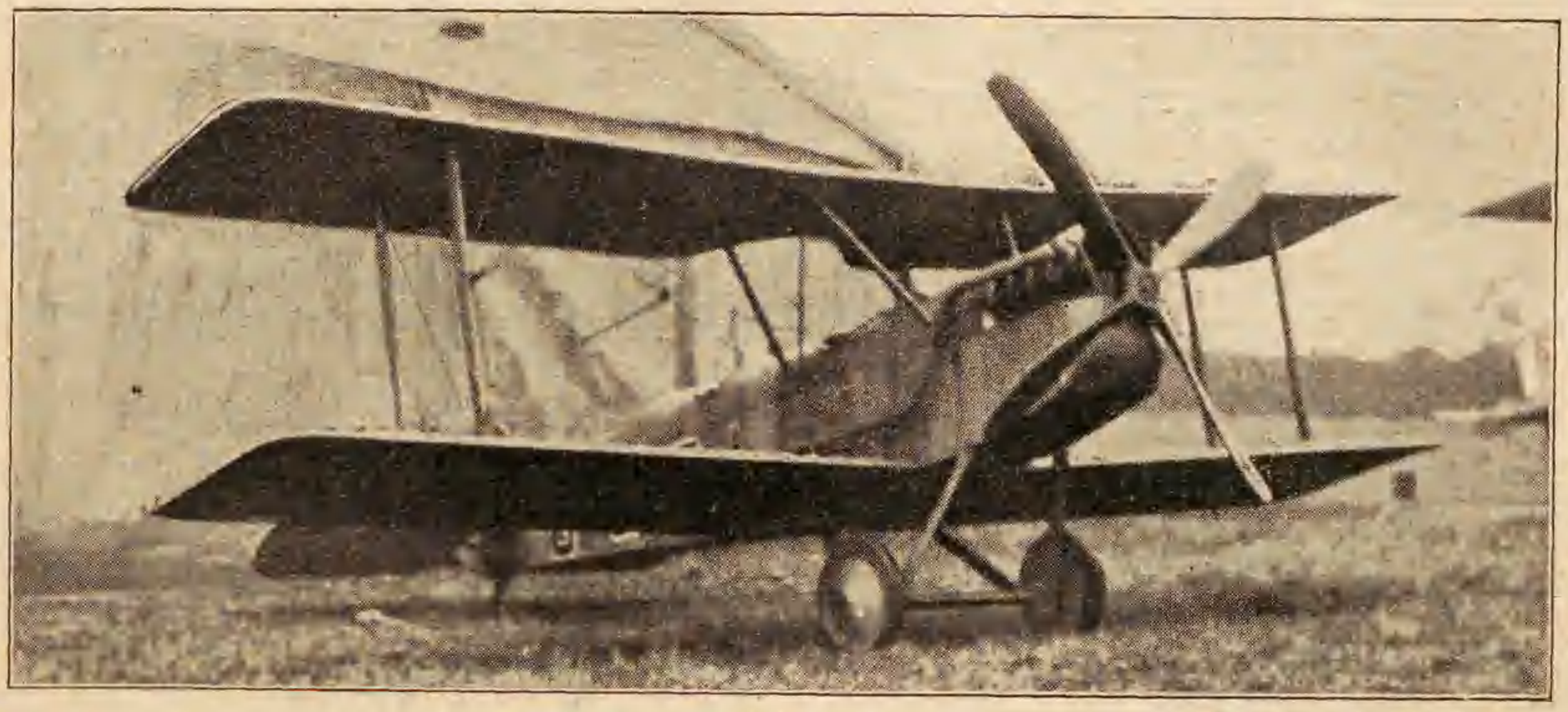
Next Sunday, September 24, the Royal Aero Club attains its majority. On that date, in 1901, a party consisting of Mr. Hedges Butler, Miss Vera Butler (now Mrs. Iltid Nicholl) and the late Hon. C. S. Rolls made an ascent in the balloon "City of York" from the Crystal Palace. At an altitude of 5,000 ft. above London, Mr. Hedges Butler suggested the formation of a club to control the science and sport of flying, and the idea was adopted unanimously by the little party. By the time a landing was made at Sidcup the Aero Club was in being. The Club rapidly developed, and did a tremendous amount of good in the services of aviation during the early years when those who believed in the possibilities of flying were ranked as cranks, to say the least. In spite of all handicaps, however, the Club flourished, and in 1912 the Club achieved the honour of becoming known as the Royal Aero Club, Mr. Hedges Butler receiving from the Home Office a letter announcing that His Majesty had been pleased to grant permission to members of the Club "to fly on their aeroplanes, airships and balloons a burgee bearing a representation of His Majesty and surmounted by a Royal Crown."

It is of interest to recall that the inaugural ascent of the Club was made in November 1901, when the "City of York" ascended from Stamford Bridge, piloted by Mr. Stanley Spencer. At an altitude of a few hundred feet above London Miss Butler unfurled a white banner some 12 yards long, bearing the words "Aero Club." The burgee of the Royal Aero Club is now, of course, a familiar sight to all interested in aviation, but in those days few—even among the enthusiasts—would have dreamed of the extent to which flying in all its branches was destined to develop during the next 21 years.

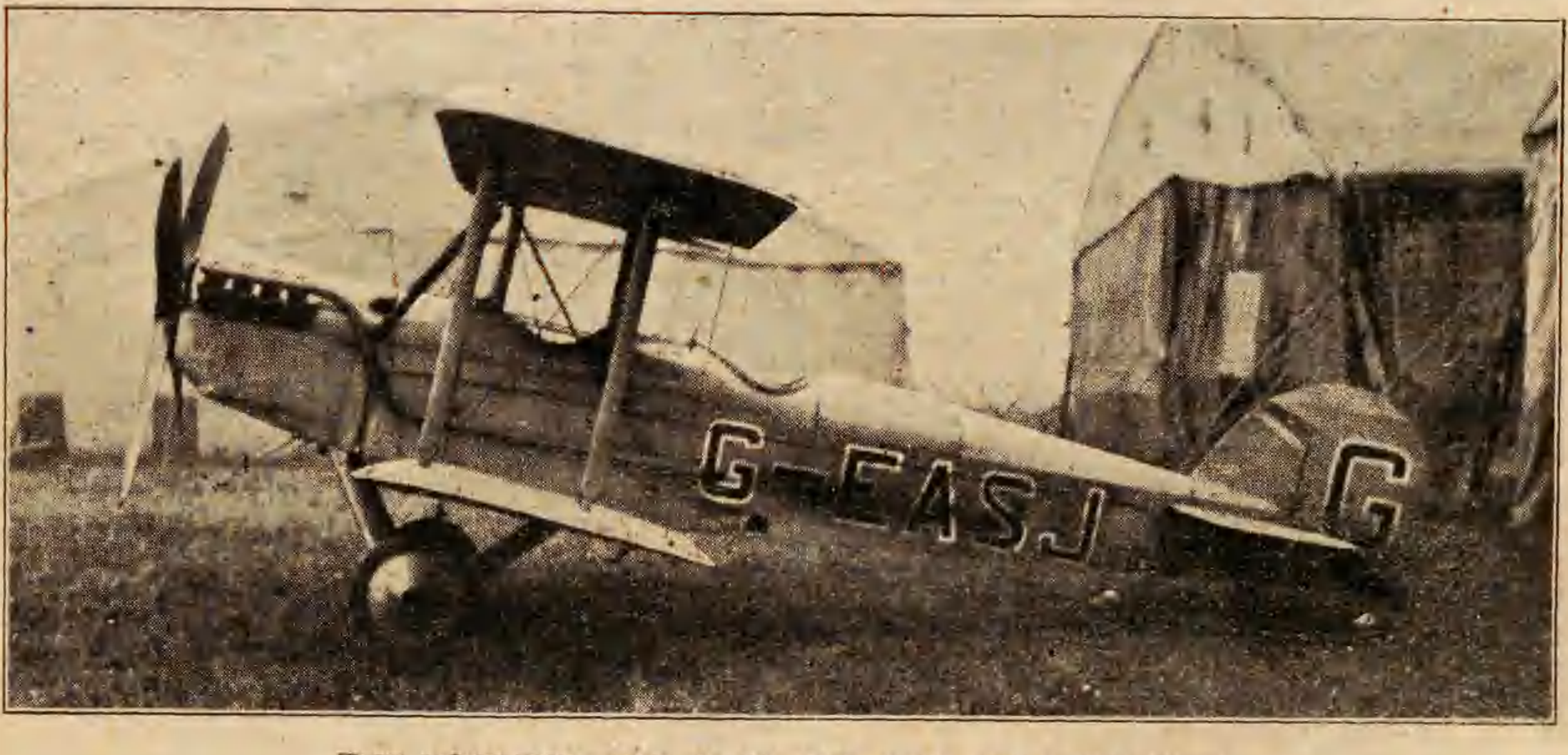
On its formation in 1909 FLIGHT was chosen as the Official Organ of the Aero Club, and has remained so ever since.

THE BOULTON AND PAUL P.9. BIPLANE

IT has been maintained that the aeroplane, at present, cannot hope to make much of a success in connection with regular air services within the British Isles, inasmuch as existing means of communication could only be but slightly improved upon. Be this as it may, we are convinced that the aeroplane can be made to serve a very useful purpose here at home in another direction, *i.e.*, as a "private" means of communication, either for business or pleasure. In fact, we are at a loss to understand why this side of aviation has not developed more than it has—if it can be said to have developed at all. Aerial taxi work, it is true, is becoming more popular, but the number of owner-pilots in this country is well under the half-dozen, in spite of the fact that "private" flying should be just the sort of thing that would appeal to the British sportsman. It is not that there are any great difficulties in the way to prevent the aeroplane being put to such a use—either for the owner-pilot or the owner with pilot-chauffeur, whilst it has been demonstrated on several occasions that the actual flying can be accomplished with as much safety as with motoring, and with but little, if any, extra cost. Neither is there any dearth of suitable machines, for during the last few years our constructors have produced several machines capable of giving very satisfactory results in this particular class of work. One of these machines, which has been more or less hiding its light under the proverbial bushel, is the Boulton and Paul P.9 which forms the subject of the accompanying illustrations and notes.



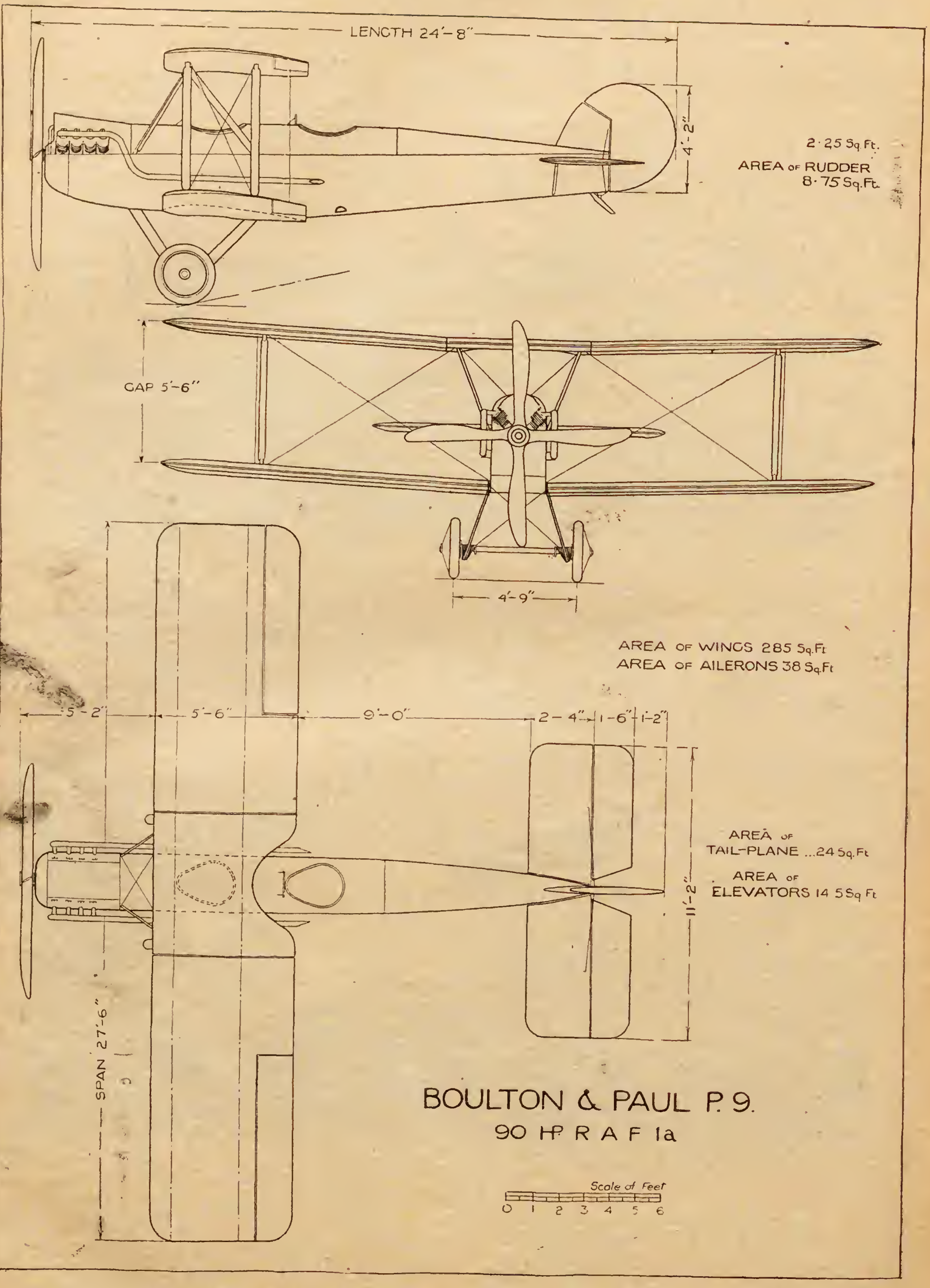
THE BOULTON AND PAUL P.9. BIPLANE : Three-quarter front view.



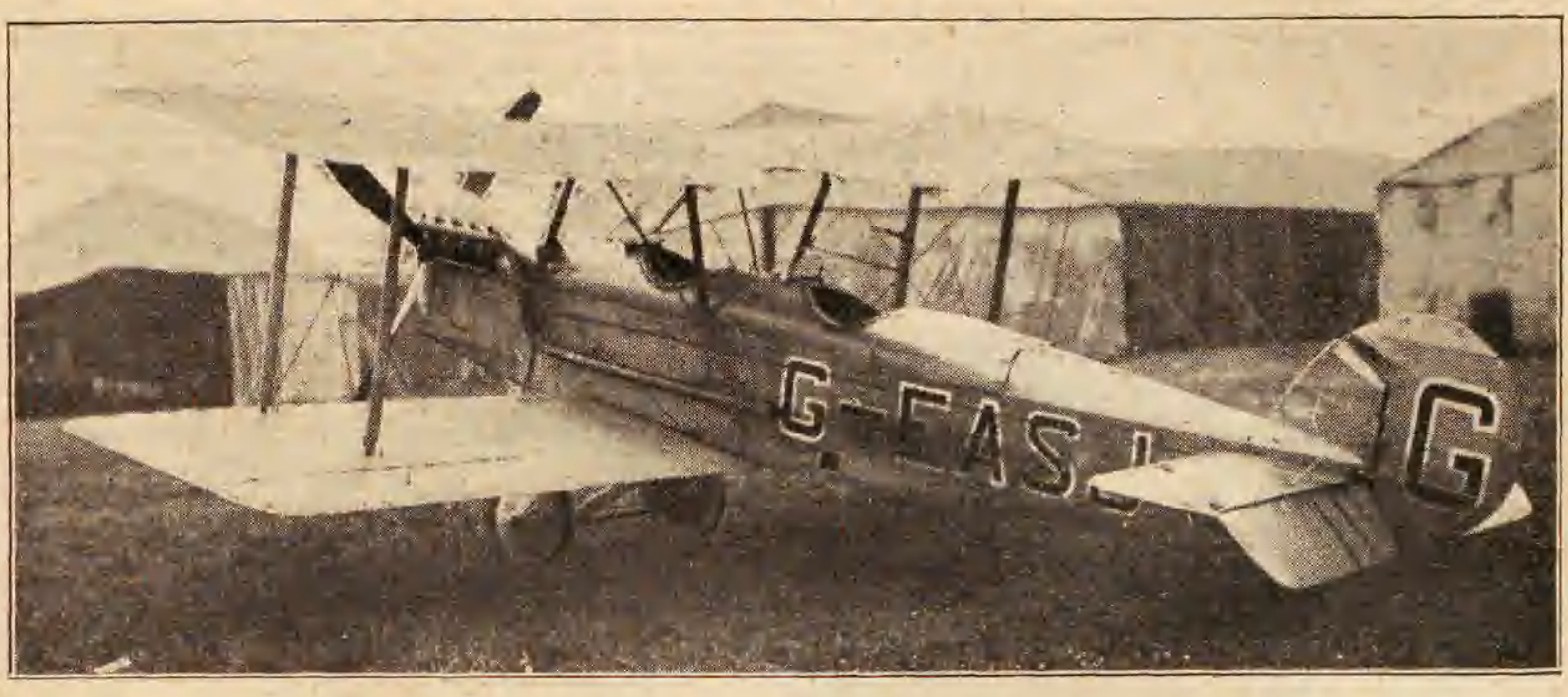
THE BOULTON AND PAUL P.9. BIPLANE : Side View.

It will be remembered that there were two of these machines flying in the recent King's Cup Race round Britain, in which their performance, though not of a spectacular nature, was none the less worthy of notice. Piloted by C. T. Holmes and J. C. Tennant respectively, these machines left Croydon within five minutes of each other, and kept a very steady course, within a few minutes of each other, throughout the race, Holmes averaging 69 m.p.h. and Tennant 68 m.p.h. for the outward journey, the averages for the homeward trips being 85 m.p.h. and 88 m.p.h. respectively. The machine shown in the accompanying illustrations is the one flown by Holmes, and is used by Mr. F. T. Courtney when he wants to "flip" anywhere in a hurry.

The P.9, which has been designed by Mr. J. D. North, is a two-seater tractor biplane of moderate dimensions, and is a plain, straightforward job both in design and construction. The outstanding features of this machine may be said to comprise low initial cost, low cost of running and maintenance and facility in handling both in the air and on the ground. It has a very good speed range and climb, and is nice and easy on the controls—which, together with its general



THE BOULTON AND PAUL P.9.: Plan, side and front elevations, to scale.



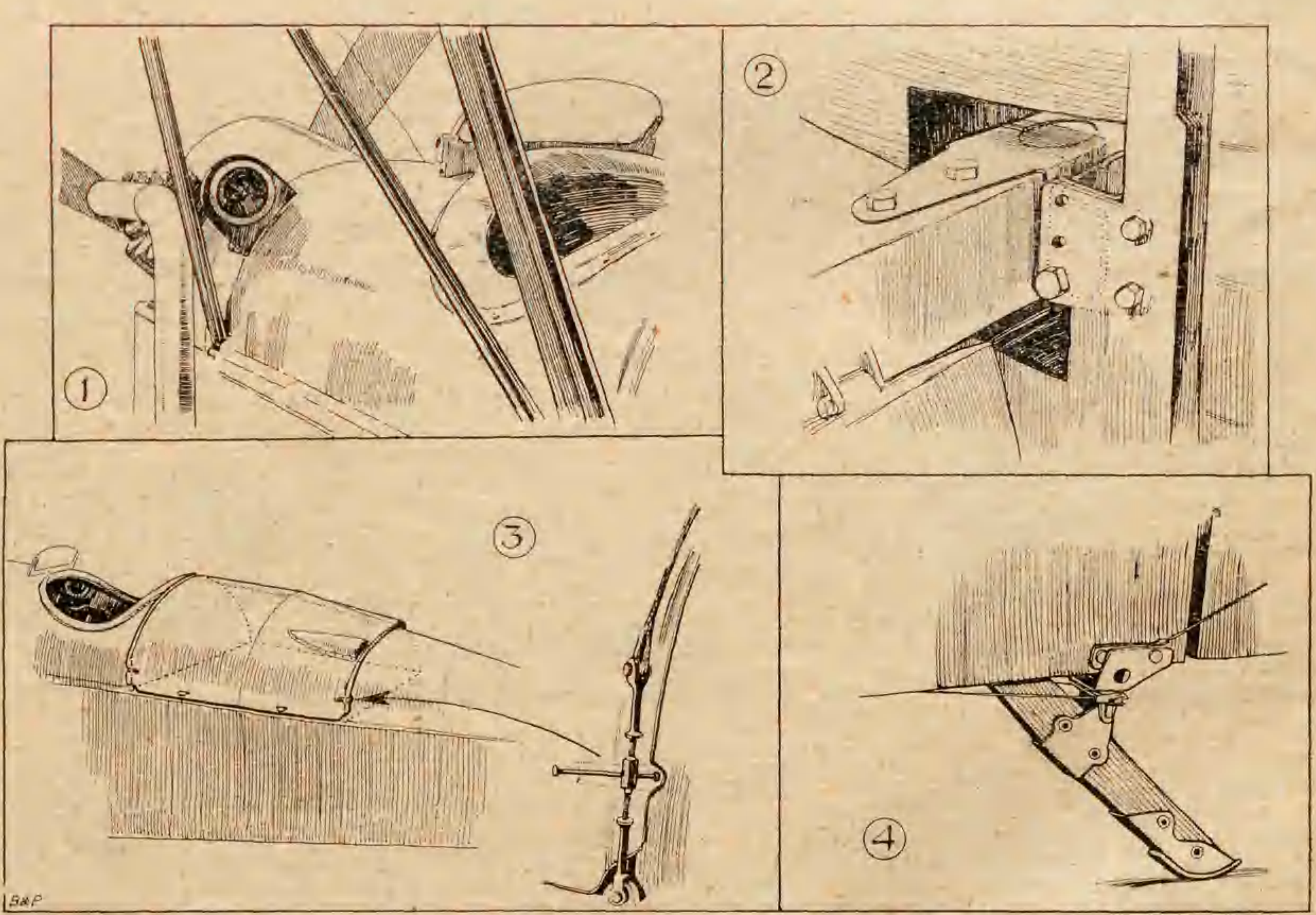
THE BOULTON AND PAUL P.9. BIPLANE: Three-quarter rear view.

stability, enables it to be flown for long periods without undue fatigue.

The main planes are of orthodox construction, and are equal span (27 ft. 6 ins.) top and bottom. They are made up of five sections, two in the lower and three in the upper. The lower sections are attached direct to the lower longerons of the fuselage, whilst the two outer sections of the top plane are attached to a 5 ft. 6 in. centre section. A single pair of streamline (wood) struts separate top and bottom planes each side, and the centre section is carried above the fuselage by two N's of steel tube, the vertical members having streamline fairings. External wing bracing is by streamline wire, and the front and rear points of intersection of landing and lift wires are connected by a steel tube in order to reduce vibration. Both planes are set at a dihedral angle of 2½°, and the angle of incidence is 2°. Ailerons are fitted to both top and bottom planes, the control cables from the fuselage being carried inside the lower wing behind the front spar.

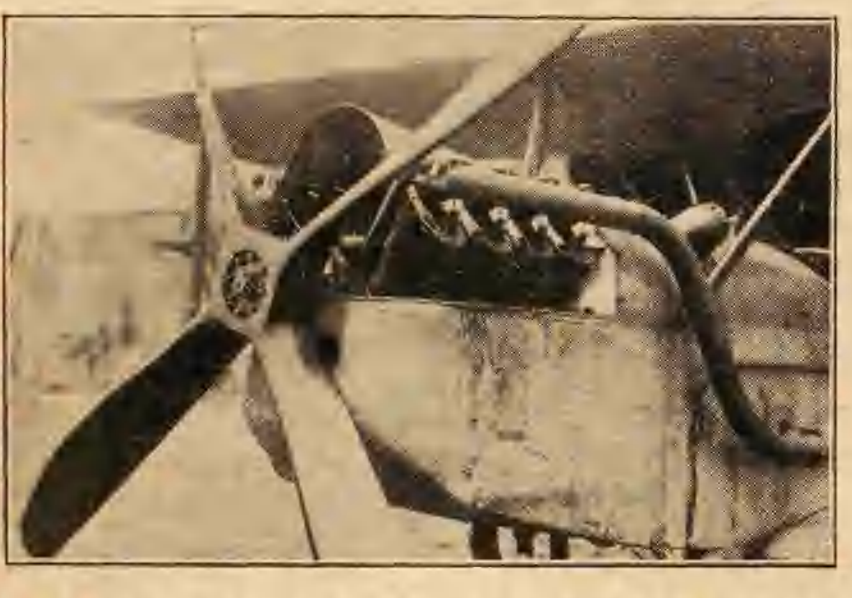
The tail planes consist of a streamline-section horizontal stabilising plane, divided elevators, a vertical fin and balanced rudder. The horizontal plane can be adjusted as regards incidence by means of a lug having three holes arranged vertically, which receives a bracket on the rear spar of the tail plane, a bolt passing through one or other of the series of holes on the lug and bracket. This adjustment is indicated in one of our sketches.

The fuselage is of the conventional rectangular-section



THE BOULTON AND PAUL P.9. BIPLANE: 1. The engine rev.-indicator is mounted in a streamline casing outside the fuselage, where it is clearly visible from both cockpits. 2. The simple adjustment for tailplane incidence. 3. The neat luggage boot behind the rear cockpit. Inset is the simple and effective fastener securing the cover in position. 4. The tail skid, which is connected up to the rudder bar to facilitate steering when taxying.

girder, wire-braced type, and the top longerons are not horizontal, but slope upwards towards the rear some 10°, so that the tail plane is slightly above the line of thrust. The comfort of the pilot and passenger has been specially considered, and each cockpit is roomy and fitted with special cane seats of ample proportions. The pilot's cockpit is at the rear, but dual control is provided for—the front control "stick" being easily removed when necessary—so that the machine can be flown from either cockpit. Instruments and engine controls are provided in both cockpits, and the engine revolution-indicator is mounted outside the fuselage, forward of the front cockpit on the port side, where it may easily be read from either cockpit. Just behind the rear cockpit a fair-sized "boot" is formed under the turtle deck of the fuselage, for carrying suit-cases, etc. The cover for this is formed by a sheet-metal cowling with ventilators, which is held firmly in place by two wire cables passing over it, in a groove at each end, from one top longeron to the other. It is very easy to remove, as the cables are held taut by two wire strainers, which are quickly loosened by means of a tommy-pin, as shown in one of our sketches.



THE BOULTON AND PAUL P.9. BIPLANE: The 90 h.p. air-cooled R.A.F. engine fitted to this machine.

Fabric is employed for the covering of the fuselage except for the engine section and cockpit decks, where three-ply wood is used, and in the nose, which is of metal. The fuselage may easily be laid bare by means of a patent lacing device, similar to that employed in furniture upholstery.

The engine, a 90 h.p. air-cooled Type 1A R.A.F., is mounted direct on to the top longerons, and is partially enclosed by a metal cowling-*cum* air scoop. It drives, through the usual gearing with this type of engine, a four-bladed tractor screw 9 ft. 3 ins. diameter. The exhaust from the engine is discharged behind the rear cockpit, thus giving a silencing effect and a freedom from fumes.

An orthodox V-type landing chassis is fitted in which the tubular axle is sprung, by elastic cord, from the apex of the V—the cord being protected at the bottom by a metal strip. The front and rear tie-rods of the chassis struts are encased in a streamline metal fairing, and the axle lies in a groove formed in the top of this fairing. A stout tail skid is fitted, and in order to facilitate steering when on the ground, it is connected up to the rudder bar.

The principal characteristics of the P.9 are as follows:—

Span	27 ft. 6 ins.
O.a. length	24 ,, 8 ,,
O.a. height	10 ,, 0 ,,
Chord	5 ,, 6 ,,
Gap	5 ,, 6 ,,
Angle of incidence	2°
Dihedral angle	2½°
Area of main planes	285 sq. ft.
Area of ailerons	38 ,,
Area of tail plane	24 ,,
Area of elevators	14½ ,,
Area of fin	2½ ,,
Area of rudder	8¾ ,,
Weight of machine empty	1,244 lbs.
Weight of machine (full load)	1,770 ,,
Weight per h.p.	17·7 ,,
Weight per sq. ft.	6·3 ,,
Speed (full load, 1,000 ft.)	104 m.p.h.
Climb (full load), in 8½ mins.	5,000 ft.
Ceiling	14,000 ft.
Range (full throttle)	3 hrs.

◆ ◆ ◆ ◆

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN SEPTEMBER 3 AND SEPTEMBER 16, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m		
Croydon–Paris ...	103	295	38	72	101	2 24	D.H. 34 G-EBBU (1h. 47m.)	B. (5), D.H. 34 (6), G. (10), H.P.W.8B (3), Sp. (5), Vi. (1).
Paris–Croydon ...	110	331	22	64	97	3 10	D.H. 34 G-EBBU (1h. 58m.)	B. (5), D.H. 34 (6), G. (10), H.P.W.8B (3), H.P. 400 (1), Sp. (5), Vi. (1).
Croydon–Brussels ...	12	62	—	—	11	2 20	D.H. 34 G-EBBW (1h. 56m.)	D.H. 18 (1), D.H. 34 (4).
Brussels–Croydon ...	12	61	—	—	12	2 44	D.H. 34 G-EBBW (2h. 3m.)	D.H. 18 (1), D.H. 34 (4).
Croydon–Rotterdam–Amsterdam.	12	3	11	11	12	2 35	Fokker H-NABM (2h. 9m.)	F. (6).
Amsterdam–Rotterdam–Croydon.	11	25	9	9	10	2 57	Fokker H-NABV (2h. 9m.)	F. (6).
Totals for 2 weeks. ...	260	777	80	156	243			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys. § Rotterdam.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad.
Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijke Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

Incidental Flying.—A bi-daily service between Lympne-Ostend has been maintained by the De Havilland Co. A busy time was spent at Croydon by the Aircraft Disposal pilots testing various machines.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

GLIDER or Aviette is a question which appears to be well to the fore at the present moment. In Germany there is, at the moment, a preponderance of the "pure gliding" school, while in France—due probably in some measure to the relatively poor results obtained at Combegrasse—there are many who maintain that we are on the wrong track in spending time and money on gliding experiments, and that greater progress would be made by studying the problem of mechanically-propelled flight with machines fitted with engines of very low power. M. Blériot, the famous French pioneer, has no great belief in the future of the glider, but thinks that the "motor-cycle of the air" offers possibilities. He has backed up his opinions by offering a prize of 15,000 francs to the French pilot who, flying from the French coast, across the Channel, turning above British soil and returning to alight on French soil, has made the double crossing of the Channel with the smallest fuel consumption. To win the prize it is necessary that the petrol consumed must not exceed 3 litres (0·66 gall.). It will be remembered that M. Blériot was the first to fly across the Channel (in 1909), and that his flight, made on the small Blériot monoplane with a fan-type Anzani engine of 28 h.p., was in those days quite as difficult a feat as is the one which he now demands from competitors for his prize.

* * *

GRADUALLY the durations established with gliders in France are being increased. Barbot, who, after the closing of the meeting at Combegrasse, made an unofficial flight of 9 minutes' duration, has now increased this to 20 mins. 31 secs. Starting from the Superbagneres in the Pyrénées, he headed into a fairly strong wind, and succeeded in remaining aloft for the period stated. It is not known where he landed, but his starting-point was about 6,000 ft. above sea level. If the flight is homologated it will constitute a record for France.

The Record Breaker: Herr Hentzen, in the cockpit of his famous "Vampyr," on which he remained aloft for 3 hrs. 10 mins. This machine, as distinct from the Hannover "Greif," has a flat-sided fuselage.

CAPT. F. WARREN MERRIAM, who taught we forget how many thousand R.N.A.S. and R.A.F. pupils to fly during the War, is, we learn, quietly building a glider down on the Isle of Wight. It is, we believe, our old friend Merriam's intention to enter the glider for the *Daily Mail* competition this autumn, and his many years' experience on the old "box kites" should stand him in good stead: after all, flying a box kite (50 Gnome) with a passenger behind you was not unlike flying a glider. If you wanted to get upstairs you had to make use of every little gust to help you, otherwise the climb was not spectacular. We are extremely glad to hear of one of the "old boys" taking up this new sport, and should like to hear from others interested.

As we have received from a number of readers requests to publish particulars of some of the successful wing sections used on German gliders, we give below the dimensions and aerodynamic characteristics of the section known as Göttingen No. 441. The dimensions of this section, expressed in percentage of the chord at stations placed at the stated distance from the leading edge, similarly expressed, are as follows:—

Dimensions of Göttingen No. 441 Section

Station (per cent.).	Camber (per cent.).		Station (per cent.).	Camber (per cent.)	
	Upper.	Lower.		Upper.	Lower).
0	3·19	3·19	40	16·97	2·48
1·25	6·12	1·06	50	15·43	3·30
2·5	7·45	0·53	60	13·56	3·72
5·0	9·68	0·11	70	10·90	3·72
7·5	11·60	0·00	80	7·80	3·24
10	13·03	0·11	90	4·26	1·88
15	15·16	0·35	95	2·32	1·06
20	16·49	0·80	100	0·27	0·00
30	17·55	1·60			

The aerodynamic characteristics were found by experiments in one of the Göttingen wind tunnels to be as follows:—

Angle of incidence.	L_c (absolute).	L/D.	Angle of incidence.	L_c (absolute).	L/D.
—8	0·075	1·7	6	0·56	11.0
—6	0·120	4·0	8	0·62	10·0
—4	0·200	14·5	10	0·68	9·4
—2	0·275	15·2	12	0·73	8·5
0	0·34	14·6	14	0·78	7·7
2	0·42	13·3	16	0·80	6·8
4	0·48	12·2	18	—	5·8

* * *

RECENTLY we announced that it was rumoured that the de Havilland Aircraft Co. were building a glider, but that we could not vouch for the accuracy of this statement. We now learn that, for once, rumour is true, and that the machine is, in fact, being built. The glider is to be flown by Capt. Herne, the Daimler pilot, and if it comes up to expectations he intends, after a few practice flights, to make an attempt to fly across the Channel on the machine. Capt. Herne has observed that even power-driven aeroplanes feel the up-currents over the cliffs along the Kentish coast, and he thinks that a light glider, by making use of these, could climb sufficiently high to enable it to glide right across the Channel. As the gliding angle of a good "sail-plane" might be in the neighbourhood of 1 in 16 or 1 in 18, the feat is not, perhaps, so impossible as might appear at first sight.

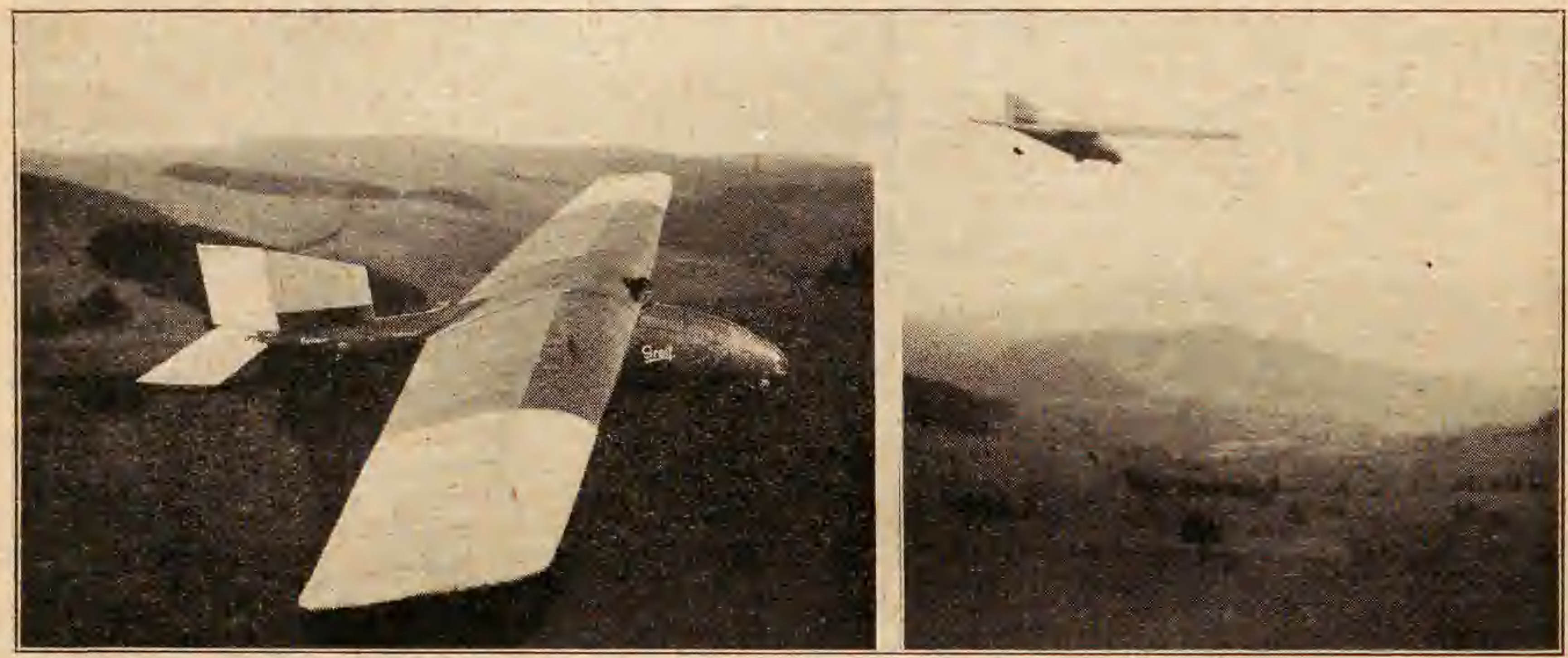
HERR KLEMPERER, the famous pilot of the Aachen monoplane glider, who won the Rhön competition last year, has had a nasty accident on his machine recently. He had his machine secured to a kite balloon, and when at a considerable height cut it adrift with a view to gliding down. It appears, however, that something went wrong with the machine, as it is stated to have got into a spin which the pilot could not stop. It seems probable that the controls of the glider must have got jammed in some way, and that this was the cause, otherwise there is no reason why the machine should not be capable of being pulled out of the spin. Fortunately, Herr Klemperer was not seriously injured. The statement which has appeared in the Press to the effect that the machine fell 4,000 ft. in 15 seconds is, of course, inaccurate. Even diving vertically at terminal velocity the machine could not have attained such a rate of descent, which would be equivalent to a speed of 180 m.p.h. Nevertheless, Herr Klemperer was fortunate in getting off so lightly.

GERMAN GLIDERS

THE RHÖN COMPETITION, 1922

Particulars of the Machines Entered

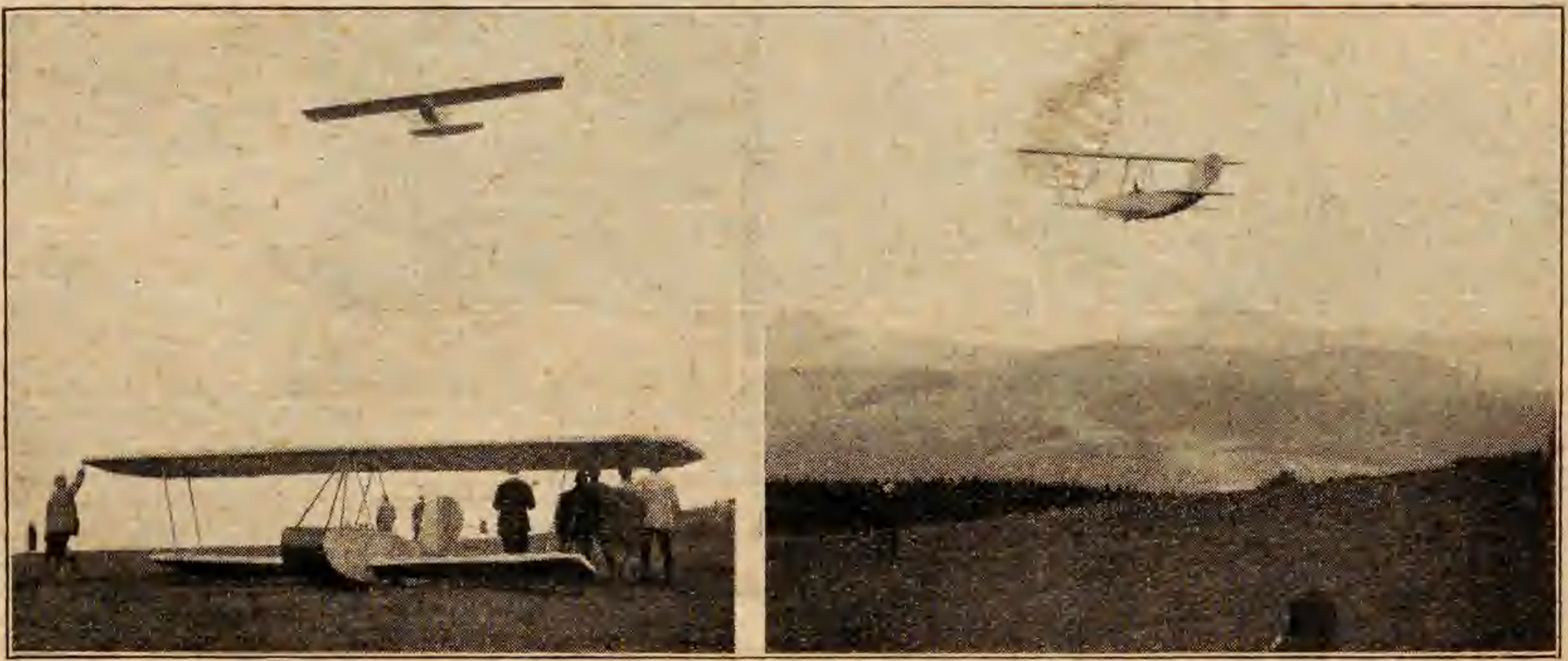
IN last week's issue of FLIGHT we published a photograph of the Hannover "Vampyr" on which Herr Hentzen remained in the air for 3 hours 10 minutes, thus winning the Great Rhön Sailing Prize (*Grosser Rhön-Segel-Preis*) of 50,000 marks.



The Hannover "Greif" (Condor) is a refined edition of the famous "Vampyr," but has not yet been sufficiently tuned up to do very extended flights, although a number of very creditable flights have been made on it. The monoplane wing has a pronounced taper, and the fuselage is carefully streamlined. The right-hand photograph, which shows the "Greif" in flight, gives a good idea of the Rhön hills.

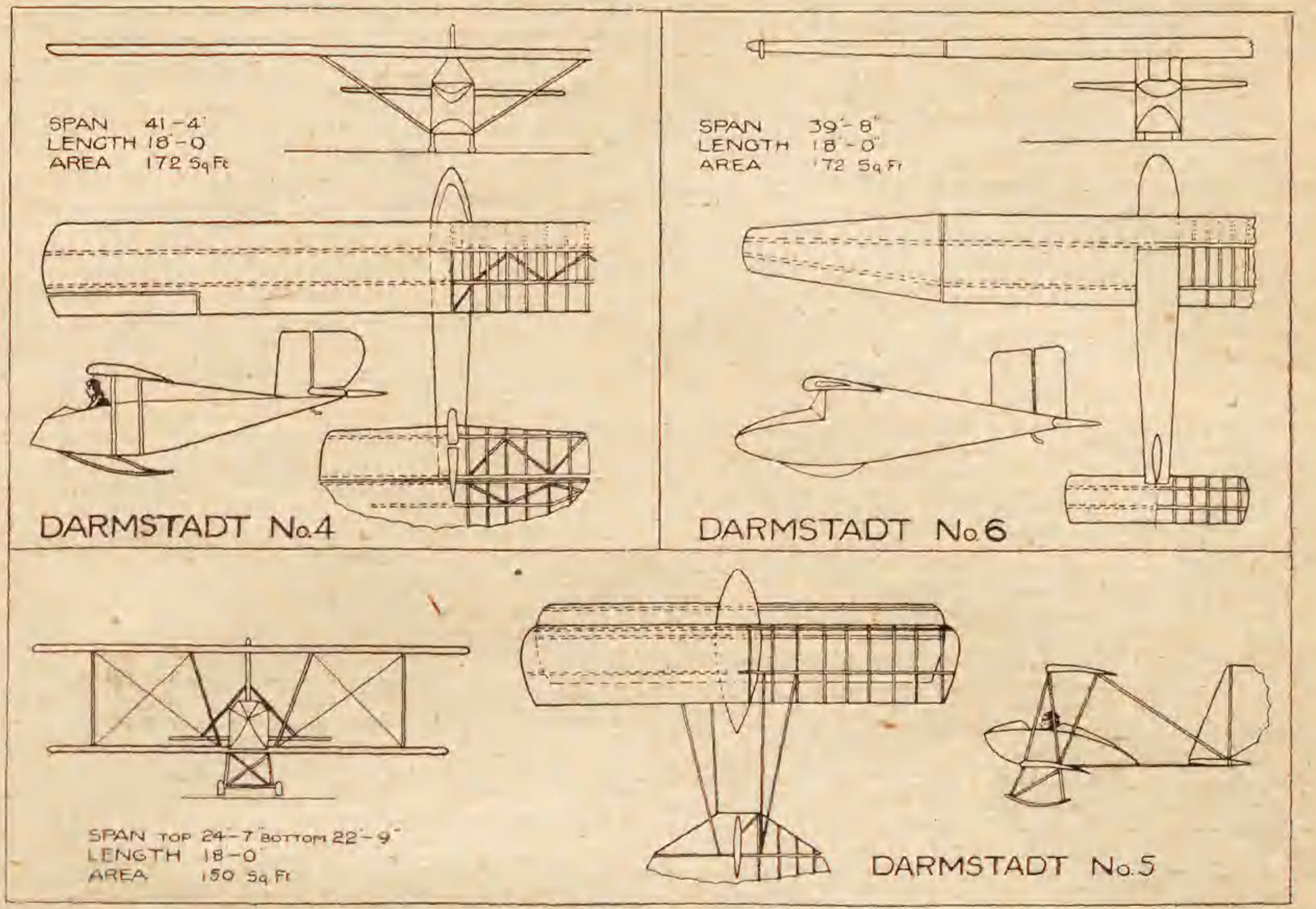
Owing to the space occupied by the report of the King's Cup Race around Britain, it was not possible to publish particulars of the 53 machines entered for the German competition and illustrations of some of the more interesting of these. We promised, however, that this information should be published in the present issue, and consequently on p. 548 will be found a table giving data relating to all these machines, while brief reference is made to the main features of some of the more interesting gliders of those which took part in the competition. It should be understood that not all the 53 machines entered turned up, while out of the number that did take part not more than a comparatively few achieved notable success, although many put up very creditable performances.

Referring to the accompanying table, it will be seen that the monoplane type was in the majority by far, 38 machines being of this type, while only 15 were biplanes, or a percentage of monoplanes of more than 70 per cent. This fact may

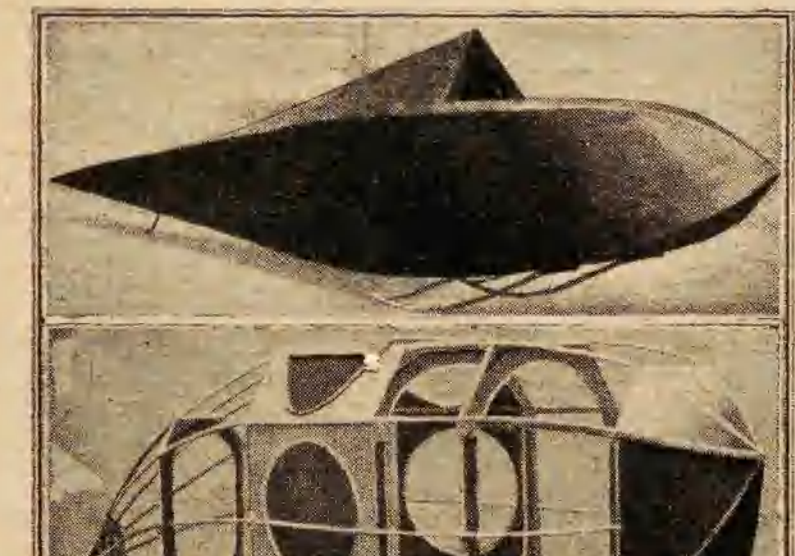


The Darmstadt monoplane, piloted by Bottsch, flying over the Dresden biplane. In the right-hand photograph the Dresden biplane is shown just after getting away. Note the two men holding the starting rope.

be accounted for partly by the fact that the Germans have for a number of years specialised on the development of thick-section cantilever monoplane wings, and partly by the resemblance of the monoplane to a bird. It may be assumed that among those who entered machines not a few were amateurs in design, and to these it is natural to suppose that the monoplane would appeal strongly, with its possibilities of clean outlines, unmarred by the unsightly struts and bracing of the biplane. It should be pointed out, however, that as yet there are not sufficient data available to enable one to state definitely that the monoplane glider is necessarily the better form. In spite of its cleaner lines the cantilever monoplane must necessarily work out somewhat heavier than the braced biplane, and it is at least open to discussion whether the extra weight can be counterbalanced by the lower resistance and consequent finer gliding angle of the monoplane. Time alone can show which is the better type, and all that can be definitely asserted at the moment is that, up to the present, the monoplane type appears to have achieved most successes in the matter of carrying off prizes.

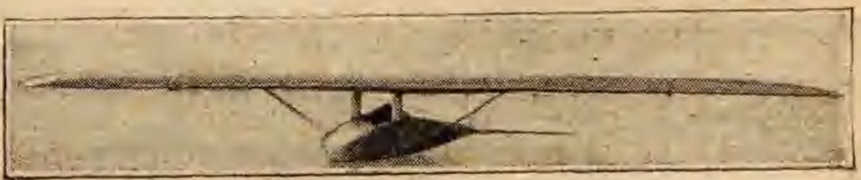


THE THREE DARMSTADT MACHINES : General arrangement drawings.



TWO DARMSTADT FUSELAGES : Top, the body of the Type 4 monoplane ; bottom, the nacelle of the biplane.

The Hannover "Vampyr."—A scale drawing of the Hannover monoplane on which first Martens and later Hentzen made such remarkable flights was published in our issue of August 31, 1922. This drawing represented the machine in the form in which it was used in 1921. It was pointed out that alterations had been made, and from the photograph published on p. 534 in our last issue (this photograph was taken almost directly from below the machine) it was apparent that the chief alteration was the addition of triangular pieces to the trailing edge of the wing tips. In its earlier form the machine had tapered wings, but the alteration made turned this taper into swept-back tips and also slightly increased the area. One result of the change would appear to be a slight shifting to the rear of the centre of pressure, and it may be assumed that in its original form the machine was slightly tail-heavy. It seems reasonable to suppose that a glider should have its centre of gravity fairly far forward and its tail set at a negative angle, and this was probably done in the "Vampyr." The constructional features were dealt with in our description of the machine on August 31, and it will therefore suffice to recall that the fuselage is three-ply covered, with flat sides. The wing has but a single spar, and the necessary torsional stiffness is obtained by covering the entire leading edge with thin three-ply wood, which, with the spar, forms a D-section tube of light weight, as well as having the advantage of retaining the correct shape of the front part of the wing section. Footballs are used as



THE HART-MESSERSCHMIDT FUSELAGE MONOPLANE : This is an experimental type, the standard machine having open tail girders and no cockpit.

RHON COMPETITION, 1922

Table of particulars of all the machines entered

No.	Entrant.	Constructor.	Type.	Length o. a.		Span.		Area.
				ft.	in.	ft.	in.	sq. ft.
1	Aachen Studienges. fur Segelflug.	Aachen Airc. Wks.	M	15	9	37	9	237
2	Aug. Nesemann	Aug. Nesemann	B	11	10	24	7	187
3	G. Espenlaub ..	G. Espenlaub ..	M	16	5	55	10	183
4	W. Rebmann ..	W. Rebmann ..	B	9	3	17	8	135
5	F. Th. Zeise ..	A. Nesemann ..	M	12	4	39	5	188
6	Hannover Group	HannoverH.Sch.	M	16	5	41	4	172
7	Hannover Group	Han. High Sch.	M	16	5	38	0	161
8	Hannover Group	Han. High Sch.	M	16	5	40	0	161
9	J. Kempf ..	J. Kempf ..	M	13	2	24	7	140
10	W. Hirth ..	Hart-Messerschmidt	M	14	9	46	0	204
11	W. Hirth ..	Hirth, Keidel. ..	B	10	6	18	5	155
12	W. Hirth ..	Hart-Messerschmidt	M	14	5	46	0	204
13	Weltensegler Co.	Segelflugz. Baden	M	16	5	36	1	161
14	Weltensegler Co.	Segelfl. Baden ..	B	16	5	36	4	215
15	W. Pelzner ..	W. Pelzner ..	B	8	7	13	2	129
16	W. Pelzner ..	W. Pelzner ..	M	9	10	32	9	172
17	Akademische Fliegergr. Darmstadt High School	DarmstadtH.Sch.	M	16	5	41	5	172
18		Bahnbed. Darmstadt	M	16	5	39	5	172
19		DarmstadtH.Sch.	B	16	5	25	0	150
20	P. Jeyes.. ..	Aachen Airc. Works	M	19	8	30	3	172
21	Frankfurt Ae. Club	Frankfurt Ae. Club	M	23	0	36	1	194
22	G. R. Eck ..	G. R. Eck ..	M	18	1	31	3	178
23	C. Möbius ..	Möbius & Pocher	M	16	5	36	1	172
24	Stuttgart Techn. Soc.	Stuttgart Techn. Soc.	M	18	1	38	1	172
25	Gotha Gliding Soc.	Gotha Gliding Soc.	M	20	4	42	7	177
26	E. Schatzky ..	Hart-Messerschmidt	M	14	10	46	0	204
27	Fränk. Fl. Soc...	L. Schaefer ..	M	17	5	39	5	280
28	Dresden Fl. Soc.	Dresden Fl. Soc.	B	15	1	29	7	202
29	Dresden Fl. Soc.	Dresden Fl. Soc.	M	14	10	41	5	167
30	K. Bacher ..	K. Bacher ..	M	14	10	30	1	134
31	Hamburg Avtn. Soc.	Hamburg Avtn. Soc.	M	16	5	42	7	215
32	Berlin Tech. High Sch.	Berlin Tech. High Sch.	M	14	10	50	0	215
33	Weltensegler Co.	Baden Glider W.	B	16	5	26	3	215
34	Glider Works, Baden	Glider Works, Baden	M	13	2	49	3	172
35	Glider Works, Baden	Glider Works, Baden	M	13	2	49	3	183
36	East Pruss. Soc.	Hart-Messerschmidt	M	16	5	46	0	194
37	Fokker Works	Fokker Works, A'dam	B	21	4	29	6	290
38	Fokker Works ..	Fokker Works ..	B	21	4	39	5	388
39	Aircraft Co., Berlin	Aircraft Co., Berlin	M	23	4	32	10	—
40	Schütte-Lanz Co.	Schütte-Lanz Co.	M	14	10	46	0	215
41	H. Wiszkirchen..	W. Wiszkirchen	B	13	2	23	0	161
42	F. Schulz ..	F. Schulz ..	M	14	10	41	0	172
43	J. Kempf ..	J. Kempf ..	B	10	4	18	1	145
44	Weltensegler, Baden	Weltensegler Works	M	9	10	49	3	172
45	North Bavarian Soc.	North Bavarian Soc.	M	14	10	36	1	177
46	Dr. M. Sultan, Berlin	Dr. M. Sultan, Berlin	B	10	2	21	4	156
47	Willi Drude ..	Willi Drude ..	M	14	10	32	9	161
48	Rhön Glider Soc.	—	B	13	2	21	4	177
49	Aachen Tech. High Sch.	Aachen Tech. High Sch.	B	14	1	26	2	188
50	Aachen Tech. High Sch.	Aachen Tech. High Sch.	M	18	1	39	5	183
51	Caspar Works ..	Caspar Works ..	M	16	5	42	7	236
52	Bavarian F. Club	C. Schöner ..	M	13	2	41	0	161
53	North Bavarian Fl. Soc.	North Bavarian Fl. Soc.	M	16	5	36	1	177

M = Monoplane; B = Biplane.

"wheels," two being mounted under the deepest portion of the fuselage, one under the nose and one under each wing tip.

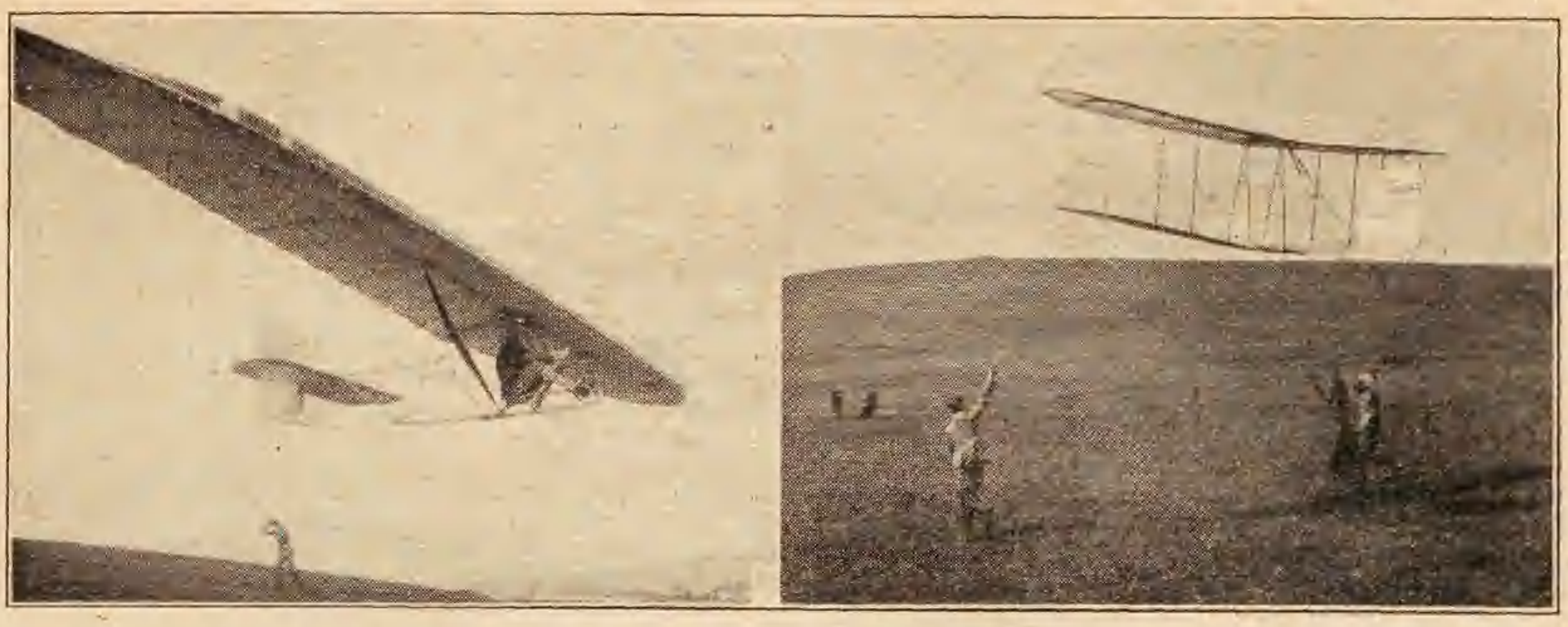
The Hannover "Greif."—In addition to the "Vampyr" two other monoplanes were entered by the students of the Hannover High School. One of these, known as the "Mucki" ("Sulky") seems to have lived up to its name, as we have been unable to discover that it made any noteworthy flights. The other is a very pretty little machine called the "Greif" (Condor), of which photographs are published herewith. This machine is a refinement of the "Vampyr," having a carefully streamlined fuselage and tapered cantilever wings. The machine is said to be less pleasant to fly than the "Vampyr," possibly because it has not yet been so thoroughly flown-in ("eingeflogen," the Germans call it) as the older model. Several very good flights were, however, made with the "Greif," and when perfected as regards trim, etc., by extensive trials and alterations should prove a very fine little machine. It is somewhat smaller in span and area than the "Vampyr," and probably the wing loading is slightly greater, but, on the other hand, the drag of the complete machine is probably considerably lower, owing to the better streamlining. The "Greif" appears to have but a single football "wheel" under the centre line of the fuselage, and when on the ground one wing tip is always touching. Possibly this fact may be in part responsible for the relatively small use that was made of this machine, as there would appear to be considerable risk of damage to the wing tips in landing.

The Darmstadt Machines.—Of the various "groups" that competed at Rhön the Hannover students did best of all, owing to the remarkable flights made by Martens and Hentzen on the "Vampyr." So much was this the case that nearly all the first prizes were won by representatives of the Hannover High School. Other institutions, however, also collected respectable prizes, notably the Darmstadt "group" (Akademischer Fliegergruppe, Hochschule, Darmstadt), whose students had entered three machines for the competition. By the courtesy of *Flugsport* we are able to publish, in addition to our own photographs, general arrangement drawings of the three Darmstadt machines, two of which are monoplanes and one a biplane.

Of the three Darmstadt machines the one which appears to have done best is No. 4 ("Edith"), which was piloted by Bottsch. This machine, which is shown both in photographs and scale drawings, is a parasol monoplane, in general arrangement not unlike the Hannover "Vampyr"; that is to say, it has a ply-wood covered fuselage with a monoplane wing placed above. The wing construction is, however, somewhat different from that of the Hannover machine, notably on account of the employment of two wing spars. The "Edith" is not a true cantilever machine, as two struts on each side slope outwards for a considerable distance from the lower longerons of the body. The monoplane wing is straight and non-tapered both in chord and thickness, and is built up of two halves joined on the centre line of the fuselage. As in the Hannover, the entire leading edge is covered with three-ply wood to give extra stiffness and to retain the shape. The fuselage is rectangular section with a triangular portion added behind the pilot's seat. The undercarriage is in the form of two skids (flexible) of ash. The weight of the machine empty is stated to be 200 lbs., so that assuming a weight of 160 lbs. for the pilot, the total loaded weight is 360 lbs. and the wing loading $\frac{360}{172} = 2\cdot1$ lbs./sq. ft., which is fairly high for a glider. Nevertheless, Bottsch on this machine was awarded third prize in the competition for slowest rate of descent. The Darmstadt monoplane No. 6 ("Geheimrat") was piloted by Hackmack, and received second prize in the slow rate of descent competition. Generally speaking, the "Geheimrat" is not greatly different from "Edith," but its monoplane wing is divided into three separate portions, a large centre section and two tapered end pieces. The wing is so mounted that the angle of incidence can be adjusted during flight. The weight of the machine is the same as that of the "Edith" (200 lbs.), as is also the wing loading. The wing is carried on two vertical extensions of the sides of the fuselage, and no external bracing struts are employed.

The third Darmstadt machine is a small biplane with a short enclosed nacelle and open tail booms. To a certain extent the machine is reminiscent of the early Caudron biplanes, except that the skids on which it lands are not continuations of the lower tail booms, but are a separate structure. The biplane wings show the usual wire bracing, but lateral control is by wing warping. One of our photographs shows the construction of the nacelle. As in the monoplane, three-ply wood is extensively used.

In our introductory remarks it was pointed out that the



On the left Baron Freyberg is seen flying the Hart-Messerschmidt monoplane. Note the central skid and open tail boom girder. On the right Dr. Sultan is shown testing his light biplane glider as a kite before launching it as a glider.

cantilever monoplane is necessarily somewhat heavier than a biplane structure. The wing area of the Darmstadt biplane is 150 sq. ft., and the weight empty is 110 lbs., so that with pilot on board the wing loading of the biplane is approximately 1·8 lbs./sq. ft., in spite of the fact that the area is some 22 sq. ft. smaller than that of the monoplanes. On the other hand, the monoplanes probably have a considerably higher *maximum* lift coefficient.

The Dresden Machines.—Flugtechnische Verein, Dresden, were represented by two machines, one a monoplane designed this year, which does not appear to have accomplished very much, and the other last year's machine, a biplane known as the F.V.D. 1921. This machine is shown in the accompanying photographs, and its main dimensions are given in the table of characteristics. It is a biplane of fairly orthodox design, and, like the Darmstadt machines, lands on skids. Piloted by Seiferth and Spies, the Dresden biplane won first prize for total duration in the air, with 1,851 secs. This aggregate was, of course, obtained as a result of a great number of flights. This machine also won second prize in the distance competition, with a distance of 2·7 km. (1·7 miles), and sundry other prizes.

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AIRISMS FROM THE FOUR WINDS

It is difficult to form any very clear opinion of the true facts of a case which has been given considerable prominence in the Press during the week. We refer to the position of Peter Hooker, Ltd., of Walthamstow. As is well known, this firm is in voluntary liquidation, and a receiver has been appointed, and it appears that the question now arises whether the Treasury is justified in waiving one of its rules—not to place orders with a firm in liquidation. From the facts that have appeared, it seems that there is hope that the Treasury sanction might be obtained, but that the Air Ministry has refused to place an order with the Walthamstow firm, the allegation being that the Air Ministry has expressed willingness to place the order for the new engine (which the firm is stated to have developed) with another firm. The matter really appears to be quite simple. If the firm in question has produced an engine which marks a step forward (we have no knowledge whatever of the facts), and the firm is willing to wait until next year for payment, it is clearly the duty of the Air Ministry to place the order with Peter Hooker's and not with another firm. On the other hand, if the reason is simply the Treasury regulation, and the idea is to get around it by having the order placed with another firm, then it certainly appears unjust to make the development of a new engine contingent upon the handing over of all drawings by the originators, simply because of some red-tape rule. Surely with a little goodwill on all sides it should be possible to arrive at some arrangement more fair to all concerned, if the merits of the new engine entitle it to consideration.

* * *

If Sir John Salmond has been quoted correctly, it would appear that there has been very good justification for the criticisms levelled against India's neglect of her Air Service. Sir John is reported to have stated that out of six squadrons, totalling 70 aeroplanes, not more than 10 machines were fit to take the air, owing to the embargo placed by the Indian Government upon urgently needed spares from home. However, it may be taken as read that Sir John Salmond, in the report which he has prepared, has expressed his views in no uncertain terms, and that, in view of the publicity recently given to the state of affairs, improvements will not be long delayed. It should, of course, be clearly realised that the Air Ministry is not to blame in the matter, as the personnel and *matériel*, once having been supplied, pass from the control of the Air Ministry. The blame lies with the Indian Government and with the Commander-in-Chief, and the whole affair provides a striking example of the folly of misguided "economy."

* * *

Every now and then the question of Diesel or semi-Diesel types of aero engines crops up, and occasionally the statement is made that at last the engine is within sight. Usually the truth is that some sort of results have been obtained with single-cylinder units, but from that to the complete engine, mounted on an aircraft and not on a very substantial test bed, is rather a far cry. The one is by way of being a laboratory experiment, while the other is a hard reality. It appears, however, that at last rumour is really beginning to approach to being fact. The new engine which is being developed by Beardmores is stated to be nearly completed, and from preliminary experiments it appears that there is promise of the new engine carrying us a long step towards the practical high-compression engine which, when it arrives, will do perhaps more than any other single item in changing the expression "Civil aviation" into "Commercial aviation."

LONDON TERMINAL AERODROME

Monday evening, September 18.

After the excitement of the Round-Britain Race, the aerodrome has appeared particularly quiet this week, even though there is still a steady stream of passengers in and out. The arrangements for the opening of the new British services have advanced a few steps forward, but, generally speaking, there is an air of expectancy prevailing, and existing services appear to be run in a half-hearted sort of way.

On Friday afternoon one of the Daimler machines left on a trial trip over the London-Berlin route to make arrangements for the running of the regular service. This machine was G-EBBS, which has now nearly 90,000 miles of airway flying to its credit, and carried as passengers Col. Searle and Maj. Woods Humfreys, while Capt. Hinchcliffe, who is to be aerodrome manager for the Daimler Airway at Amsterdam, acted as pilot. In addition, a representative of the insurance company travelled in the machine, evidently to appraise the risks along the new route.

There is a considerable amount of negotiation going on between the Air Ministry and the German Government. The latter are attempting to use the fact that we wish to run British air services to Germany as a lever to enable them to obtain the removal of some of the Allied restrictions on German commercial flying. It is probable that the visit of Col. Searle, who is to meet representatives of the Deutsch Luft Reederei, the biggest of the German commercial air firms, will do much to bring these differences to a satisfactory conclusion, and probably some working agreement will be made between the two companies.

Plans for a Motor-Cycle of the Air

I understand that when M. Fokker, the famous Dutch designer, heard that Capt. Hinchcliffe was to be stationed at Amsterdam, he immediately enlisted his aid in connection with his gliding experiments, and these are now to be elaborated, and flights made along the Dutch coast. M. Fokker's ultimate idea is to evolve a small semi-glider, with a 2 h.p. engine, that will, he hopes, make flying a popular sport.

A dramatic incident occurred on the aerodrome on Thursday just before the Instone air-liner left for Paris at 11.30 a.m. One of the passengers, who had arrived in his own car to travel by this machine, was detained by the C.I.D. man in the immigration office, and was later arrested by Scotland Yard detectives. It appears that a warrant had been out for his arrest since June 22, and he had already been across to the continent twice by boat and train without being detected.

So close is the watch now kept at the air-station, however, that he was immediately recognised as one of the long list of people whom the C.I.D. officers have orders to detain. He was quite resigned to his fate, and sent his own car to Scotland Yard to fetch the detectives with the warrant to arrest him. This is the first time that anyone has been arrested here while attempting to leave the country by air.

Capt. E. D. C. Herne, of the Daimler Airway, made an extremely rapid motor-car journey from Paris to London during the week. He had a day's leave from flying, and spent it fetching a motor-car chassis from Paris. He left London on the night train, and, arriving in Paris about 6.30 a.m., took delivery of a Hispano chassis, and set off for London, driving this chassis, at 8 a.m. In spite of the fact that he had to have this chassis hoisted aboard a cargo-boat, and then run round and catch the passenger steamer himself in order to get across the Channel—with a similar performance on this side when it was unloaded—he reached the air-station, covered in mud, by about six o'clock the same evening. He tells me that along the French roads he was touching 85 m.p.h. at times!

Capt. Leverton, of the K.L.M., has been over to Rotterdam during the week to visit the aviation meeting there, and presumably to talk over the coming opposition in the shape of the competition from the new Daimler line through Holland to Berlin.

He tells me that the aviation meeting has been a great success, and that the arrangements of the hotel and offices at the Rotterdam aerodrome are ideal. The buildings are so arranged that it is possible to sit in the hotel and watch all that is going on. The authorities there have taken every step to make the meeting popular, even to providing a fair in the grounds adjoining. The only British machine there appeared to be the Vickers "Vulcan," flown by Messrs. Cockerill and Broome, which was busy taking up joy-riders.

Traffic on the London-Brussels Route

Traffic on the Instone Air Line's Brussels service is, in spite of the usual inexplicable fluctuations, on the whole good. On Saturday there were no fewer than 14 passengers from London to Brussels, which is to some extent surprising, as the bulk of this traffic is from Brussels to London.

The petrol competition on the aerodrome is still keen, and the latest move is the erection by the Anglo-American Oil Company of an office next door to the Shell Mex establishment.

Handley Page Transport are altering the times of their services as from today. The morning and afternoon services will be cancelled, and they will revert to their old original services, leaving both London and Paris at 12 noon.

The weather has continued to be composed of the strangest mixtures, and has hampered the services on several occasions. Quite a feature of the week has been the strong winds which have been blowing either dead against or right behind the machines on the Paris route. One day there would be a strong northerly wind, and the D.H.34's would be flying to Paris in well under the two hours, and taking nearly three to return, while the next day the position would be reversed, and rapid return journeys would be the rule. Morning mist and fogs over the hills, and in northern France, have made the early-morning newspaper services somewhat irregular.

M. Didier was back from his week-end in Paris early on Monday. He informs me that the Paris-Marseilles service of the C.M.A. is running regularly, and is such a success that there is talk of making it a regular daily service next year. The C.M.A. also intend to open a daily service between Paris and Cologne in the spring.

The strong winds over the week-end interfered to some extent with joy-riding, and the Surrey Flying Services did not take their usual hundreds of passengers up for short flights, although, in spite of the wind, there were a goodly number of hardy spirits who ventured into the air. There are, in fact, quite a lot of regular patrons who arrive at the aerodrome week after week and go up in the Surrey Flying Services' Avros.

A NEW FLYING SCHOOL

Visions of the happy, though strenuous, early days of flying arose when we received the announcement that a new flying school is about to be started. Known as Fraser's Flying School, this new venture is now ready to start operations at the Kingsbury aviation ground under the supervision of Mr. A. Fraser, who has been connected with aviation since the early days and has done a considerable amount of flying himself. He will be assisted by an efficient staff, one of whom, we understand, is Mr. Phillips, who has done quite a lot of flying recently in various parts of the country, on his own Avro.

It is proposed to use dual-control Avros for the initial training, after which advanced training will be carried out on the 80 h.p. Le Rhone Sopwith "Pup." In the near future other machines are to be added, such as the D.H., etc., the idea being to give pupils tuition on various types of machines, and not merely to pass them out just fit to fly on one particular type or make of machine.

Mr. Fraser also intends to add to the school stud an entirely new type of monoplane, the designs of which are now finished, and arrangements are being made for the first machine to be constructed.

The first twenty pupils to enrol in the Fraser Flying School will be entitled to a reduced fee of £75 for the course, but the regular fee is to be £100.

It is not, as yet, quite decided whether the School will remain permanently at Kingsbury, but in all probability Brooklands may be the future home, in which case this pioneer flying ground will assume somewhat an aspect reminiscent of the very early days of flying.

Judging by the enquiries we receive from time to time it would seem that there are still many who wish to learn flying, so that this new school should find ready support. Anyway, we wish Mr. Fraser every success in his new venture, and hope to report progress in this journal from time to time.

THE ROYAL AIR FORCE

London Gazette, September 12.

General Duties Branch

Pilot Offrs. to be Flying Offrs, June 21:—C. J. Collingwood, B. W. T. Hare.

The follg. are transferred to the Reserve:—

Class A.—Flying Offr. L. W. Allen, M.C.; Sept. 1. Flight Lieut. H. V. Worrall, D.S.C.; Sept. 12. Flying Offrs. F. J. H. Ayscough, M. W. Baseden, G. H. Bittles, G. L. Blake, R. A. C. Brie, I. G. G. Edgar, W. H. Howell, H. C. Peirce, G. W. C. Ravenhill, B. R. Rolfe, W. J. Sivewright; Sept. 12.

Class B.—Flight Lieut. C. G. Hetherington, M.B.E.; Sept. 12. Flying Offrs. A. E. W. Finch, A. J. Martin, A. F. Warner, H. A. L. Way; Sept. 12.

Class C.—Flying Offrs. S. C. Rose, H. J. de Waal, R. W. Warner, J. S. G. Wrathall; Sept. 12.

Flying Offr. H. M. T. Lehmann, M.C., resigns his short service commn., and is permitted to retain rank of Capt.; Sept. 12.

Flight Lieut. C. H. B. Jenner-Parson relinquishes his short service commn. on account of ill-health, and is permitted to retain rank of Capt.; Sept. 13.

Stores Branch

J. A. Coleman is granted a short service commn. as a Flying Offr., for accountant duties, with effect from, and with seny. of, Sept. 1.

Capt. F. Binns, M.B.E., R.A.P.C, is granted a temp. commn. for accountant duties as a Flight Lieut., with effect from Sept. 4, and with seny. of April 1, 1918, on seconding for three years' duty with R.A.F.

Flight Lieut. F. Binns, M.B.E., to be Acting Squadron Leader; Sept. 4.

The follg. are transferred to the Reserve, Cl. B; Sept. 12:—

Flight Lieut.—E. S. Baker.

Flying Offrs.—J. S. Card, H. F. J. Taylor.

Medical Service

J. F. Carruthers, M.D., is granted a temp. commn. as a Squadron Leader, with effect from, and with seny. of, July 31 (substituted for the notification in *Gazette* of Aug. 22).

Chaplains' Branch

The Rev. P. T. Hutchison is granted a short service commn. as a Chaplain, with the relative rank of Squadron Leader, for the purpose of precedence discipline, and administration; Sept. 2.

The Rev. J. R. Walkey, M.A., is granted the relative rank of Wing Commander for the purposes of precedence, discipline, and administration; Sept. 14.

Memorandum

The permission granted to Sec. Lieut. C. Oakley to retain his rank is withdrawn on his joining the Army.

London Gazette, September 15.

General Duties Branch.

The following are transferred to the Reserve (September 16):—

Class A.—Flying Officers.—J. L. N. Bennett-Baggs, W. E. Lunnon, W. A. Rochelle.

Class B.—Flight Lieut.—J. M. Burke.

Class C.—Flying Officers.—H. C. Atkin, H. Auliff, H. W. Prockter.

Stores Branch.

Wing Comdr. T. O. Lyons, O.B.E., is placed on half-pay, Scale A (September 9) (substituted for the notification in *Gazette* of September 8).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Wing Commander.—J. N. Fletcher, A.F.C., from Air Ministry (D. of E.) to No. 1 Flying Training School (Inland Area). (Supernumerary.) 1.9.22.

Squadron Leaders.—J. A. G. de Courcy, M.C., from R.A.F. Base, Gosport (Coastal Area) to R.A.F. Depot (Inland Area). (Supernumerary.) 1.10.22. A. W. F. Glenny, M.C., D.F.C., from Headquarters, R.A.F. India (India) to command No. 28 Squadron. 1.8.22. E. Rivers-Smith, M.B.E., from R.A.F. Depot (Inland Area) to No. 1 Group Headquarters (Inland Area). 12.9.22.

Flight Lieuts.—G. C. Bailey, D.S.O., from School of Photography (Inland Area) to R.A.F. Depot (Inland Area). (Supernumerary.) 1.10.22. T. C. Thomson, from Central Flying School (Inland Area) to R.A.F. Depot (Inland Area). (Supernumerary.) 1.10.22. W. L. Fenwick, from No. 24 Squadron (Inland Area) to No. 1 Flying Training School (Inland Area) for duty as Adjutant. 5.9.22. A. L. Fiddament, from No. 20 Squadron (India) to Headquarters, R.A.F. India (India). 24.7.22. F. St. J. Woolard, A.F.C., from No. 4 Flying Training School (Middle East) to No. 216 Squadron (Middle East). 4.8.22. A. L. Lingard, from the Packing Depot to No. 1 Flying Training School (Inland Area). 11.9.22. H. H. Balfour, M.C., from Headquarters (Inland Area) to Central Flying School (Inland Area). (Supernumerary.) 7.9.22. D. J. Jones, M.B., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to No. 1 School of Technical Training (Boys) (Halton). 7.9.22. J. K. R. Landells, M.B., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Depot (Inland Area). (Supernumerary.) 4.9.22. J. A. Musgrave, from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to No. 1 School of Technical Training (Boys) (Halton). 4.9.22. R. A. Young, from Headquarters, No. 12 Wing (Ireland) to R.A.F. Depot (Inland Area). (Supernumerary.) 9.9.22. (Actg. Wing Comdr.) L. J. Lightfoot, O.B.E., from R.A.F. Depot (Inland Area) to Headquarters, R.A.F. (Iraq). (Supernumerary.) 1.9.22. (Actg. Sq. Ldr.) F. Binns, M.B.E., from Army (R.A.P.C.) to R.A.F. Depot (Inland Area). (Supernumerary.) 4.9.22. O. St Leger Campion, from R.A.F. Depot (Inland Area) to R.A.F. Central Hospital (Coastal Area). 18.9.22. C. P. Barber, from Instrument Design Establishment (Inland Area) to R.A.F. Depot (Inland Area). (Supernumerary.) 8.9.22. W. J. King, D.C.M., from No. 1 Stores Depot to Headquarters, R.A.F. (India). 6.4.22. Substituted for the notification concerning this Officer which appeared in R.A.F. Intelligence Bulletin dated 26.4.22.

R.A.F. TAKING OVER IRAK

IN accordance with the policy announced approximately a year ago, the Royal Air Force will take over on October 1 the responsibility for the maintenance of peace in Mesopotamia, or, as it is now called, Irak. The announcement of this policy followed the return of Mr. Winston Churchill and Air Marshal Sir Hugh Trenchard from a visit to the East; and Air Vice-Marshal Sir John Salmond, on his return from his tour of inspection in India, will be in command of the R.A.F. Irak.

Officers and men to the number of approximately 1,100 left Southampton on board the *Braemar Castle* on September 14, bound for Mesopotamia, and it is of interest to note that this was the first occasion on which the R.A.F. has chartered a ship exclusively for its own drafts. The officer commanding the troops was Group-Capt. the Hon. J. D. Boyle, with Wing-Commander W. H. Primrose in command of the armoured-car section. The officers and men were drawn from Manston (458) and Uxbridge (542) training centres, and in addition to the officers and other ranks the ship's complement included two matrons, R.A.F. Nursing Service, four sisters and four Staff nurses. Flight-Lieut. A. H. Wann, who, it will be remembered, was in command of "R.38," is making the journey as ship's adjutant.

The total personnel of the R.A.F. in Irak will number about 3,000, and four armoured-car companies, a signal section, an armoured-train section and a water transport section will be included in the establishment. Eight squadrons of the R.A.F. will be stationed in Irak, some at Hinadi, some at Mosul and some at Shivah. The squadrons, their equipment and their stations will be as follows:—

At Hinadi, No. 1 (Sopwith "Snipes"—200 h.p. B.R.); No. 6 (Bristol fighters—275 h.p. Rolls-Royce); Nos. 8 and 20 (D.H. 9A's—375 h.p. Rolls-Royce); Nos. 45 and 70 (Vickers troop-carriers—two 375 h.p. Rolls-Royce). At Mosul, No. 55 (D.H. 9A—375 h.p. Rolls-Royce); and at Shivah, No. 84 (D.H. 9A). Each Squadron consists of 12 machines and reserves.

Of the machines none call for comment except, perhaps, the Vickers troop-carriers. These are practically developments of the famous Vickers Vimy commercial machine, and two types are in existence, the Vernon fitted with Rolls-Royce engines and the Victoria with Napier "Lions." It is not, however, permissible to publish details.

28th Squadron Dinner

THE 3rd Annual Reunion Dinner will be held under the auspices of the 28th Squadron Old Boys' Association on Saturday, October 7, at Anderton's Hotel, Fleet Street, E.C. 2. Assemble at 5.30 p.m.; dinner at 6 p.m. prompt.

Tickets are now available at 8*s.* 6*d.*, and can be obtained from the Hon. Secretary, Mr. C. T. Hodges, 102, Camden Street, N.W. 1.

Marriage Allowance and Allotments of Pay

THE Royal Air Force is introducing a new method for the payment of marriage allowances and allotments of pay. From October 5 the present system of issuing books of allowance forms will be discontinued, and postal drafts will be issued instead direct from the Air Ministry to the payee, who will obtain payment fortnightly in advance at the post office named on the draft.

Identity certificates (ring papers) will no longer be used when the new method comes into operation, but payees will require to notify the Air Ministry of all changes in address.

The R.A.F. Club Cricket Week

THE following changes are to be noted: Hon. F. S. G. Calthorpe is unable to play for the North, and Miles Howell is unable to play for the Rest of England. Rhodes (Yorks) will play for the North and the Rest in place of these two.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association.)

AT the last meeting Mr. W. E. Evans presented the Society with a Cup to be known as the "Model Glider Record Cup," and a hearty vote of thanks was passed to Mr. Evans for his kindness. It was decided that members should congregate on Parliament Hill on Sunday next, the 24th, at 11 o'clock for 11.30, when an effort will be made to improve the present record for model gliders.

On Saturday last members attended at Wimbledon Common to compete for the "Kelly" Challenge Cup. Unfortunately, the weather was so boisterous that the event had to be postponed till Saturday next, the 23rd inst., at 4.30 p.m.

Meetings of the Society will be held on Friday evenings at 7.30 at Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, instead of on Thursdays as heretofore. Anyone interested in model aeronautics will be welcomed. Hon. Secretary, A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

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International Air-Law Proposals

IN Buenos Aires delegates to the International Law Association have last month been thrashing out matters relating to crime under international laws. The possibility of illegalities occurring *via* the air was naturally one of the subjects of which cognisance was taken, and at the discussion upon this section it was agreed that the radius of operation of military aircraft ought to be restricted, and it was decided to appoint a committee to formulate regulations.

The following regulations, recommended by the Aviation Law Committee as providing a uniform international code of law, civil and criminal, for persons carried on aircraft—a question not dealt with in the International Convention for the Regulation of Aerial Navigation, 1919—and amended in certain respects during the discussion, were agreed to:—

(*a*) *Civil Jurisdiction* (Art. 1).—The airship which is above the open sea or such territory as is not under the sovereignty of any State is subject to the laws and to the jurisdiction of the country of which it has the nationality. (Art. 2).—Passenger aircraft over foreign territory remain subject to the exclusive jurisdiction of the State of origin. Private aircraft over foreign territory are subject to the laws and jurisdiction of such territory only in case of violation of its public safety laws and military and fiscal laws, and violation of its laws governing air navigation and acts committed on aircraft affecting such territory. In all other respects private aircraft are amenable to the laws and jurisdiction of their own flag.

(*b*) *Criminal Jurisdiction* (Art. 3).—If during a flight of an aircraft over any State or States or their territorial waters without landing, any person on board such aircraft commit any crime, the person charged shall be arrested, in the air if necessary. The accused shall be tried and punished in accordance with Article 2. The State in which the aircraft alights is obliged to detain the accused if necessary and deliver him to the State of jurisdiction. (Art. 4).—Acts committed on board a private aircraft not in flight in a foreign State shall be subject to the jurisdiction of such State, and any person or persons charged with the commission of such acts shall be tried and, if found guilty, punished according to the laws of such State.

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PERSONALS

Married

At All Saints', Warlingham, EDMUND GEORGE POLE, late R.A.F., only son of Mr. and Mrs. George Pole, of "Westfield," Caterham, Surrey, to KATHLEEN, only daughter of Mr. and Mrs. ALFRED MEREDITH, of Caerwys, Warlingham, Surrey.

To be Married

The marriage arranged between Flying Officer RICHARD GRICE, D.F.C., and Miss SHEILA LANGDON will take place at Port Said on Thursday, Oct. 5.

Birth

MRS. L'ESTRANGE MALONE, wife of Mr. L'Estrange Malone, M.P., gave birth to a daughter last week at 36, Buckingham Gate, S.W. 1.

Item

Major NOBILE CARLO M. GRAZIANI, Air Attaché to the Italian Embassy, has arrived in London from Geneva, where he has been engaged in the Air Conference.

IMPORTS AND EXPORTS, 1921-1922

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
Mar. ...	14	1,471	118,199	166,607	1,565	100
April...	1,370	3,846	138,983	139,995	450	5,880
May ...	3,350	2,416	59,624	167,999	1,818	4,254
June ...	5,181	816	79,713	129,137	—	14,530
July ...	540	1,039	530,628	24,405	860	—
August	343	198	111,595	88,910	—	685
	17,636	11,505	1,185,699	862,734	6,997	26,572

⁂ ⁂ ⁂ ⁂

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(*Continued from p. xiv.*)

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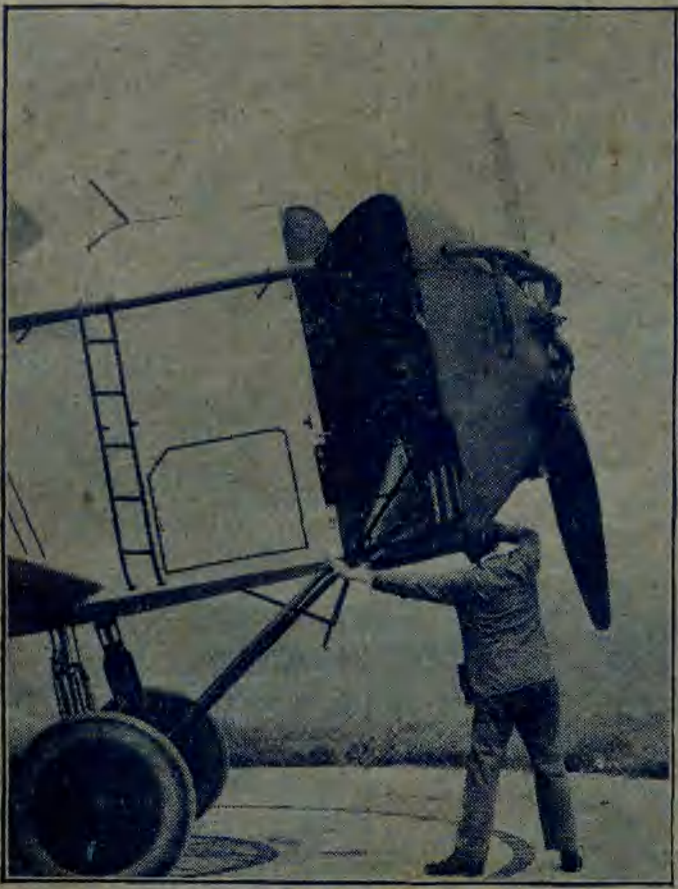

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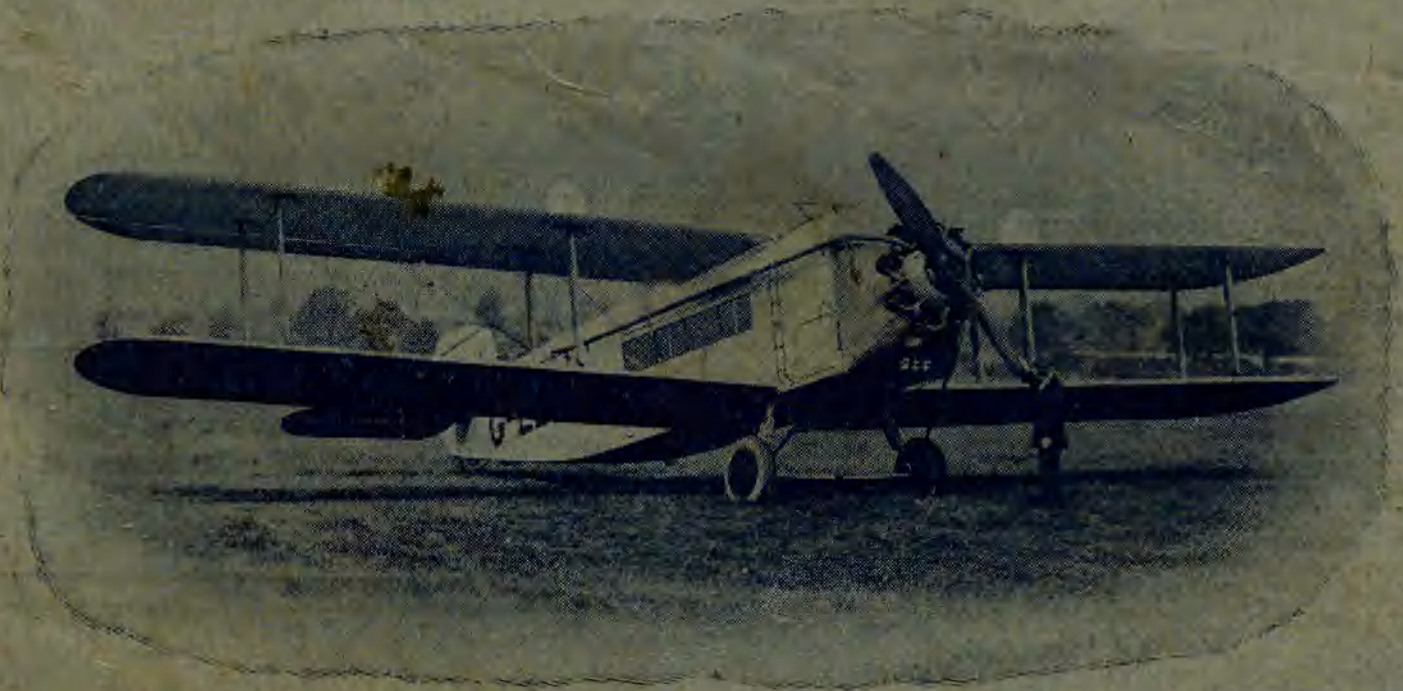

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Sept.	**Tyrrhenian Cup, Italy**
Sept.	**Italian Grand Prix**
Sept. 30	**Coupe Deutsch (300 kil.)**
Oct. 16–21	**Daily Mail £1,000 Gliding Competition**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries Close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

Inter-City Championship Air Races

IF certain practical difficulties can be overcome, the suggestion of instituting annual inter-city championship air races, which has been made by Lieut.-Col. Spenser Grey, appears to be an eminently sound one, and one which would undoubtedly do a very great deal towards spreading an interest in and understanding of aviation. As Col. Grey remarks, it is no manner of use to clamour for a large air service and at the same time insist on rigid economy, and by encouraging towns and cities all over the country to subscribe towards the building of one or more aeroplanes for such a race, a material addition could be made to our aerial strength. Keen as was the interest displayed at all the controls during the race for the King's Cup, it would be a hundred-fold greater if all the cities at which there were controls were represented by their own machines in the race. It is scarcely to be doubted that, if handled properly, the suggestion should meet with general approval, and we imagine that the number of towns which would decide to enter machines would be very considerable.

The suggestion that the machines thus brought into being should be earmarked for the new Auxiliary (or Territorial) Air Force, recruiting for which is to begin next spring, is also excellent, providing a way can be found to make the machines both suitable for the race and useful to a Territorial Air Force.

That there are difficulties to be overcome is hardly to be denied, and a great deal of goodwill on all sides will be necessary to make the scheme workable. For instance, in the very nature of things the proposed race will have to be a handicap one, as not only will the Territorial Air Force require several types of machines, but also the subscriptions of individual towns will vary in amount from a few hundred pounds to several thousands. Figuratively speaking, it should be possible for a very small town or large village to enter an Avro Baby, while London might provide a large high-power twin-engined bomber, and Southampton a large amphibian flying boat. Thus the race is limited from the very beginning to being a handicap one. That is not, perhaps, any great drawback, although it should be remembered that, as the handicapping is based on performance in still air, if the day of the race should turn out very windy, the slower machines are handicapped by the wind to a much greater extent than the handicap in still air allows for. Thus the entrants of a slow machine might conceivably be dissatisfied, and a good deal of ill-feeling might be created which we should try to avoid at all costs. At any rate, we do not envy the handicappers their job.

Then again, it is suggested that machines should be built to one or other of the Air Ministry specifications. Who is going to decide which? Suppose, for the sake of argument, that for a given sum of money one can obtain either an amphibian flying boat, a large single-engined long-distance bomber, or a two-seater fighter. Who will decide which type a certain town with that amount of money subscribed shall buy? It is at any rate possible that the subscribers of the purchase price would prefer the two-seater fighter, as it would be faster and possibly stand a better chance in the race, although the R.A.F. (Territorial) might prefer the bomber.

Another point which comes to mind is, suppose the R.A.F. has had one of these machines for a year or so, and the machine is required for the inter-city or some other race, and that it is crashed by a service pilot a few days before the race. Will the subscribers be sporting enough to say: "Well, it is hard luck but it cannot be helped." We think most of them would, but it is rather asking a lot, although quite possibly the value to the country of that particular machine during the period it was with the R.A.F. may have been far greater than its sporting or propagandist value in the race.

We have no desire whatever to throw cold water on the project, which is, we think, one of the most promising ever put forward in this country, and one which, if found practicable, will in all likelihood do more towards educating the general public to an intelligent interest in aviation than has any other sporting event ever held here. But at the same time, it is no use closing our eyes to the fact that not inconsiderable difficulties will have to be overcome, and the framing of the rules will require the utmost care and consideration if friction is to be avoided. We believe that, given this goodwill on all sides, it should be possible to find ways and means, and we therefore heartily welcome the scheme and trust that it will duly emerge in concrete form.

◆ ◆ ◆

The New British Air Routes

According to schedule, the new air routes should begin operation on October 1. Under the new arrangement Handley Page Transport is to operate the London–Paris service, the Instone Air Line takes over the London–Brussels–Cologne route, and the Daimler Airways inaugurate the London–Amsterdam–Hamburg–Berlin route. Theoretically this re-arrangement of the subsidised air lines is all to the good, inasmuch as it does away with the competition between British firms operating over the same routes. As General Brancker said at the last Air Conference, we have quite enough competition from France, without increasing it by putting several British firms in competition against one another.

Now, however, it appears that the London–Berlin service, at any rate, may prove a "non-starter." The restrictions imposed by the Allies on German construction of aircraft in order that it might be classed as "civilian," limited the useful load, the power of the engines, and the amount of fuel that might be carried to a certain figure. This figure was such as practically to prevent commercial aviation in Germany, the idea being to make quite sure that the Germans did not produce commercial machines which could be converted into military aircraft. One result of the restrictions has been to lead our late enemies to make arrangements in various neutral countries for the construction of machines of a power and capacity which would have been classed as "military" machines if built in Germany. So far as we can see, and have always so insisted, there is no way of preventing this.

Now, at the eleventh hour, it is dawning upon our people that we (the Allies) may have been cutting off our nose to spite our face by these restrictions upon "commercial" German aircraft, for naturally the Germans are unlikely to make any one-sided arrangement whereby British (or French, for that matter) aircraft of high power and speed and large carrying capacity is allowed to fly on German routes on which German lines are only permitted to run "restricted" machines. When the announcement was first made that a new arrangement was to be made, it was naturally taken for granted that this side of the question had been given consideration, and it is therefore somewhat surprising to learn now, a week before the scheduled time of starting the services, that difficulties arising out of regulations which have been in force for months are likely to prevent the inauguration of the new services. The matter appears simple enough: Either we cut off Germany from air communication with the rest of the world, and in so doing we cut ourselves off from air communication with (and presumably across) Germany, or else Germany is placed on an equal footing with us, at any rate over such lines as are to be operated conjointly by British and German firms, and we in return have the right to run our lines to Germany. The present arrangement is an unsuccessful attempt to eat our cake and keep it too.

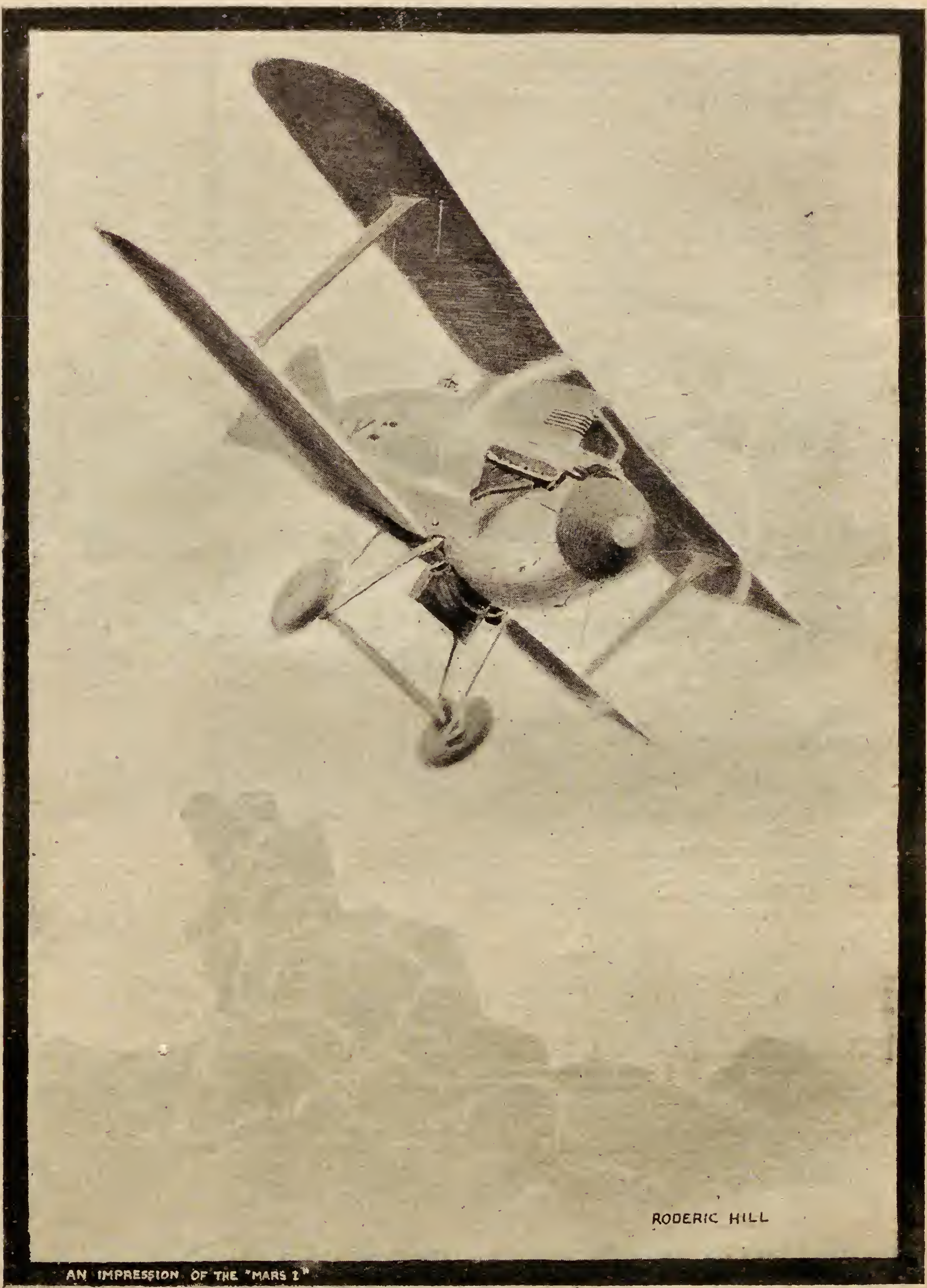
We trust that means may be found to surmount the present difficulties, and that the inauguration of a line which could hardly fail in time to prove one of the most important of those radiating from London will not be unduly delayed. That the line to Berlin would soon become a success there can be little doubt. Two simple facts ensure this: the single fare has been fixed at £5 10s., which is no more than the first-class railway fare, while the time taken between London and Berlin is about seven hours by air as against twenty-four hours by train.

◆ ◆ ◆

The Forthcoming Gliding Competition

The site for the gliding competition for the *Daily Mail* prize has now been chosen, and particulars will be found on another page of this issue. The site appears to be very well suited for the purpose, and it has the great advantage of being within easy reach of London. Seven entries have been officially received at the moment of writing, and it is expected that very many more will be in the hands of the Royal Aero Club before the closing date, October 7, among those expected being several French entries. It now seems fairly certain that no German competitors will be coming over for our gliding week. The interest in gliding which is now so manifest among the general public is a very good sign, and we firmly believe that gliding as a sport will quickly become popular.

For the Deutsch Cup.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ALTHOUGH it is realised that rapid and excellent work can be done by taking vertical photographs and, piecing the separate exposures together, thus obtain a photographic map of any town or district, the speed and accuracy which this new method, opened up by the advent of aircraft, can give is, perhaps, less generally appreciated. In this connection it would be difficult to find a better example than the accompanying hydrographic chart and aerial photographic mosaic of the same area, the St. Lawrence River and canals in the vicinity of Cornwall Island, showing the town of Cornwall, Ontario. From the General Progress Report of the Air Board of Canada, covering a period of six months (from October 1, 1921, to March 31, 1922), we quote the following notes :—

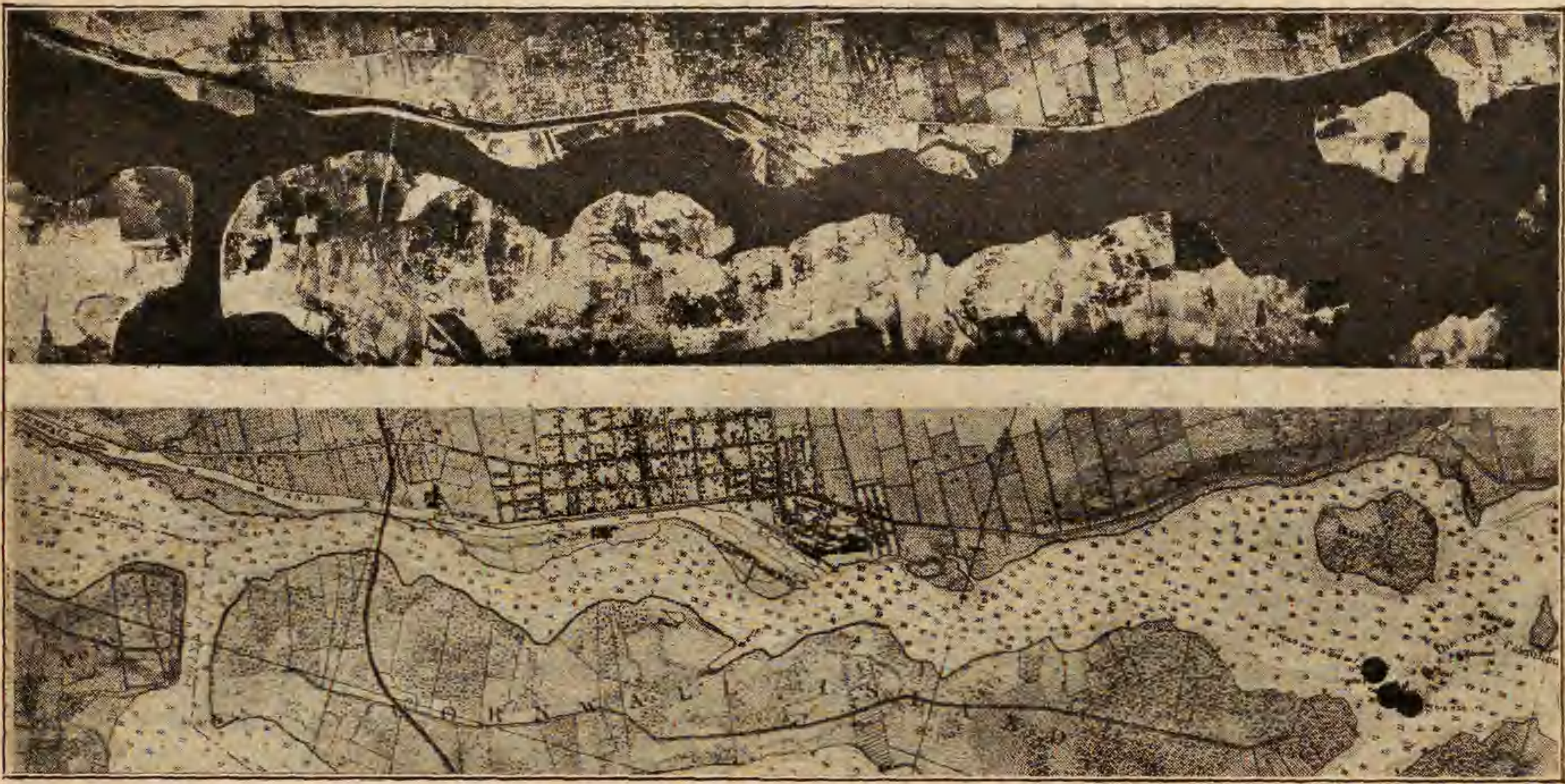
"Attached to this report are two illustrations showing comparisons between mosaics and maps made from actual ground surveys. The maps used in this case are charts made by the Corps of Engineers of the United States Army and issued by the United States Lake Survey Office. Probably no more accurate mapping and finer reproduction could be chosen for comparison purposes. The mosaics were made during last summer by the Air Board for the Canadian Section of the International Joint Commission for use in connection with their report on the St. Lawrence Waterway project. The detail in both suffers somewhat from reproduction and the reduction of scale. This is specially so of the mosaic, as it has had to be re-photographed several times with consequent loss of sharpness in detail.

"The pictures were taken from a D.H.4 aeroplane, at an altitude of 8,000 ft., with a K.1 film camera made by the Eastman Kodak Company, flown from Ottawa Air Station by Flight-Lieut. H. L. Holland. The flying conditions were excellent, and so closely did the prints from the original negatives match that no rectification of the individual negatives was found necessary. This shows that under good flying conditions and with careful and skilled piloting remarkably accurate results can be obtained.

"Owing to constant changes in light and shade on the water surfaces, due to ripples caused by the varying winds, passing watercraft and other natural conditions, it was found impossible to obtain even matching in texture of the pictures forming the mosaic over such areas. To obviate the patchy appearance due to this, the water areas were brushed over so as to give a uniform texture. With this exception the mosaic was made direct from prints off the original negatives without retouching or rectification of any kind.

"The possibilities of time and labour saving in map-making can readily be seen from the comparison. Aerial surveying by photographic methods is being rapidly developed, and scientists in many countries are working on the development of maps, accurate to scale and elevation, from oblique and vertical aerial photographs. Mosaics such as are shown here do not pretend to absolute accuracy, and cannot at present take the place of maps made from ground surveys. They are rather supplementary to them, giving an actual reproduction of the terrain as it exists, and showing it in much greater detail than the most carefully made map can do.

"Provided a series of points, recognisable from the air, were fixed on the ground along a stretch of country of which a map was required, the whole of the detail of the map could be transferred from vertical aerial photographs taken and the laborious process of traversing the whole could be dispensed with."



A comparison between an aerial mosaic and a hydrographic chart of the St. Lawrence River and Canals in the vicinity of Cornwall Island, showing the town of Cornwall, Ontario. The mosaic and chart are to the same scale, and cover an area of over 10 square miles. The comparison will indicate the accuracy with which topographical detail is revealed in aerial photographs and the possibilities of their use in the revision of existing maps. The taking of the photographs in this instance (140 exposures in all) required but a single flight of 2½ hours.

* * *

Senior Officers' School

ARMY ORDER 308, just published, states that the following are among the officers who have attended the 9th Course at the Senior Officers School, Woking, from May 26 to August 18, 1922 :—

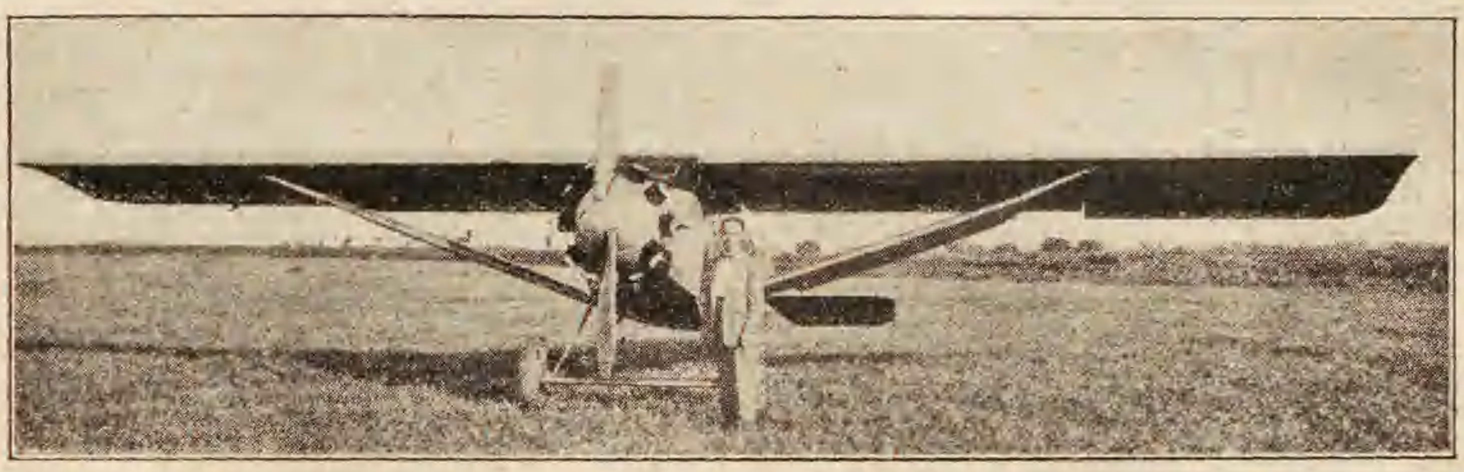
R.A.F.—Squad.-Leader H. J. F. Hunter, M.C., and Squad.-Leader A. J. Butler, M.C., A.F.C.

Pilot's Rescuer Rewarded

THE Board of Trade, on behalf of the Air Council, have awarded a gold watch to William Thomas Hawkins, Rescue Boatman of Forth Bridge, and £5 each to his assistants, Richard Marshall and John Allan Ritchie, in recognition of their services in rescuing a flying officer who fell into the Firth of Forth in his Sopwith Camel, on May 29 last.

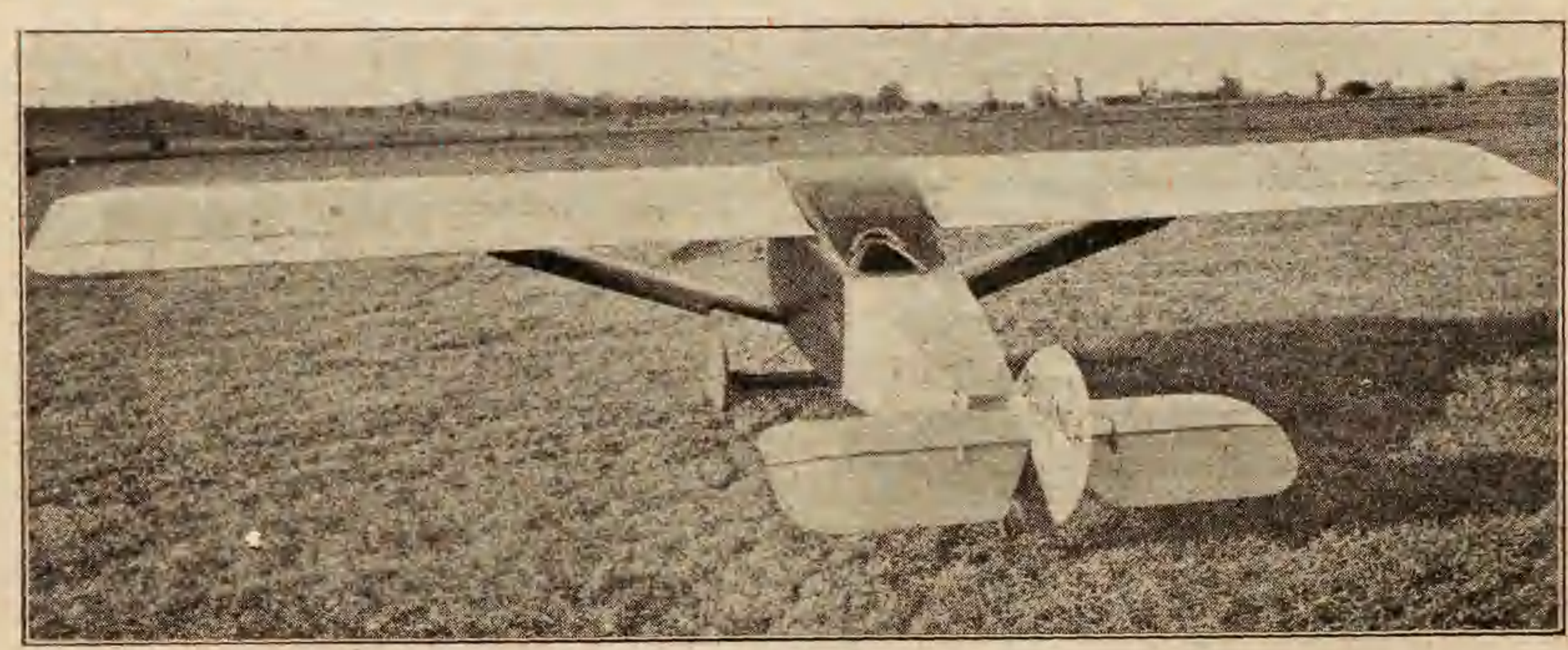
THE BELLANCA CF FIVE-SEATER COMMERCIAL "SESQUIPLAN"

On the occasion of the flying meeting held at Monmouth, Ill., U.S.A., last June, some considerable stir was caused in aviation circles by the appearance of a new American-built machine, which carried off the first prizes in the four competitions in which it took part. This machine was the Bellanca CF five-seater cabin-type "Sesquiplan," or "one-and-a-half-plane." It has been designed by G. M. Bellanca—who was responsible for the successful small, low-powered biplanes bearing his name of 1918—with the financial assistance of Victor H. Roos and others of Omaha, Nebr.



THE BELLANCA CF 5-SEATER "SESQUIPLAN": Front view.

The Bellanca CF embodies several noteworthy features, such as, apart from general design, low landing speed and quick take-off, high speed with high pay load, simplicity of design, low head resistance—although not of the cantilever or internally-braced type, external bracing wires are conspicuous for their absence—and economy. The primary object before the designer was to produce a machine with an increased carrying capacity per h.p. of useful load, which at the same time had a low cost of manufacture and low cost of maintenance.



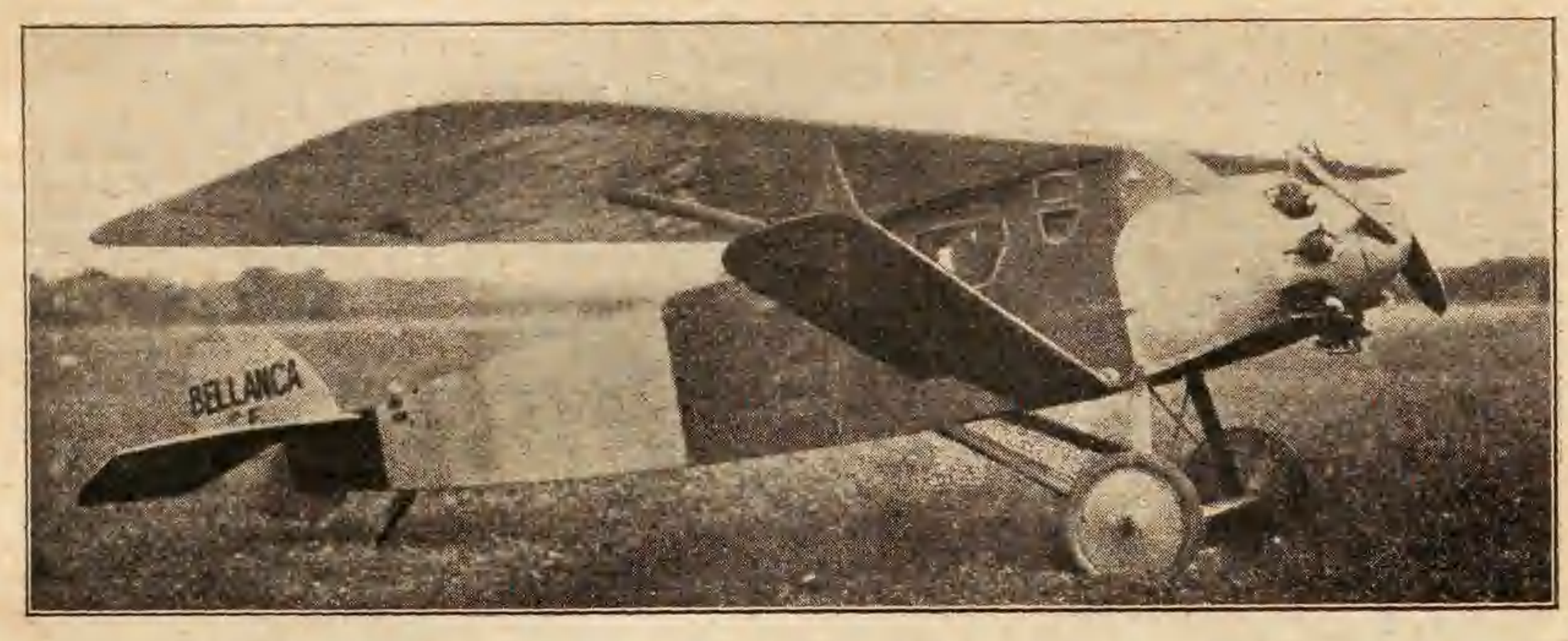
THE BELLANCA CF 5-SEATER "SESQUIPLAN": Rear view, showing the pilot's cockpit.

Actual flights have demonstrated that the above characteristics have been successfully fulfilled, and a remarkably efficient machine produced. With a 90 h.p. Anzani engine and pilot and four passengers, the Bellanca CF accomplished a speed of 109·8 m.p.h., over the measured course (six half-mile flights, three each direction) at the Fort Crook Army Field. The landing speed is claimed to be as low as 30 m.p.h.

In the trial flights the machine handled remarkably well, and showed a remarkable degree of inherent stability—flying several complete circles with only the rudder control in action. It also carried out all the usual "stunts" (loops, spins, etc.) in a satisfactory manner.

Before passing on to a brief description of this machine, it may be of interest to refer to the events won by this machine at the Monmouth meeting—previously mentioned. In a speed contest, it covered the 15-mile triangular course in 9 mins. 15 secs., as against 11 mins. 30 secs. put up by the second machine, fitted with a 150 h.p. engine. In the gliding contest it took 4 mins. 43 secs. to descend (engine off) from 2,000, covering a distance of 4½ miles, equivalent to a gliding angle of 1 in 12. Such a performance indicates a valuable feature in the event of an engine failure when on a cross-country flight, enabling the pilot to look around for a suitable landing ground. Another event was the climbing contest, in which this machine, reached an altitude of 7,000 ft. in 11 mins.

As will be seen from the accompanying illustrations, the Bellanca CF is a monoplane with comparatively small auxiliary planes, set at a fairly pronounced dihedral angle, underneath the main planes, and serving as braces for the latter. The *fuselage*, which is of good streamline form, is of the composite type, and is of box-veneer construction with internal reinforcing of Port Orford cedar, forming a stiff frame of triangles and box-girder construction with cables and wires. The forward portion, just behind the engine, is formed into a roomy cabin at the top of which are the main plane attachments. The position of the cabin is such that the weight of the passengers coincides, at all times, with the centre of gravity of the machine. Thus the machine is always well-balanced, whether with full or light load. The cabin is of veneer construction, and accommodates four passengers, with comfort, the rear passengers facing forward, whilst those in front can face either forward or backward. Should occasion arise, six passengers can easily be taken in the cabin. On each side of the cabin are three windows, and in front a



THE BELLANCA CF 5-SEATER "SESQUIPLAN": Three-quarter front view.

large window gives a good view ahead, looking over the engine. Air intakes provide for the ventilation of the cabin, and if necessary the front window can be opened as widely as desired. As the engine compartment is completely separated from the cabin, it is possible to smoke in the latter, whilst the noise from the engine is reduced to a minimum.

At the rear of the cabin is the pilot's cockpit, aft of which the *fuselage* tapers sharply to a vertical knife-edge. The pilot's view forward is, we should say, somewhat restricted by the top of the cabin, but by looking over the sides he has a fairly clear view forward under the main planes.

The main characteristic of the wing construction is extreme simplicity. The spars are of Port Orford cedar I-beam cross-section, and the ribs are a combination of bass wood, ash and fabric. The average strength of these ribs, which weigh about 9 ozs. each, is stated to be 700 lbs.

The wing spars extend beyond the wing roots, and pass through the top of the cabin to the attachment within, so that port and starboard spars abutt, forming thereby what is practically a continuous beam. Thus, the main stresses of the wings are not transfered to the *fuselage*. Extending from the lower *longerons* of the *fuselage* up to a point on the main wings about midway out from the roots are the auxiliary planes, the spars of which are splayed out near the extremities, so as to attach to the front and rear spars of the main wings; they are left uncovered at this portion, and practically speaking take the form of struts. These auxiliary wings thus take the landing and flying stresses, thereby eliminating the usual bracings, streamline struts and wires, and so considerably decreasing the weight and head resistance whilst at the same time adding to the lift. They have the further advantage of improving the lateral stability of the machine, by virtue of their pronounced dihedral angle.

The load factor for the lifting stresses is 14, the lift being taken by ¼ in. cables attached to the spars of the main wings at the cantilever points, and passing through the auxiliary wings and through the *fuselage*. The load factor at the cantilever point of the rear main spar is 9—this being the weakest point in the machine—and for the front spar 10½. The safety factor for the reverse air load is 5½, which is claimed to be more than sufficient. While on the subject of safety factors, it may be mentioned that the *fuselage* is capable of withstanding a load of 70 lbs. per sq. ft. applied at the tail, the f.s. of the various members having been figured at 2. The stabiliser and elevators are made to withstand a load of 50 lbs. per sq. ft., and the rudder a load of 35 lbs. per sq. ft. The f.s. of the landing gear is 8.

The main wings are of fairly thick section, and have an L/D of 20, the centre of pressure displacement being 10 per cent. of the chord; the drift at low angle is very small, making the wing well adapted for high speed. The cross-section of the lower wing—the thickness of which is 16 per cent. of the chord—is such that its L/D is 16·4; the combined L/D of the complete supporting unit (main wings, auxiliary planes, and resistance of short wires and struts) is 18, which compares very favourably with the internally braced wing, in that it gives lighter construction, higher L/D, and smaller drift at low lift coefficient.

The tail group is composed of a non-lifting fixed stabiliser, with divided elevators and rudder. The attachment of the stabiliser is such that it can easily be detached by removing four cotter pins. Control cables pass within the *fuselage*.

A 90 h.p. 10-cylindered air-cooled Anzani engine is fitted within a neat streamlined nose piece, only the cylinder heads being exposed to the open. The tractor screw, designed by Prof. Bellanca, is 8 ft. diameter by 8 ft. pitch, and is fitted with an aluminium spinner having air vents which cool the covered part of the engine. Two magnetos are fitted, and a double oil pump assures ample lubrication under all conditions.

The landing gear is of the conventional V-type, consisting of stout ash streamline struts—glued together with birch veneer—and rubber sprung axle enclosed by a fairing having a lifting cross-section.

The principal characteristics of the Bellanca CF are:—

Span (main)	40 ft.
Span (auxiliary)	22 ft.
Chord (main)	6 ft. 6 ins.
Chord (auxiliary)	2 ft. 6 ins.
Overall length	23 ft. 10 ins.
Total wing area	290 sq. ft.
Weight empty	950 lbs.
Weight loaded	1,990 lbs.
Weight/sq. ft.	6·85 lbs.
Weight/h.p.	22·1 lbs.
Useful pay-load	680 lbs.
Speed range (full load)	40-108 m.p.h.
Climb in 10 mins. (full load)	5,000 ft.
Range (full speed)	440 miles.
Miles per gall. of fuel	16 miles.

* * *

A League of Nations Air Force?

In the course of a speech at Ripley, Derbyshire, on the 19th inst., General Seeley, referring to the Near East trouble and the necessity for the League of Nations to be equipped with an efficient police force, suggested that this force should be a naval force and an air force. "With these two powers you can cut the communications of any hostile array. Had the League of Nations had both the authority and the power, this latest war could never have occurred. The Greeks were warned not to advance. International sea power would have cut their communications and rendered their advance impossible. Had Mustapha Kemel attempted to advance, international air power would have cut his communications and broken up his concentrations."

Experiments with Helicopters

It is reported that M. Damblanc intends to carry out some interesting experiments with helicopters in November, with the object of making observations on their fall through the air when dropped from a balloon at an altitude of about 4,000 ft. The helicopters will not, of course, carry pilots, but will be fitted with instruments which will record the various phases of the descent, which, according to M. Damblanc, will not be more than 30 ft. per second.

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING.

A MEETING of the Committee was held on Wednesday, September 20, 1922, when there were present: Lieut.-Col. F. K. McClean, A.F.C., in the Chair; Group-Capt. F. W. Bowhill, C.M.G., D.S.O., R.A.F.; Maj.-Gen. Sir W. S. Brancker, K.C.B.; Mr. Ernest C. Bucknall, Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S.; Lieut.-Col. M. O'Gorman, C.B.; Mr. F. Handley Page, and the Secretary.

Election of Members.—The following new Members were elected:—

Maj. H. G. Brackley.
Charles Roderick Carr.
Henry Douglas Clark.
Arthur John Hawes Elverson.
Richard Claude Hancock.
Everard John Boothby How.
Flying Officer Thomas Albert Gibbs Hudson, R.A.F.
Flight-Lieut. W. H. Longton, R.A.F.
Charley Edmond William Ricou.
Lieut. Joseph Russell Stenhouse, R.N.R.

The King's Cup Race.—The Reports of the Racing Committee, the Stewards of the Meeting and the Judge were received.

On the motion of the Chairman, a unanimous vote of thanks was passed to the following for the valuable assistance rendered in the organisation of the race:—

Royal Air Force, for supplying mechanics at each control.

The Air Ministry, Controller of Communications and Press Section.

The Handicappers, Lieut.-Col. W. A. Bristow and Capt. R. J. Goodman Crouch.

Aerodrome Officials.

Maj. Gilbert Dennison, Birmingham Control.
Mr. A. E. George, Newcastle Control.
Mr. J. Allison, Jun., Glasgow Control.
Mr. John Lord, Manchester Control.
Mr. H. J. Thomas, Bristol Control.

The thanks of the Club were also accorded to Maj.-Gen. Sir W. S. Brancker, K.C.B., the Racing Committee, and the Club officials who organised and carried out the details of the race.

Jacques Schneider Cup, 1922.—It was decided to hold a banquet towards the end of October to commemorate the British victory of the Supermarine Napier Flying Boat in the Jacques Schneider Cup, 1922, and to present a silver salver to the pilot, Capt. H. C. Biard.

F.A.I. Conference, Rome.—The Committee considered the various questions down for discussion at the F.A.I. Conference to be held in Rome on October 8–12, 1922. Lieut.-Col. M. O'Gorman, C.B., was appointed delegate to attend on behalf of the Royal Aero Club.

Air Conference, 1923.—Lieut.-Col. M. O'Gorman, C.B., was nominated to represent the Club on the Committee of the Air Conference to be held in February, 1923, organised by the Air Council.

Gliding Committee.—The reports of the Gliding Committee dated August 28 and September 14, were received and confirmed.

Detroit Aviation Race.—The application to include a portion of Canadian territory in the Detroit Aeroplane Race in October was granted subject to the approval of the Aero Club of Canada.

Deutsch Cup.—The entry of the Gloucestershire Aircraft Company of Cheltenham was confirmed.

The Secretary reported the arrangements made between the Royal Aero Club, the Aero Club de France, and the Compagnie Générale de Navigation Aérienne regarding the free entry of the British machine into France for the race, which were approved and confirmed.

Maj.-Gen. Sir W. S. Brancker, K.C.B., Lieut.-Col. F. K. McClean, A.F.C., and Mr. H. E. Perrin were appointed to represent the Club at the Race for the Deutsch Cup to be held at Etampes on September 30, 1922.

Aviators' Certificates.—The following Aviators' Certificates were granted:—

7930.	The Hon. Elsie Mackay.	August 14, 1922.
7931.	Henry Vigne.	October 12, 1918.

Aeronauts' Certificates.—The following Aeronaut's Certificate was granted:—

280.	Cyril W. Price.	October 30, 1918.

GLIDING COMMITTEE.

A Meeting of the Gliding Committee was held on Thursday, September 14, 1922, when there were present: Lieut.-Col. M. O. Darby, in the Chair, Lieut.-Col. W. A. Bristow, Maj. O. T. Gnosspelius, Mr. W. O. Manning, Capt. W. H. Sayers. In attendance: Mr. B. Reynolds, Mr. F. Entwistle (Meteorological Department, Air Ministry) and the Secretary.

The Committee considered the reports on the site for the Gliding Contest, and it was decided to select Itford Hill, on the South Downs, near Lewes.

The Secretary was instructed to approach the owners and make the necessary arrangements.

GLIDING COMPETITION

(*Under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aéronautique Internationale*)

For the Prize of £1,000 offered by the Proprietors of the "Daily Mail." October 16–21, 1922.

The Gliding Committee has selected Itford Hill, Newhaven, for the Gliding Competition for the £1,000 Prize offered by the proprietors of the *Daily Mail*.

Shed accommodation will be provided free, and will be available from October 12.

Machines by rail should be sent to Glynde Railway Station.

Machines from abroad should be sent to Newhaven.

Transport from both these stations to the sheds can be arranged through the Secretary, Royal Aero Club, 3, Clifford Street, London, W. 1.

The prize of £1,000 offered by the proprietors of the *Daily Mail* will be awarded to the competitor who remains the longest time in the air, providing such flight occupies not less than 30 minutes, under the following conditions:—

Supplementary Regulations

All flights must be commenced between sunrise and sunset.

Organisation.—The Competition will be conducted by the Royal Aero Club.

Competitors.—The Competition is open to persons of any nationality holding a licence issued by any Aero Club affiliated to the Fédération Aéronautique Internationale. (NOTE.—Licences for British competitors will be issued by the Royal Aero Club.)

The Competition is open to any heavier-than-air machine not provided with any motive power except that produced by the personal exertions of the occupants during flight and which is not supported either wholly or in part by any gas which is lighter than air.

Timing.—The timing of flights will be taken from the moment at which free flight commences until first contact with the earth. The machine must have no connection with the earth during flight.

Alighting.—The alighting must take place within an area which will consist of a circle of a radius of approximately 800 yards measured from the official point of departure.

Entries.—Entries must be made to the Royal Aero Club, 3, Clifford Street, London, W. 1, not later than 5 p.m. on Saturday, October 7, 1922. There is no entry fee.

The Royal Aero Club, in the interests of safety, reserves to itself the right to refuse any entry and/or to prohibit the flight in the Competition of any competitor if it considers the flight would be dangerous.

Entries.

Capt. Frederick Warren Merriam, Whiteley Bank House, Wroxall, Isle of Wight (Monoplane).

Maj. Maurice Edgar Arthur Wright, Mr. Frank Courtney, Mr. W. H. Sayers, c/o *The Aeroplane*, 175, Piccadilly, W. 1 (Monoplane).

Mr. Arthur Henry Knott, 119, Pentre Treharne Road, Landore, near Swansea (Monoplane).

George England (1922), Ltd., Hersham Road, Walton-on-Thames, Surrey (Monoplane).

Mr. John Hogg Robertson, 1, Albemarle Street, W. 1 (Monoplane).

Mr. James M. Hargreaves, 39, Lynmouth Road, Reading (Biplane).

John J. O'Freddy, 56, St. Martin's Lane, London, W. 1 (Biplane).

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

IT is now reported that M. Barbot will fit a small engine in his Dewoitine monoplane and attempt a flight across the Channel, presumably in order to attempt to win the Blériot prize. The time for the attempt is not definitely settled, but it is thought that the machine may be ready during October.

* * *

IN a letter to the Editor of our American contemporary, *Aviation*, Dr. Georg Madelung, one of the designers of the Hannover glider "Vampyr," on which Herr Hentzen remained aloft for 3 hrs. 10 mins., gives some very interesting information about the design of that machine. From Dr. Madelung's letter we quote the following, which has its application, as regards the first part of it, to power-driven machines no less than to gliders :—

"The surprisingly high quality of the aerodynamical properties of this glider was not obtained by a particularly suitable *form* of the body. I had developed the form of the body principally from the constructional standpoint. It has, for instance, not only a rectangular section, but also a rather pronounced corner on its under side, comparable to the step of a float. We had a competitive test between this odd-shaped body and a real 'streamline' body, with round section very appealing to the eye. The tests were made with a large model, 1/10 size, in which all drag producing parts were taken into consideration—tail surfaces, tail skid, pilot's head. The foot balls only were neglected. The air speed of the wind tunnel was about three times the actual gliding speed. The scale effect can, therefore, almost be neglected, and I believe that the results of this test are reliable, not to speak of the usual thoroughness of Dr. Prandtl's institute.

"*The results were remarkable. The odd-shaped body was slightly superior to the streamlined body. At large angles of incidence the model with this body had a higher lift and a better lift/drift ratio than the model with the streamlined body. It was even better than the bare wing.*

"This does not mean, of course, that a body of primitive form has less resistance than a well streamlined body. It shows only that I had found a particularly suitable arrangement for the body where it had no detrimental influence on the wing.

"The particular merit of this glider is neither its good L/D, which is equal to 16, nor its high maximum lift, which is $C_a = 165$ per cent., or in American units: $K_y = 0.0042$. [This is equal to a lift coefficient of 0.82 in English 'absolute' units.—Ed., FLIGHT.] To obtain a low rate of descent it is necessary to have both of these factors at the same time, at the same angle of incidence. The characteristic factor which determines the rate of descent is :—

In (German) absolute units $\dfrac{C^3_a}{C^2_w}$ or

In (American) $\dfrac{\text{lb.}}{\text{sq. ft.}} \times \left(\dfrac{\text{Hour}}{\text{Miles}}\right)^2$ units: $\left(\dfrac{L}{D}\right)^2 \times K_y$

"I developed for my glider a section, which has not only a very high maximum lift, but also a section drag for high lift lower than any other section so far tested, and obtained thereby a value :—

$$\frac{C^3_a}{C^2_w} = 305 \qquad \text{or}$$

$$\left(\frac{L}{D}\right)^2 \times K_y = 0.78$$

"The Rhoen mountains are very different from the average flying field. The glider must be handled, started and landed on 20 per cent. slopes, in fields covered with stones, fences and bushes, and sometimes in treacherous winds. It was, therefore, necessary to design the glider not only for a high magnitude of forces, but also for forces of very different kinds. Such cases had to be considered as hitting the ground or a fence pole with the wing tip, the nose, the elevator, or even the case of completely turning over. This precaution proved to be necessary, for in one of the first flights a start failed. The plane touched the ground first with one wing tip, then with the nose of the body. The damages were local only, and could be repaired within a couple of days."

* * *

The Göttingen experiments on models of the Hannover *fuselage* indicate that we really know far less about the subject of lift and resistance than we think we do, and that the practice which has been followed hitherto of estimating the resistances of the various components, and adding them together to get the resistance of the complete machine, may lead to serious error. It appears to be time we got to think of an aeroplane as a whole, and not as a conglomeration of separate parts. We believe that in the case of the de Havilland monoplane a somewhat similar result was obtained, *i.e.*, the efficiency and lift of the wing was increased by the presence of the *fuselage*.

* * *

GLENN CURTISS, the famous American aircraft designer and constructor, who was one of the first to fly, has designed, built and flown a small seaplane glider. The machine was, it appears, towed behind a fast motor-boat until it got up sufficient speed to rise. It is stated to have alighted safely. It may be remembered that in the very early days of flying M. Voisin made similar tests on the Seine with aeroplanes towed along by motor-boats. Owing to the imperfect knowledge of design in those days, M. Voisin's towed aeroplanes came to grief on more than one occasion.

* * *

IN the Royal Aero Club Notes in this issue will be found announcements relating to the site chosen for the forthcoming gliding competition for the *Daily Mail* prize, and to the entries so far received. The latter number seven, but as entries are received up to Saturday, October 7, it is hoped that this number will be very greatly increased before the closing of the entries list. Incidentally we would remind our readers that there is no entry fee, and consequently no forfeit in case of non-starting. We therefore recommend all who are hoping to get machines ready in time to enter them at any rate, so that, if finished at the last moment, they may not be debarred from taking part in the competition. By this we do not mean that people who have no possible chance of getting a machine ready in time should enter. That would be unfair to the Royal Aero Club, as it would give the organisers a lot of unnecessary work. But if there is a possibility, even if it appears at the moment somewhat remote, our advice is, *Do not delay*.

* * *

WITH regard to the machines themselves, but little information is available at the moment, as entrants are naturally not over anxious to give away too many details of their machines before the competition. A few particulars may, however, be of interest. The glider entered by Merriam is of his own design and construction. It is, we believe, a cantilever monoplane, not unlike the famous Hannover "Vampyr" in general arrangement. Mr. Merriam is building it in one of the large sheds belonging to Mr. S. E. Saunders, of Cowes, Isle of Wight, who has, with his usual generosity where sport is concerned, placed it at Merriam's disposal. Mr. Newman, works manager of the Saunders aircraft department, is interested with Merriam in the construction, and between the two of them they should turn out a very useful machine. We learn that the Merriam-Newman monoplane has a span of 36 ft., and that it will weight about 200 lbs. empty. In the competition the machine will be piloted by Merriam.

* * *

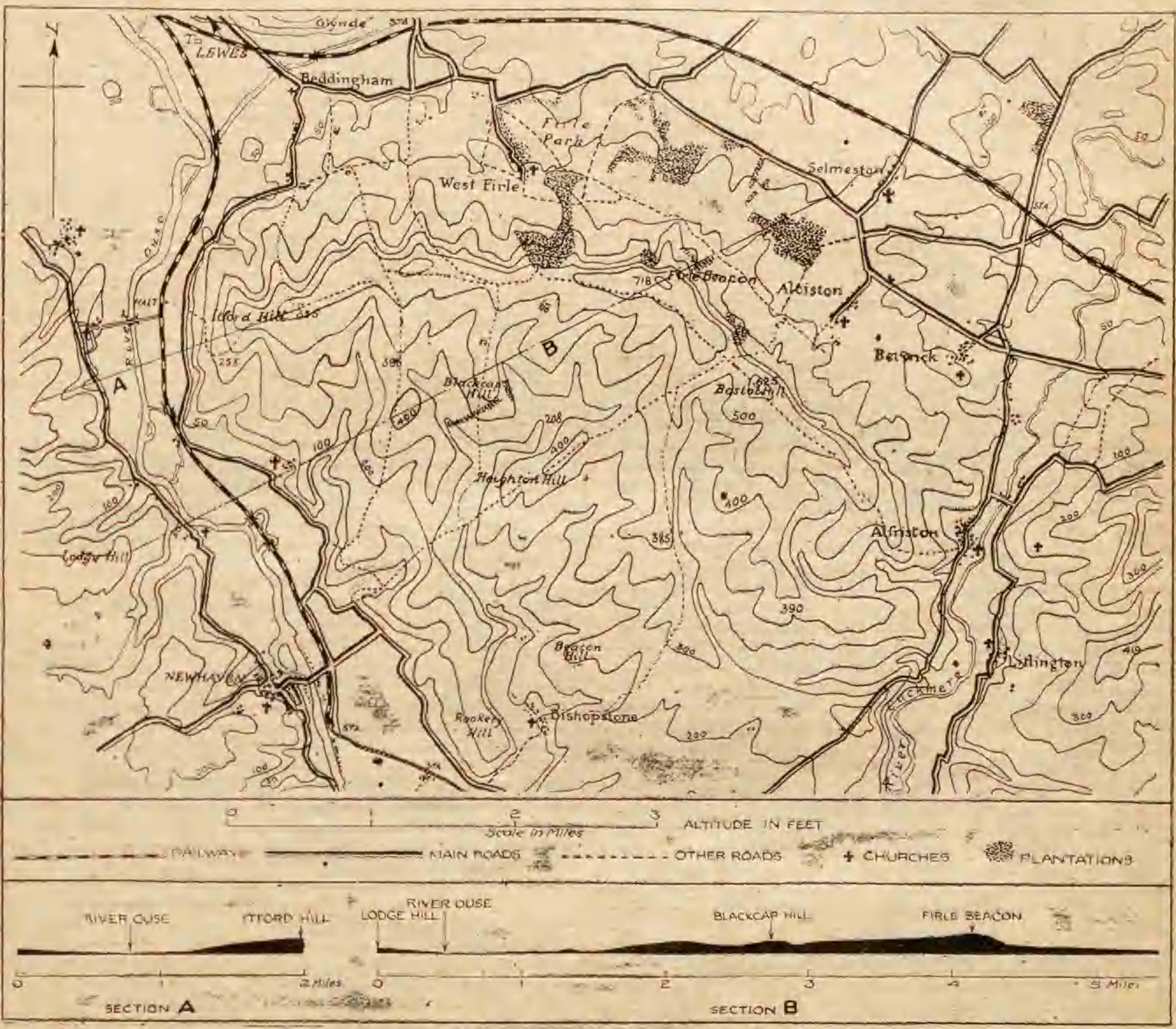
THE machine entered by Maj. Wright, Mr. Courtney and Capt. Sayers is also a monoplane, designed, we believe, by Capt. Sayers, and to be piloted by Mr. Courtney. The monoplane is being built by the Central Aircraft Co., of Kilburn, and will have a wing span of 42 ft. and a weight empty of 200 lbs., bringing the loaded weight up to about 350 lbs., or approximately the same as that of the Merriam-Newman glider.

* * *

MR. GORDON ENGLAND has now started work on his machine in real earnest, and hopes to have it ready by the end of this month. His machine is a cantilever monoplane with enclosed *fuselage*, and it is stated that he hopes to be able to build it for a weight of less than 100 lbs. As Mr. England is one of our pioneer pilots (also of gliders), the performance of his machine will naturally be watched with great interest, and we hope shortly to be able to announce that other "old-timers" are building gliders. The machine is quite small, being of but 28 ft. span, and is being constructed at the works of George England (1922), Ltd., of Walton-on-Thames. In the competition the machine will be piloted by Mr. Gordon England.

* * *

MR. A. H. KNOTT, of Landore near Swansea, is building a very small monoplane of but 20 ft. span and a weight empty not exceeding 80 lbs. His machine is to be fitted with a propeller driven by the pilot's feet. In spite of the presence of the propeller, it appears doubtful if a monoplane surface of only 20 ft. span can provide sufficient area to make the machine a good glider, whatever its properties may be as a foot-propelled aeroplane.



Contour Sketch-Map of Scene for Gliding Competition.

* * *

MR. J. H. ROBERTSON of 1, Albemarle Street, has entered a patent wing monoplane, which is stated to have been built and successfully flown in 1910. Since then the machine is said to have been re-designed and to have been tested recently with good results.

* * *

Two more entries have been received by the Royal Aero Club, both biplanes. One is by Mr. J. M. Hargreaves and the other by Mr. J. J. O'Freddy. Of these two machines no further particulars are available at the moment.

* * *

THAT the gliding competition is not going to be entirely without unorthodox designs appears probable. Thus we understand that a foot-driven helicopter is being entered by the British Helicopter Company, of Blackheath. At the moment of writing the machine has not been entered, but it is expected that it will be within the next few days. The helicopter is stated to be designed for two men, one of whom sits in front and operates a tractor air screw, while the second, seated farther aft, drives a direct-lift screw, described as a "vertical cone propeller." We are looking forward to a week on the South Downs.

* * *

THE other day we had the privilege of inspecting at the De Havilland Aircraft Co. works at Stag Lane, Edgware, two gliders which are now being constructed. The two machines are identical, thin-section braced parasol monoplanes. We are not at liberty, at the moment, to disclose details of the construction, but hope to publish an illustrated description of the machines in a forthcoming issue of FLIGHT. The workmanship is extremely good, as was to be expected from a firm of this standing, and the design is about as simple as it was possible to get it. The difficulty has, we believe, been to get used to the small sizes required in a lighly-loaded glider after being used to the relatively heavy members called for in large power-driven machines, but in spite of this fact the machines promise to work out quite light.

* * *

WITH regard to the site chosen for the gliding competition, this, as announced in the Royal Aero Club Notes on p. 559, is Itford Hill, near Lewes, Sussex. The site appears (we are speaking from examination of a map only, and not from personal inspection of the actual site) to be very suitable, and it certainly has the further not inconsiderable advantage of being within easy reach of London. In the accompanying contour sketch-map of the district the main features of the scene of the competition may be seen. Itford Hill itself is about 500 ft. above sea level, and the organisers of the competition have succeeded in obtaining permission to use the whole range of hills for three miles eastward as far as Firle Beacon, which reaches an altitude of over 700 ft. above sea level. Briefly these two points—Itford Hill and Firle Beacon—mark the western and eastern limits of the ground available. To the north the range drops fairly rapidly at first, then more slowly, reaching the meadows around Glynde Reach in a distance of about two miles. To the south also the slope is at first fairly steep, gradually flattening out, and ridges running roughly north and south divide the slopes into smaller separate gradients. To the west the slope from Itford Hill is fairly steep, terminating at the foot of the hill in the Ouse valley. Between the foot of the hill and river runs the Newhaven and Seaford line of the L.B. and S.C. railway, but the gradient here is so steep that machines should have no difficulty in clearing the railway and alighting beyond it in the meadows around the River Ouse. In strong westerly and south-westerly winds this side of the hill should produce suitable conditions for flights of considerable duration, while the southern slopes would probably be chosen for flights in which it was desired to cover greater distances.

* * *

As regards accessibility, the site is, as already mentioned, particularly favourably placed. A frequent train service from London to the village of Glynde is available, and from Glynde to Itford Hill is only a distance of about 2½ miles. By road from Lewes the distance is about 4½ miles. Tents will be provided for housing the machines, and competitors may succeed in getting accommodation in the inns at Glynde or West Firle. If not, the nearest hotels appear to be those at Lewes. It seems probable that some enterprising firm at Lewes will run some sort of motor conveyance between Lewes and some point at the foot of Itford Hill. Altogether, the scene for the competition appears to be laid in very pleasant surroundings and if this year's experience proves the district suitable, it is to be hoped that arrangements may be made for retaining the rights to use it for future gliding meetings.

* * *

We very much regret to have to record this week that the American pilot Allen, who took part in the French gliding competition at Combegrasse and later had his machine sent to Germany, has met with a serious accident while flying in the Rhön Hills. It appears that Allen took his machine out in a very gusty wind, and that on landing he crashed rather badly. He was taken to a hospital at Gersfeld, and is reported to be progressing favourably.

* * *

We have been asked to publish the fact that, in response to numerous enquiries, the Engineering Works, Mill Hill, Appleby, Westmorland, are about to add an aviation branch to their works. This branch will be devoted solely to aeronautical work, and the services of a well-known pilot and designer have been obtained. The design and construction of gliders or light-powered machines will be undertaken, as will also construction to customers' own designs. The firm is prepared to give free tuition to anyone purchasing a machine from them, and if the necessary number of pupils can be obtained it is intended to start a school for training pupils in gliding and soaring flight.

INTER-CITY AIR RACE

Colonel Spenser Grey's Suggestion

The suggestion made by Lieut.-Col. Spenser Grey, as a result of his observation of the tremendous enthusiasm at the various controls during the race for the King's Cup, that an inter-city championship race around Britain should be instituted for next year is one which has a great deal to recommend it. As we stated in our Editorial Comment on September 14, 1922, the King's Cup Race aroused widespread interest in and enthusiasm for aviation races, and an annual race between machines representing various cities could scarcely fail to increase greatly the enthusiasm of the population of the cities represented in the race. From interest in a particular air race to interest in aviation in general is but a short step, and if certain difficulties, which do undoubtedly exist, can be overcome, we think that the scheme is an admirable one and one which should meet with general support. Briefly Col. Spenser Grey's suggestion is as follows:—

(*a*) Each city or town desiring to enter for the race would open a subscription list for the building of an aeroplane to represent it.

(*b*) The machines when built would be entered in the race by the town or city for which they were built.

(*c*) All machines entered would be built to one or other of the Air Ministry's specifications for aeroplanes, and after the race would be placed at the disposal of the Royal Air Force, earmarked for the use of the new Auxiliary (or Territorial) Air Force, recruiting for which is to begin in April next year.

(*d*) A challenge cup to be presented to the entrants of the champion machine would be held year by year by the Aero Club, formed by the subscribers to the building of the winning machine.

(*e*) These machines would also be eligible to compete in the King's Cup Race, the Aerial Derby, and any other air races in which the proprietary city might wish them to compete.

The advantages claimed by Col. Spenser Grey for a race of this nature are, briefly, as follows:—

1. It is useless for those who believe in air power to call for a big Air Force while the prevailing cry is for economy. By thus stirring up local patriotism and interest in flying a material addition may be made to our aerial strength by the people who are already believers in air power, and many others may be educated in that belief.

2. The building of the machines will lead to improvements in design and construction, for, having fulfilled the Air Ministry requirements, designers will be encouraged to further efforts towards efficiency in order to win the race.

3. Employment will be given to the design, experimental and constructional staffs of a number of aircraft factories at a time when there is grave danger of those staffs being dispersed owing to lack of employment.

It appears that the first city likely to start the ball rolling by taking practical steps to put into practice Col. Grey's scheme may be Leeds, the home of the Blackburn Aeroplane and Motor Co., Ltd. At a dinner given in honour of Lieut.-Col. Spenser Grey and Mr. R. W. Kenworthy, pilots of the two Blackburn "Kangaroos" which took part in the race for the King's Cup, Mr. Stuart A. Hirst announced that he would undertake to guarantee a substantial prize to the pilot who, in next year's race, puts up the best performance on a Yorkshire-built machine, and expressed the hope that there would be an entry of a machine in the name of Leeds, coupled with a challenge to any other town or city. He could not, he said, conceive of any large centre declining such a challenge.

Sir Edwin Airey undertook to guarantee a prize for the pilot making the best time between the starting point and the city of Leeds, and Mr. David Little, President of the Leeds Chamber of Commerce, promised to bring the scheme to the early notice of that body with a view to launching it successfully.

There is little doubt that many other towns will follow suit, and if a set of rules can be drafted which will ensure that all machines will stand an equal chance in such a race, there is every possibility that next year will see the most important air race ever held in this country. We cordially invite suggestions from our readers, and shall be glad to open our columns to a discussion of the best lines upon which to work in order that the race may combine the greatest interest and the fullest participation with the greatest utility in connection with the new Auxiliary (or Territorial) Air Force which is to come into being during the spring and summer of next year. We understand that the Air Ministry takes a favourable attitude towards the scheme, especially if, as suggested, the machines entered are built to Air Ministry specifications.

London's Air Peril

Speaking last Thursday night at the monthly dinner of the Royal Naval Volunteer Reserve (Auxiliary Patrol), Admiral Mark Kerr, referring to the possibility of an attack upon this country from the air, said that the one thing that would kill us at the commencement of a great war would be a great raid on London—the heart of the Empire. He spoke of the possibility of 500 'planes coming unexpectedly over London, each dropping 100-kilo. bombs. "I feel," he said, "we are at the mercy of a near country. Don't let us take anything for granted. We have been the advanced people in the world as far as truth, justice and honour are concerned. In the past we have played the game. At the present time we are getting a little shaky."

A Scandinavian Altitude Record

A new altitude record for Scandinavia was put up on Friday last, when Lieut. Gottenburg, of the Norwegian Army Air Service, accompanied by a passenger, reached an altitude of 23,293 ft. Both were provided with oxygen apparatus. The former record was 16,732 ft.

THE COUPE DEUTSCH RACE AT ETAMPES

Saturday's Great International Event

The greatest international speed race of the year, the race for the Coupe Deutsch, will be flown over the usual course between Etampes (Villesauvage) and La Marmogne on Saturday, September 30. The distance between the turning points is 50 kms. (31 miles), so that altogether three out-and-home trips, totalling 300 kms. (186 miles) will have to be made.

At the moment of writing it is not definitely known which of the French machines entered will fly in the race, as the eliminating trials take place on September 27, but five machines will take part, three from France, one from Italy, and one from Great Britain.

The British representative is the Gloucestershire Aircraft Co.'s Mars I, 450 h.p. Napier "Lion" engine. This machine, which will, of course, be piloted by Mr. J. H. James, is the same as that flown by James in the Aerial Derby, which he won at an average speed of 178 m.p.h. For the Coupe Deutsch, however, the machine has been fitted with smaller wings, and as James was not flying "all-out" in the Derby, his speed in the Coupe Deutsch race may confidently be expected to be considerably greater. How much greater we have no means of knowing, since not only pure speed but keeping a good course and wasting no time at the turning points count for a great deal in the Coupe Deutsch. The French pilots have, of course, been flying frequently over the course, and have been getting used to it under different weather conditions. Also they have been practising quick turns around pylons, and we remember that Sadi Lecointe has once (in the Gordon-Bennett race of 1920) been timed to round the pylon at Villesauvage in three seconds. However, "Jimmy" is something of an artist himself, and we have no doubt he will get the "Bamel" around in the quickest time possible. On pure speed he may have a hard fight against such projectiles as that on which Lecointe will be mounted, but we are certainly not without hope that on average speeds over the course James will be able to put up a good fight. He is under a handicap in being our only representative (as against three from France), but he and his machine are undoubtedly the best combination which could be found in Britain today, and we wish him every success in the great race.

The Italian representative is Brack-Papa, who will be flying a Fiat biplane with 700 h.p. Fiat, type A.V. 12-cylinder, engine. His machine has a length of 25 ft. 9 ins. and a wing span of 34 ft. 10 ins. The wing area is 237 sq. ft., and the weight empty of the machine is 3,080 lbs. On this machine Brack-Papa was recently credited with a speed of 209 m.p.h., but it is now learned that the Italian Aero Club have not homologated the flight as a record. The reason is not known.

No less than six French machines have been entered for the Coupe Deutsch, and as each country may only be represented by three machines, eliminating trials will have to be held. These, as already stated, will take place on September 27, but as Flight goes to press before then it will not be possible to state this week which of the six machines will fly in the actual race. The six French machines entered are three Nieuport-Delage machines, one Madon "Simplex," one Nungesser monoplane, and one Blériot-Casale biplane.

Of the three Nieuport-Delage machines entered one is a biplane, to be flown by Lasne or Berthelin. This machine is probably generally similar to the biplane on which some of Lecointe's records have been established in the past. The machine is not so fast as the monoplanes, and is probably intended more as a stand-by than as a serious competitor. The machine, which has a Hispano-Suiza engine of 320 h.p., is 20 ft. 4 ins. length over all, with a span of 19 ft. 9 ins. and a wing area of 132 sq. ft. and weighing 1,530 lbs. empty.

The second Nieuport-Delage is a "Sesquiplan" (one-and-a-half plane), and will be piloted by Lasne or Lecointe. It has a length over all of 23 ft. and a wing span of 26 ft. 10 ins. The wing area is only 130 sq. ft., and the weight empty 1,720 lbs. The engine is a 320 h.p. Hispano-Suiza.

The real racer from the Nieuport stable is, however, the small "Sesquiplan," which will be flown by Lecointe. This machine, although similar in general to the older type, has been further reduced in size (although this would scarcely seem possible), and has an overall length of but 20 ft. and a span of 26 ft. 3 ins. The wing area is 118 sq. ft., and the weight empty is 1,660 lbs. The engine of this machine also is a 320 h.p. Hispano-Suiza. In a recent test flight over the measured 1 km. course, Sadi Lecointe established the following times on this machine:—First kilometre in 10⅖ secs. (215 m.p.h.), second kilometre in 10⅗ secs. (210 m.p.h.), third kilometre in 10⅖ secs. (215 m.p.h.), and fourth kilometre in 10⅘ secs. (206·5 m.p.h.), or an average of 211·6 m.p.h. To be considered for world's records flights have to be made over a measured course of 1 km., two flights in each direction, and it was in doing this that the speeds indicated above were obtained. It goes without saying that in the Coupe Deutsch, with the time which must necessarily be wasted at the turning points, the machine will not do the same speed, but with skilful handling the Nieuport-Delage racer should be capable of close upon 200 m.p.h. if the day prove reasonably calm, and Sadi is in his usual form. It will be seen that the Mars I will have its work cut out to hold its own, and the race may well prove a very close one between the Nieuport, the Mars I and the Fiat. Incidentally, it is rumoured that Lecointe intends to retire shortly, and that the Coupe Deutsch may probably be the last great race in which he will fly. Frankly, we are rather pleased to hear this. Lecointe is not only one of the finest pilots in the world, but he is also a thoroughly good sportsman and a most charming personality, and it cannot be denied that these races, with speeds constantly creeping up, are getting dangerous. Sadi has had many bad tosses, and it would be a thousand pities should he tempt fate too far by continuing. We therefore wish him good luck in the race, and hope that when it is over—whether he wins it or not—he will retire and settle down at some less risky occupation that we may have him among us for many many years to come.

Reference has already been made in Flight to the Blériot-Casale machine which is a biplane of the typical Spad-Herbemont type, and has a Lorraine engine of 450 h.p. The length of this machine is 21 ft. 4 ins. and the span 28 ft. 2 ins. The wing area is 273 sq. ft. and the weight empty 2,730 lbs. In spite of its high power, it is not expected that this machine, which is an adapted military machine and not designed as a racer in the first instance, will be one of the three French machines chosen after the elimination trials. The machine is not, however, a slow one by any means, and its designer, M. André Herbemont, expects that it will be capable of covering the Coupe Deutsch course at an average speed of about 295 kms. (183 miles) per hour. The machine will be flown in the eliminating trials, and in the great race itself if it passes the former, by Jean Casale.

Some curiosity has been aroused as to the "parentage" of the machine which is to be flown by Nungesser. It is, we learn, a cantilever monoplane with 700 h.p. Fiat engine, and although classed among the French machines, it is stated to be constructed by Fiats. It is therefore presumed that the machine has been, if not designed, at any rate built by the French branch of the Fiat company. The main particulars of the machine are as follows: Length overall, 19 ft. 9 ins.; span, 43 ft. 6 ins.; area, 239 sq. ft.; weight empty, 3,080 lbs.

The machine to be flown by Madon is of the tailless "Simplex" type Madon-Carmier. The main characteristics are: Length overall, 23 ft.; span, 26 ft. 3 ins.; area, 175 sq. ft.; weight empty, 1,540 lbs.; engine, 320 h.p. Hispano-Suiza. Madon has been trying-out a small biplane with rotary engine at Etampes for some months past, and is stated to have obtained very good results. Evidently the new machine is an attempt to apply the experience thus gained to a fast racing machine. The machine, which was designed by Madon, who will pilot it, and Carmier, chief engineer of Schwarts and Léon See, the constructors, is, it will be seen from above figures, quite a small affair, and its behaviour will be watched with more than ordinary interest on account of its unorthodox design.

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Gloucestershire Machines for Greece

After competing in the race for the Coupe Deutsch, Mr. J. H. James will proceed to Salonica to test a large batch of machines sold to the Greek Army by the Gloucestershire Aircraft Company, the constructors of the Mars I. These machines are of the Mars VI type, which are practically Nieuport Nighthawks fitted with the new Siddeley "Jaguar" engines. Visitors to Croydon on the occasion of the Aerial Derby will have seen one of these machines perform, and cannot have failed to notice its extraordinary climb, than which probably nothing better exists today. We congratulate the Greeks on their choice.

Paris–Bukarest in 14 Hours

An aeroplane piloted by Maj. Vuillemin, of the French Army Air Service, and carrying a passenger, left Paris at 5 a.m. last Saturday and arrived in Bukarest at 7 p.m. the same evening.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN SEPTEMBER 17 AND SEPTEMBER 23, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	37	121	14	25	32	3 5	D.H. 34 G-EBBV (1h. 50m.)	B. (4), D.H. 18 (1), D.H. 34 (5), G. (8), H.P.W.8B (3), Sp. (1).
Paris–Croydon	36	137	10	27	33	3 38	D.H. 18 G-EAWX (2h. 4m.)	B. (5), D.H. 18 (1), D.H. 34 (5), G. (8), H.P.W.8B (3), Sp. (2).
Croydon–Brussels ...	7	29	—	1	7	2 21	D.H. 34 G-EBBR (1h. 50m.)	D.H. 9 (1), D.H. 34 (3), Vi (1).
Brussels–Croydon ...	7	42	—	—	6	3 11	D.H. 34 G-EBBV (2h. 35m.)	D.H. 9 (1), D.H. 18 (1), D.H. 34 (4).
Croydon–Rotterdam–Amsterdam.	6	8	6	6	5	2 53	Fokker H-NABV (1h. 52m.)	F. (5).
Amsterdam–Rotterdam–Croydon.	7	10	4	5	7	2 54	Fokker H-NABI (2h. 6m.)	D.H. 34 (1), F. (6).
Totals for week ...	100	347	34	64	90			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys. § Rotterdam.

Av. = Avro. B = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad. Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijke Luchtvaart Maatschappij; Messageries Aériennes.

Incidental Flying.—The De Havilland Co. ran a daily service between Lympne and Ostend with a D.H. 16 making one trip each way. The Aircraft Disposal pilots (Perry, Piercey and Stocken) were busy testing Bristol Fighters, D.H. 9a and Martinsyde F. 4 machines at Croydon.

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LONDON TERMINAL AERODROME

Monday evening, September 25.

WHAT will probably prove to be the most important event in the history of civil aviation is now resulting from the flight of the Daimler Airways D.H.34 to Berlin. This machine arrived back at the aerodrome late on Saturday evening carrying as passengers Col. Searle, Maj. Woods Humphreys, and a Maj. Wronsky, who is representing the Deutsche Luft Reederei, the big German air transport organisation. Maj. Wronsky has come to London to make the final arrangements for the running of the London-Berlin air service, and I understand that while the Daimler representatives were in Berlin and Amsterdam negotiations were commenced, and are already in an advanced stage, for the formation of an organisation to run the air transport lines of Northern Europe.

This organisation, consisting of the Daimler Airway, the Royal Dutch Air Service, the Deutsche Luft Reederei, and the Danske Luftfartselskab, are to make a working agreement for the running of air-lines through their various countries. The only big question that remains to be settled is that of the size and horse-power of the German "air expresses," which are limited under the terms imposed on Germany by the Allies. This question has already been discussed by the Governments concerned, and it is probable that an agreement on the lines of limiting the number of higher-powered "air expresses" that the Germans are to build will be arrived at.

The Daimler people are enthusiastic over the prospects of the new route to Berlin. The country is practically flat the whole way, the only high obstacles being wireless masts, which, both in Holland and Germany, rise at some stations to a height of 1,000 ft. These, however, can easily be avoided by arranging the route so that they are given a wide berth. The return journey from Hamburg to London on Saturday was accomplished in a flying time of barely five hours.

Bad Weather on the Continental Routes

THE weather during the week has been all against flying, and, in consequence, the services have been rather "ragged." The early-morning newspaper services have been considerably delayed, and on one occasion had to be cancelled owing to the morning mists. Several machines flew through the gale, which seriously delayed the cross-Channel boat services during the week. On Sunday the entire services were held up with the exception of one "Goliath," which managed to get through. On this day Mr. Alan J. Cobham, in spite of the weather, made a splendid flight to Paris and back to get pictures of the Carpentier-Siki fight for one of the London picture papers. He left Paris too late to arrive at Croydon before dark, and crossed the Channel in the dusk in very bad flying weather, the clouds at times being within a few feet of the water. He picked up the lights at Lympne aerodrome, and completed his flight to Croydon in the dark, arriving there at about a quarter-past eight.

In connection with the weather, arrangements have been made for meetings between the chief pilots of the three British companies to decide if conditions are fit for flying. If their decision is against flying, the C.A.T.O. issues a notice to the British firms stating the findings of the meeting, and saying that no British machine will leave until further notice.

One of the K.L.M. monoplanes, *en route* from Croydon to Rotterdam, was compelled to descend at Lympne with engine trouble during the week, and it was found that one of the big-ends had gone. This is the first time this season that the K.L.M. have had a forced landing in England for engine trouble. No new engine was available on this side, and a new one was flown over in another machine, together with mechanics, from Holland.

Economies are being made in the working of the aerodrome by the Air Ministry, and the staff of the C.A.T.O. has been considerably reduced. I understand that this is the first move towards cutting these expenses considerably.

The wind-indicator which was beside the control-tower has been moved to a position near the Daimler engine-shops, and a new fire hydrant is being installed in the same position. A number of sheds, petrol-pumps, and other inflammable erections have been built in this section of the aerodrome lately, and a fire hydrant had become an urgent necessity.

More Machines for "Air Taxi" Work

THE machine entered by the Duke of Sutherland for the King's Cup race, a D.H.9, has been sold to the Surrey Flying Services, who intend to use it for air-taxi work. This company have been busily re-erecting one of the Royal Aero Club Avros which was crashed a short time ago, and have also re-conditioned their own Renault-Avro, which came to grief in a corn-field when starting for Ostend. This machine is, I understand, to be sold to a private owner, who intends to use it for taking his friends for air jaunts.

During the high winds in the early part of the week pilots flying over the dunes of Northern France observed sandstorms of quite respectable size being whirled along by the wind beneath them. The storms extended to a height of about 800 ft., and pilots who have done much flying in arid countries described them as being smaller editions of the violent sandstorms experienced in those lands. This sand in northern France, being whirled about by the wind, has caused machines to force-land at times, owing to it being sucked into the air-intake of the engines.

The Instone Air Line close their Paris service today. Maj. Greer has been in Cologne making all arrangements for the opening of the Cologne service. I am told that the levelling operations at the Brussels aerodrome, combined with the heavy rains, have made the aerodrome so soft that machines sink up to their axles in the mud. One machine was over an hour-and-a-half getting away from the aerodrome, sinking into the mire time after time.

The Messageries Aériennes, or, as they now call themselves, the "C.M.A." Air Lines, have the largest commercial fleet in existence. This consists of 10 Goliaths, 11 5-seater Spads, and 13 Breguets. Their goods' traffic to and from all parts of Europe and London continues to increase, and they will be running special goods machines next spring. In the meantime they are equipping their Goliaths with electric heating for the winter. One of these machines, which has already been to Croydon, has separate heating for each passenger, who controls foot and back warming arrangements by a switch at his side.

The Goliath pilots are putting up a very fine show in the bad weather. One day this week the Grands Express Goliaths were the only machines to get through in both directions between London and Paris.

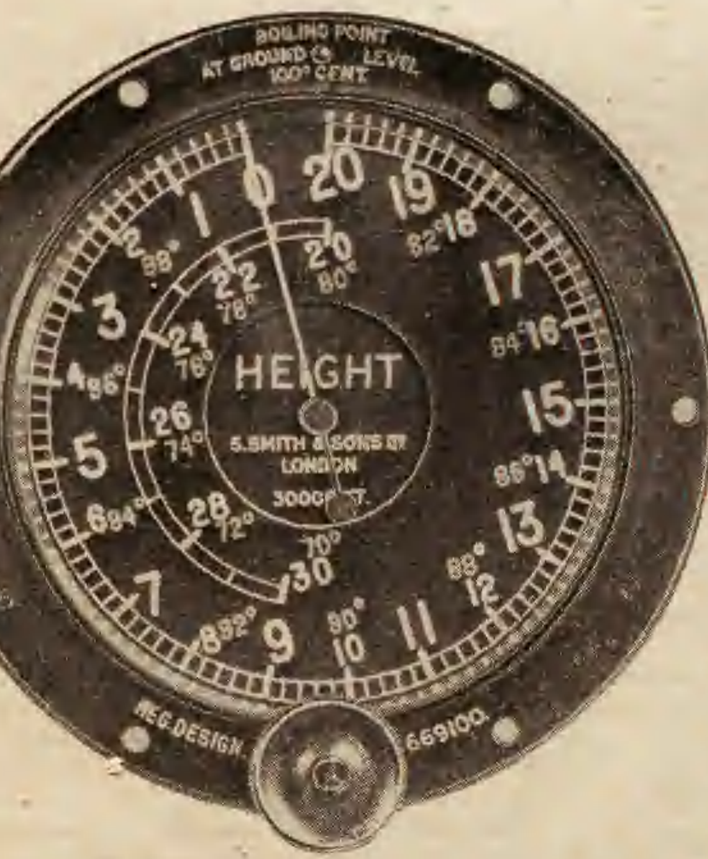
There is a rumour on the aerodrome that Handley Page Transport are building six more machines to cope with the passenger traffic on the London-Paris route when they are the only British firm operating next year. These machines will, I understand, be fitted with seating accommodation for 16 passengers.

I am able to announce, from information just to hand, the extremely low "air-fares" which will be charged on the new London-Berlin route. They will be as follows :—London to Berlin (single), £5 10s. (which works out at about 2*d*. a mile) ; London to Amsterdam, £4 ; Amsterdam to Berlin, £2 ; Hamburg to Berlin, £1.

"THE SMITHS OF CRICKLEWOOD"

A Brief Visit to the Works of S. Smith and Sons (M.A.), Ltd.

Chancing to be in Cricklewood direction the other day, we took the opportunity of paying a hurried visit to the works of S. Smith and Sons (M.A.), Ltd., where the famous Smith Aviation Instruments are made. As a result of this visit two outstanding impressions gave us a pleasant surprise, one being the extensive area occupied by these works, together with the great activity going on therein, and the completeness or self-contained character of the work carried out. Practically speaking, every instrument turned out from the works is manufactured from the raw material, on the premises, and not built up from ready-made parts. This point was particularly emphasised as regards the very large range of Smith's clocks, in which the movement is entirely of their own manufacture, and not imported from Switzerland.



THE SMITH "BOILING POINT" ALTIMETER : The boiling point at any height is indicated by red figures against the respective altitude figure.

Of course, in common with others in the aviation industry, S. Smith and Sons are feeling the prevailing slackness of trade to a certain extent, but are determined to keep their aviation section going, in order to retain the valuable plant and skilled workers that have given such valuable service in the past. It is obvious that occasional orders for a new indicator here and an altimeter there are of little use as a means of keeping a production plant going to the best advantage—to say nothing of maintaining the necessary and expensive testing and experimental section. However, for all that, we managed to see, on the occasion of our visit, a fair amount of aviation stuff going through, but naturally, after supplying the British as well as Allied Governments with instruments during the war, the works do not now seem to be *quite* so lively.

As regards the testing and experimental sections of the Cricklewood works, these we noticed were exceptionally well equipped, and some very interesting experimental instruments were undergoing trials, about which we hope to have something to say on a future occasion.

In the testing section we saw engine revolution indicators being adjusted and calibrated by an extremely ingenious "tuning fork" device—similar, we believe, to that evolved by the R.A.E.—and then there were rows and rows of clocks, with their neat log cards attached, undergoing their reliability trials, which last, we understand, for several days.

In another part of the works we saw painting, lacquering, and plating in progress—another item that is done "on the premises." Of course, besides the various aviation instruments, the well-known motor accessories are also produced at the Cricklewood works, and form a large and active section of the work carried on there.

We must also mention the excellent arrangements made for the care and comfort of the employés, who have a large and well appointed canteen—which, when the tables, chairs, etc., are moved away, forms an ideal and well patronised dancing hall—and an efficiently equipped first-aid hospital.

In conclusion we take the opportunity of giving some brief particulars of one of the recent aviation instruments produced at Cricklewood known as the Smith Boiling Point Altimeter, which is shown in the accompanying illustration.

The Smith Boiling Point Altimeter is similar in every other respect to the standard instrument, embodying certain improvements which give it almost entire freedom from lag when the machine is ascending, and in addition it has the special advantage of a subsidiary set of figures incorporated on the dial in red, which show the boiling point of water at various altitudes. The value of this scale, of course, is particularly great when flying under extremely cold conditions, and in addition it leaves the ordinary radiator thermometer dial quite free of boiling point figures which, due to the small space available, only tend to crowd and confuse the appearance of the dial.

With the Smith Radiator Thermometer the dial is left quite plain, and merely shows the actual temperature and degrees Centigrade, and is used in conjunction with the boiling point altimeter, which shows at a glance the temperature of the water under all conditions.

Readers might be reminded that in any case even with the older type of service radiator thermometers it was necessary to refer to the altimeter before correcting in order to ascertain the height at which the machine was flying, while with the Smith instrument the same operation is gone through, but the matter is more simple on account of the larger dial.

AIRISMS FROM THE FOUR WINDS

Apropos the exploring expedition under the leadership of Capt. Frank Hurley which is being launched to take bearings in New Guinea from the air, a correspondent who has recently returned from our Papuan possession, writing to *The Times* upon the undertaking, gives the following somewhat humorous reminiscences of his own experiences in the same line from—*terra firma*. He says:—

"Exploring New Guinea from the air sounds a venturesome project. It could not be much more exhausting than exploring New Guinea on land, and has certain distinct advantages into the bargain. Dense jungle country, precipitous ravines and 'razor-backed' mountains all combine to make exploration difficult and dangerous, and comparatively little is known about the interior of the island.

"Memory takes me back to the early days of the Australian occupation of German New Guinea. The District Officer at Ablingi, on the south coast of New Britain (to the north of the mainland), had received orders to report on the possibility of a road right across the island to Talassea.

"It was hot work, that patrol inland—with a squad of black 'boys' crashing on ahead, carving a way for us through the tough tropical creepers that hung like a curtain across our path and hid the sky above. We fell down precipices concealed by the treacherous undergrowth; we were hauled up the sheer face of the mountain-side by our native police orderlies. And one night, as we sat under the mosquito netting outside the District Officer's tent, eating a supper of bully beef and paw-paw, there came a runner from headquarters with a polite suggestion that we should requisition horses if we thought our work would be expedited.

"'Horses!' said the District Officer, with a sad smile, 'What we really need if we want to see this country is a blooming aeroplane.'"

- \- \-

"APPARENTLY," continues the story, "they are trying the 'blooming aeroplane'—or at least a seaplane—in the British territory, and yet I do not know that I envy the airmen their job. It is a sporting proposition. They will find excellent harbours for landing-places along the coast, but with a very few exceptions the rivers inland are poor affairs, overhung by thick trees and full of reeds and snags, with occasional crocodiles. Of course, the Fly is one of the exceptions; one could take a fair-sized boat hundreds of miles up its course.

"If it is successful the expedition should obtain some most interesting results; the islands abound in unsuspected harbours and inlets that are hidden from the sea and inaccessible from the land. It has a good leader. Frank Hurley is an adventurous spirit who has 'made good' in many parts of the world. He went to the Antarctic with Sir Douglas Mawson's party; he fought with the A.I.F. on Gallipoli, and afterwards became official photographer with the Australian Army; he met Ross Smith at Darwin, and flew south across the continent with him, getting some wonderful photographs of Australia. Mr. L. Hordern (who is a member of a great 'universal provider' firm in Sydney) has made seaplaning a useful hobby, and has already carried out extensive experiments in surveying on the Australian coast.

Silly questions we have been asked:

III.—(*You have just "forced" landed—having run out of petrol.*)
"May I fill my Patent Lighter from your tank?"

THE ROYAL AIR FORCE

London Gazette, September 19, 1922

General Duties Branch

Group Capt. A. E. Borton, C.B., C.M.G., D.S.O., A.F.C., to be actg. Air Commodore; Aug. 31.

The following are granted short service commns. in rank stated, with effect from, and with seny. of, date indicated :—

Pilot Offrs. on Probation.—R. C. Brooke-Hunt, H. C. E. C. P. Dalrymple, J. Francis, J. H. G. Franklin, V. J. Hatton, H. M. Kenyon, W. H. E. Labatt, L. E. Maynard, N. P. C. Mellor, H. V. Michell, B. N. Murgatroyd, R. V. M. Odbert, A. J. Peacey, W. H. Phillips, C. J. Pooley, W. J. E. Rodwell, B. H. Shaw, D. C. D. Stephen, A. E. Stewart, O. B. Swain, A. W. Taylor, A. C. Trendell, W. C. Venmore, S. R. Walters, W. P. Wiltshire, T. J. Woods, L. B. W. B. Wride; Sept. 2.

Wing Comdr. G. P. Grenfell, D.S.O., is restd. to full pay from half-pay; Sept. 14.

The following are transfd. to Reserve, Class C.—Flight Lieut. A. R. T. Pipon, D.S.C.; Sept. 6. Flying Offr. M. Goodall; Sept. 12.

Flying Offr. W. L. Hope resigns his short service commn., and is permitted to retain rank of Lieut.; Sept. 11.

Flying Offr F. S. Chapman is placed on retired list on acct. of ill-health contracted in Service; Sept. 20.

Stores Branch

Flying Offr. H. D. Fletcher is transfd. to Stores Branch from General Duties Branch; July 15.

The following Flying Offrs. are transfd. to Stores Branch for Accountant duties from General Duties Branch.—J. M. Adams; Sept. 8. P. E. D. Addis; May 22.

Medical Service

Flight Lieut. J. Paxton relinquishes his temp. commn. on ceasing to be employed; Aug. 31.

Memoranda

The follg. Cadets are granted hon. commns. as 2nd Lieuts., with effect from the dates of their demobilisation.—G. A. Aston, 322153 A. Edwards, 317541 F. Kemp, 321544 W. E. Pattle, S. W. Powell, 148043 E. S. Redfearn, 319540 J. J. Smith, 624679 H. C. Thom.

Hon. 2nd Lieut. A. T. Blake is deprived of his commn. on sentence by Field General Court-Martial to penal servitude.

London Gazette, September 22, 1922

General Duties Branch

Capt. A. J. Carlielle, R.A.S.C., is granted a temp. commn. as a Flying Offr. (Hon. Flt. Lieut.) on secdg. for four years' duty with the R.A.F.; April 8 (substituted for *Gazette*, July 4). Wing Comdr. D. L. Allen, A.F.C., is placed on half pay, Scale A, from Sept. 18 to 20, inclusive. Flying Offr. H. J. Q. Campbell is dismissed the Service by sentence of Gen. Court-Martial; June 25

Chaplains' Branch

The Rev. H. Marshall, M.A., is placed on the retired list; Sept 7 (substituted for *Gazette*, Sept. 5).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

Air Commodore: E. A. D. Masterman, C.M.G., C.B.E., A.F.C., from Half-pay List to Central Flying School (Inland Area). (Supernumerary.) 2.10.22.

Wing Commander: D. L. Allen, A.F.C., from R.A.F. Depôt (Inland Area) to Half-pay List. 18.9.22.

Wing Commander: A. V. J. Richardson, O.B.E., M.B., D.P.H., from R.A.F. Depôt (Inland Area) to Air Ministry (D.M.S.). 18.9.22.

Wing Commander: J. McIntyre, M.C., M.B., M.A., from Air Ministry (D.M.S.) to Headquarters, No. 1 School of Technical Training (Boys) (Halton) (Supernumerary.) 18.9.22.

Squadron Leaders: J. T. Whittaker, M.C., from R.A.F. Depôt (Inland Area) to Headquarters, No. 12 Wing, Ireland. For "Air" Staff duties. 18.9.22. G. G. A. Williams, from No. 56 Squadron (Middle East) to Aircraft Depôt, Egypt (Middle East). (Supernumerary.) 8.9.22. A. T. Harris, A.F.C., from No. 31 Squadron (India) to Headquarters, R.A.F., Iraq. Supernumerary.) 28.7.22.

Flight Lieutenants: C. R. Richardson, from No. 70 Squadron (Iraq) to R.A.F. Depôt (Inland Area). (Supernumerary.) 6.8.22. B. Ankers, D.C.M., from No. 4 Flying Training School (Middle East) to R.A.F. Depôt (Inland Area). (Supernumerary.) 23.8.22. W. Burkinshaw, from Palestine Wing Headquarters (Middle East) to R.A.F. Depôt (Inland Area). (Supernumerary.) 23.8.22. P. C. Livingstone, D.P.H., from No. 20 Squadron (India) to R.A.F. Depôt (Inland Area). (Supernumerary.) 12.8.22. C. A. Harrison from R.A.F. Depôt (Inland Area) to C. and M. Party, Biggin Hill (Inland Area). 5.9.22. O. Armer from No. 5 Flying Training School (Inland Area) to No. 2 Squadron (No. 12 Wing, Ireland). 15.9.22. A. H. Wann, from R.A.F. Depôt (Inland Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). (Supernumerary.) 7.9.22. (Substituted for the notification which appeared in R.A.F. Intelligence dated 29.8.22.) G. C. Pirie, M.C., D.F.C., from No. 4 Squadron (Inland Area) to Headquarters (Inland Area) for "Air" Staff duties. 1.9.22. P. G. N. Ommanney, from R.A.F. Depôt (Inland Area) to Half-pay List. 11.8.22. J. W. Harper, M.D., from Headquarters, R.A.F. (Middle East), to No. 14 Squadron (Middle East). 11.8.22. J. P. Coleman, A.F.C., from No. 56 Squadron (Middle East) to Aircraft Depôt, Egypt (Middle East). (Supernumerary.) 8.9.22. A. J. Long, from Electrical and Wireless School (Inland Area) to M.T. Repair Depot (Inland Area). (Supernumerary.) 25.9.22. F. Petch, M.B.E., from R.A.F. Depôt (Inland Area) to Inland Area Aircraft Depôt. 1.10.22. L. E. Taylor, M.B.E., from Instrument Design Establishment (Inland Area) to Seaplane Training School (Coastal Area). 1.10.22. A. W. Mylne from Electrical and Wireless School (Inland Area) to R.A.F. Cadet College (Flying Wing) (Cranwell). 20.9.2. J. K. R. Landells, M.B., from R.A.F. Depôt (Inland Area) to No. 2 Squadron (No. 12 Wing, Ireland). 19.9.22. T. McClurkin, M.B., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area). 11.9.22. G. S. Ware, M.B., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area). 11.9.22. H. H. M. Fraser, from School of Photography (Inland Area) to No. 2 Flying Training School (Inland Area). 1.10.22. D. W. Clappen, from School of Photography (Inland Area) to Armament and Gunnery School (Inland Area). 1.10.22. J. F. Gallagher from No. 1 School of Technical Training (Boys) Halton) to R.A.F. Depôt (Inland Area). 23.9.22. David J. Jones, M.B., from No. 1 School of Technical Training (Boys) (Halton) to R.A.F. Depôt (Inland Area). 23.9.22.

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PERSONALS

Married

Major F. J. ROBERTS, late R.A.F., only son of Mrs. Roberts, and of the late J. F. Roberts, of Buenos Aires, was married on August 8, at Mombasa Cathedral, to MARGERY, younger daughter of Mrs. DOWELL-ELLIS, and of the late J. Dowell-Ellis, of Johannesburg.

To be Married

The engagement is announced between ROYDON E. ASHFORD DASH, D.F.C., only son of R. Ashford Dash, of Berrylands, Surbiton Hill, late of Oxshott, Surrey, and CHRISTINE (CHRISSA), third daughter of F. G. TYRRELL, of Westholme, Hastings, Sussex.

The marriage arranged between Mr. IDRIS MEREDYTH DAVIES (late Captain, Welch Regt., and R.A.F.), elder son of Mr. Timothy Davies, J.P., and Mrs. Davies, of Alltyferin, Carmarthenshire, and 25, Collingham Gardens, S.W., and GWENDOLINE, daughter of Mr. and Mrs. MAURICE B. O'CONNOR, of Ballygunge, Calcutta, and Ballygunge, St. George's Hill, Weybridge, will take place at St. Margaret's, Westminster, on Monday, October 9, at 2.15 p.m.

The engagement is announced between GEORGE ARTHUR DONNE HANCOCK (late Captain, R.A.F.), eldest son of Mr. and Mrs. George Donne Hancock, Westcroft, Exmouth, and nephew of Mrs. R. Donne Hancock, Blake's House, Halse, Taunton, and JOSÉPHA LAURE MARIA LENAERTS, of Brussels.

The marriage arranged between Flight-Lieut. P. B. HUNTER, R.A.F., younger son of Mr. and Mrs. Percy Hunter, of Teddington, and EVELYN MARY, second daughter of the late Mr. E. E. STOODLEY C.B., and Mrs. STOODLEY, of Teddington, will take place at Alexandria early in November.

The engagement is announced of Flight-Lieut., EDWARD RADCLYFFE PRETYMAN, A.F.C., R.A.F., younger son of the late Maj.-Gen. Sir G. Tindal Pretyman, K.C.M.G., C.B., and Lady Pretyman, 10a, Devonport Street, W. 2, and MABEL HENRIETTA LOUISA (Go-Go) Ross HUME, daughter of Robert and Lady Mabel Sievier, Fitzroy House, Newmarket, and 68, Regency Square, Brighton.

Item

Lieut.-Aviateur Chevalier Willy Coppens, Assistant to the Belgian Military Attaché for Air Service Duties, returned to London on September 24 from Brussels.

ROYAL AERONAUTICAL SOCIETY

New Chairman.—On the termination of the term of office as Chairman of Lieut.-Col. Mervyn O'Gorman, C.B., Professor Leonard Bairstow, C.B.E., F.R.S., becomes Chairman of Council on October 1 for the year 1922-1923.

Election of Members.—The following members were elected at a Council Meeting held on Wednesday, September 13:—Associate Fellow, Miss H. M. Lyon; Student, H. A. Sherwin Gothard.

Presentation of Awards.—The Society's Silver Medal will be presented to Mr. H. R. Ricardo, and the Pilcher Memorial Prize for Students to Mr. S. H. Evans, at the commencement of the first meeting, to be held at the Royal United Service Institution, Whitehall, on Thursday, October 5, at 5.30 p.m.

Library.—The following books have been received and placed in the Library for the use of members of all grades:—"Fuel for Motor Transport" (Second Memorandum), by the Fuel Research Board. "A Short Course in Elementary Meteorology," by W. H. Pick. "Proceedings of the Second Air Conference, held on 7th and 8th of February, 1922," Air Ministry. "All the World's Aircraft," edited by C. G. Grey. "Aeronautic Papers," by J. H. Parkin. "A Dictionary of Applied Physics," Vol. I (Mechanics, Engineering, Heat) and Vol. II (Electricity), edited by Sir Richard Glazebrook. Reports of the First International Air Congress, Paris, 1921. "Report on Ex-German Aerodromes and Material in Back and Occupied Areas," by the Inter-Allied Aeronautical Commission of Control. "Aviation in Peace and War," by Sir F. H. Sykes. "Application de la Resistance des materiaux au calcul des avions," by M. Boileve. "The War in the Air," by Sir Walter Raleigh. "14,000 Miles through the Air," by Sir Ross Smith. "Steel Thermal Treatment," by J. Urquhart. "H. G. Hawker, Airman," by M. Hawker. "Theory of Wave Transmission," by George Constantinesco.

Forthcoming Arrangements.

October 5, 5.30 p.m.—Royal United Service Institution. Presentation of Awards. "The Work of S. P. Langley," by Prof. L. Bairstow.

October 11.—*Scottish Branch.* Annual Meeting. "A Proposed Solution of Aerial Transport Problems," by Sholto Sheppard. "The New Beardmore Engine," by A. A. Sydney.

October 12, 6.45 p.m.—Society's Library. Students' Section. Annual Meeting and Election of Officers. 7.30 p.m.—Inaugural Address by Dr. A. J. Sutton Pippard. Chairman, Lt.-Col. W. Lockwood Marsh. (This meeting is open to all members of the Society.)

W. LOCKWOOD MARSH, *Secretary*.

* * * *

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

(London Aero-Models Association.)

THE Competition for Mr. Kelly's Cup for Compressed Air Model Competition has again been postponed until Saturday next, the 30th inst., at 4 p.m., Wimbledon Common, as the state of weather was too unsatisfactory to hold same last week.

On Sunday the 24th inst., members congregated on Parliament Hill, Hampstead, for the purpose of competing for Mr. W. E. Evans' Record Cup for Model Gliders. A dozen members attended with their model gliders, and some excellent results were obtained. The first competitor, Mr. C. A. Rippon, put up some excellent glides, his best being one of 36 secs. The next was one of $41\frac{3}{5}$ secs., by Mr. H. L. Davis, which proved to be the record, Mr. C. Burchell running very close with a glide of $37\frac{3}{5}$ secs.

Some of the model gliders were of unique construction. Mr. F. de P. Green had a triplane, which was greatly admired, and also a small monoplane, which glided for 23 secs. Judging by the enthusiasm shown by the competitors and the public, model gliding has a great future as a new sport, apart from its scientific value.

A Competition for Mr. D. A. Pilcher's Challenge Cup for Enclosed Fuselage Models Duration will be held on Hackney Marshes at 12 noon, Sunday, October 29, 1922, under the following rules:—

1. The Competition is open to Club members only.

2. The holder of the Cup cannot be challenged for one month.

3. The models to be constructed within the limits of the following formula:—

$$\frac{\text{Length of body in inches}}{5} = \text{min. area of maximum cross section in square inches.}$$

4. The Competition is open to both power-driven and elastic-driven models.

5. Wing loading not under 5 ozs. per square foot.

6. Maximum span limit, 6 ft.

7. The length of the model shall not be greater than the span nor less than two-thirds of the span.

8. The minimum duration flight shall be 15 secs.

9. All flights shall be made under official observation.

10. The flight shall be a duration flight, the time being taken by a stop watch. The model shall leave the ground under its own power, without any assistance from the competitor whatever. The time measured by the observer shall be the period from which the model is clear of the ground to the time it alights, the period while the machine is taxying being excluded.

Meetings are held at Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, every Friday evening at 7.30 p.m. Hon. Sec., A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

* * * *

SIDE-WINDS

A JAPANESE Military Aviation Commission, headed by Col. Koiso, is at present on a visit to this country. On September 14, a visit was paid to the Aircraft Disposal Co. at Waddon, the delegation being shown the very extensive A.D.C. establishment by Col. Darby and Major Grant.

On September 15, the Commission visited the de Havilland Aircraft Works at Stag Lane, Edgware, where the modernised D.H.9 and the new D.H.38 were inspected. Members of the Commission also made a flight in one of the D.H. 34 commercial machines.

On September 20, the Japanese Commission paid a visit to the Napier Works at Acton, where they saw the famous Napier "Lion" and Napier "Cub" being manufactured. It is a compliment to British designers of aircraft and engines that representatives of the Japanese Imperial Military Staff should visit various British works before placing orders for military aircraft and engines.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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7,145. LUFTSCHIFFBAU ZEPPELIN GES. Rigid frame for airships. (159,844.)

8,525 A. FLETTNER. Governing of surfaces moving within a non-rigid medium. (175,233.)

8,7[illegible]6. S. M. DUNCAN. Screw propellers. (185,146.)

9,0[illegible]. AUGUSTIN AUTOMATIC ROTARY ENGINE CO. Rotary I.C. engines. (185,149.)

11,200 and 11,202. A. G. BELL. Hydroplanes, hydro-aeroplanes, etc. (163,033 and 163,035.)

13,617. SIR J. B. HENDERSON. Automatic control of the steering of aircraft, etc. (185,162.)

14,158. A. TAYLOR. Direction-finding apparatus. (185,169.)

14,424. J. G. YONGESE. Aeroplanes. (185,175.)

16,323. D. F. BROWN. Aerial machines. (185,248.)

20,027. E. A. STEWART. Rotary engine. (185,297.)

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from p. xvi.*)

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D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5. Dalston 1893.

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OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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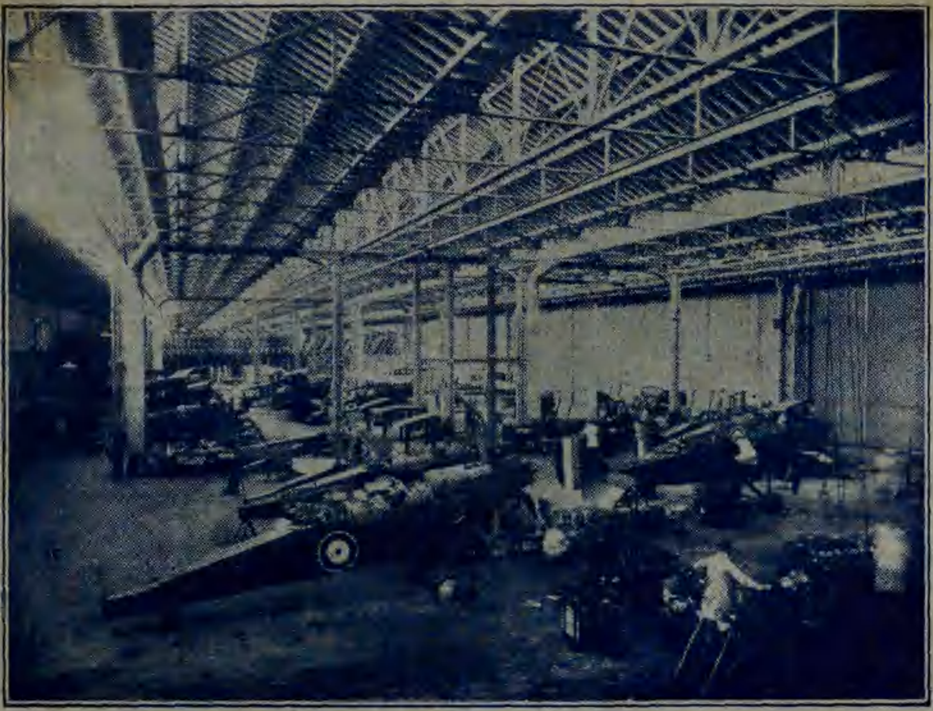

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

1922.	
Oct. 16-21	**Daily Mail £1,000 Gliding Competition**
Nov. 30 ...	**Closing date for FLIGHT Designing Competition**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

General Sir Sefton Brancker on Air Transport

ELSEWHERE in this issue of FLIGHT we publish a *résumé* of a lecture given by General Sir Sefton Brancker, Director of Civil Aviation, before the Overseas League. Sir Sefton was speaking to an audience not intimately connected with, nor, presumably, in very close touch with aviation, and in his lecture he, therefore, covered a good deal of ground which has already been thoroughly traversed by himself and others on various occasions. The D.C.A., however, made one or two remarks which appear to call for comment. Thus, his announcement that it is proposed to establish five or six civilian flying schools for the training of officers of the R.A.F. Reserve will be received with considerable satisfaction. General Brancker's actual words were somewhat vague, but if we interpret them correctly, his idea is that these civilian schools will train a certain number of reserve officers, the cost of such training to be borne by the R.A.F., and that while the Government assistance thus afforded will keep the schools going, it will also enable them (the schools) to train civilians, possibly at a lower rate, and thus provide an extra reserve of pilots against emergencies. This is all to the good, and indicates a return to the old days before the War, when our civilian flying schools did such valuable service in training the men who, during the period of greatest stress, became the very backbone of our R.F.C. and R.N.A.S. Just as from those early pilots, trained at our civilian flying schools, was formed the nucleus of our flying personnel, which grew during the War to such gigantic proportions, so the Government assistance to civilian flying schools now promised will enable us to found a reserve from which, in case of future need, may be drawn the pilots, instructors and mechanics who are to teach the new generation.

Another statement made by General Brancker is, we think, entitled to special notice, dealing as it does with a fact which, although realised in a more or less vague way, is somewhat likely to be lost sight of. He pointed out that in the past great Empires remained great only so long as they gave due consideration to the question of good communications.

When these were allowed to decline the Empires appeared to decline with them. From this undisputed fact General Brancker drew the conclusion that it was reasonable to suppose that the next few years might see the British Empire kept together by air transport. The personal contact between those in high places will do much more towards good will and understanding than reams of written documents, and it is in strengthening this personal element that aviation has so much to offer, much more, probably, than is generally realised.

Speaking as a member of the International Convention on Air Navigation, Sir Sefton Brancker said: "There is more mutual trust and real co-operation between nations on that Convention than on any other. There is a spirit about aviation which tends to co-operation instead of eternal bickering and fighting over small points, and I am not at all sure that the International Convention will not be one of the biggest weapons for peace of the League of Nations. This statement was received with cheers, and to these we would all add our voice.

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A League of Nations Air Force

Not untirely unconnected with Sir Sefton Brancker's statement on the importance of the International Air Convention and on its importance to the League of Nations is Lord Robert Cecil's suggestion that an Air Force of the League of Nations should be formed to make the guarantees effective. Both statements are indications of the growing realisation of the vast possibilities, as yet barely touched upon, of the Air Arm. A strong League Air Force would be one of the very best means of assuring that no member of the League would foolishly attempt aggression against any other member of the League. The very presence of such an Air Force would act as a deterrent, while, if in spite of its existence, any nation should take aggressive steps, the air, sea and land forces of the nation so attacked would naturally join forces with the League Air Force, and thus might avoid the necessity for any other measures being taken by the League. Added to this effectiveness of a League Air Force, it should not be forgotten that even a very large Air Force could be maintained at relatively trifling cost, at any rate, compared with the expenses involved in many nations maintaining at strength their respective fighting services. Thus, expenditure on armaments could be reduced all around, and at the same time the maintenance of units serving with the League Air Force would ensure a standing and ever ready force, prepared to strike at any moment when such action should prove necessary. From every point of view Lord Robert's suggestion appears to us to be worthy of the most serious consideration, and we sincerely hope that the necessary action to that end may be initiated without delay.

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D. of R. and Farnborough

As first announced in FLIGHT several months ago, it was decided to transfer a large portion of the establishment of the Directorate of Research to the Royal Aircraft Establishment at Farnborough. This transfer has now been effected, and an official statement on the subject suggests that it is expected that very considerable economies will result, as well as a closer co-operation between the Directorate of Research and the practical experimental work carried out at the R.A.E.

When we first heard of this intention we pointed out that it might be that the move was actuated by a genuine desire for economy, but that on the other hand it might mean the first step towards a return to the old evil days when the Royal Aircraft Factory (as it was then called) performed functions in the way of design and construction for which it was never intended, and which could not be tolerated. Whilst we trust that no such plans are even remotely entertained now, the concentration of research and experiment at Farnborough appears to carry with it the danger that the "Factory" may again have plans for more designing and constructional work than will be good for the country or the industry, which should not be allowed. May we call attention to a statement made by the Director of Research at the last Air Conference, in which he pointed out that his department was about one-fifth research and four-fifths engineering? Professor Bairstow very rightly pointed out that if that were the case it would appear to be time for changing the name of the department. As we have said, we do not know that there is necessarily anything more than meets the eye in the transference to Farnborough, but the move is one which will bear careful watching.

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The Coupe Deutsch

As recorded elsewhere in this issue, the race for the Coupe Deutsch this year, was a most unsatisfactory affair. To all intents and purposes, there was no race, as only one competitor, Lasne, finished the course. Casale retired with radiator trouble. Lecointe crashed. Brack-Papa did not properly cross the starting line on the first attempt and abandoned the race in the second; while James was rendered *hors de combat* by his map strings. As the only British representative the failure of James was naturally a keen disappointment to all interested in British aviation, not to mention the Gloucestershire Aircraft Co. and Napiers. After taking every precaution, and spending a great deal of money on getting the Mars I and its engine into the best trim possible, to see all chances of success shattered by such an absurd happening must have been a great blow to all, and we sincerely sympathise with the firms most concerned. At the same time, the mishap was one that should not have been possible, as, even if the pilot considered this a satisfactory method of carrying the maps, those responsible for the machine might well have insisted on some less haphazard way of securing the maps.

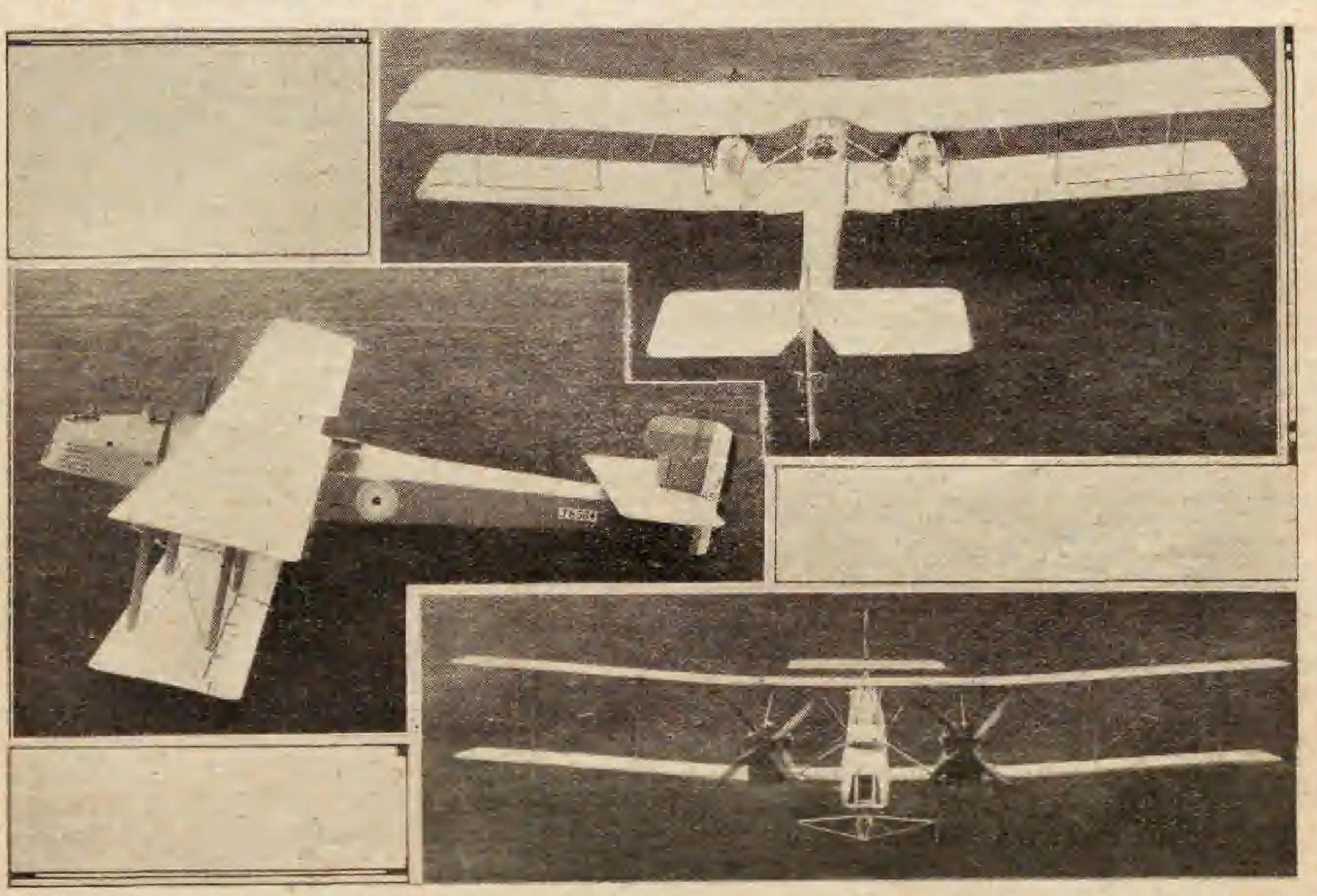
It is not only from the British point of view, however, that the race was disappointing. As things happened, the race has taught us nothing, and we know no more than the French as to which is really the fastest machine in the world today. The speeds put up by Lasne and (unofficially) by Brack-Papa are certainly slightly in excess of those attained last year, but not one of the really fast machines had an opportunity of showing what it could do. Sadi certainly did establish a new record over the 100 km. course, but his ignition trouble prevented him from completing the whole course. It is to be hoped that next year's race may prove more successful, and we shall look forward to Britain being represented, not by one machine, but by the full three to which each country is entitled.

THE BOULTON AND PAUL "BOLTON" (P. 15)

Two 450 H.P. Napier "Lion" Engines

IN our issue of September 14, 1922, we published photographs of the new Boulton and Paul "Bolton" all-metal biplane (in skeleton), with two Napier "Lion" engines. On Friday of last week we paid a visit to the Boulton and Paul works at Norwich, where we had the privilege of examining the machine and of seeing it flown by Mr. Courtney. As the "Bolton" is built for the Air Ministry, but few particulars may be published, but the accompanying photographs, showing the machine after being covered will give a very good idea of the general lines. Concerning the really interesting features of the new biplane, *i.e.* the all-metal construction, nothing may be said, and the following notes therefore deal with the general design rather than with constructional details.

Although the "Bolton" bears a certain family resemblance to the famous "Bourges," it differs from the earlier machine not only in size, but also in several other important respects. The power plant consists of two Napier "Lion" engines, mounted fairly high in *nacelles* carried on the lower plane. As the question of efficient cooling is one about which comparatively little is known, it is of interest to note that in the "Bolton" the Napier engines are left uncovered to an unusual extent, with the consequence that radiators of relatively small size can be employed. A further advantage of this arrangement is that the exhaust silencers, which are of the patented Boulton and Paul type, with aluminium manifolds terminating in steel pipes having saw-cuts in them, are very efficiently cooled. In spite of their simplicity and lightness, these silencers are certainly very effective, as we had an opportunity of ascertaining, and it appears probable that the combination of exposed engines and small radiators offers no more resistance than enclosed engines with large radiators and complicated exhaust pipe arrangements.



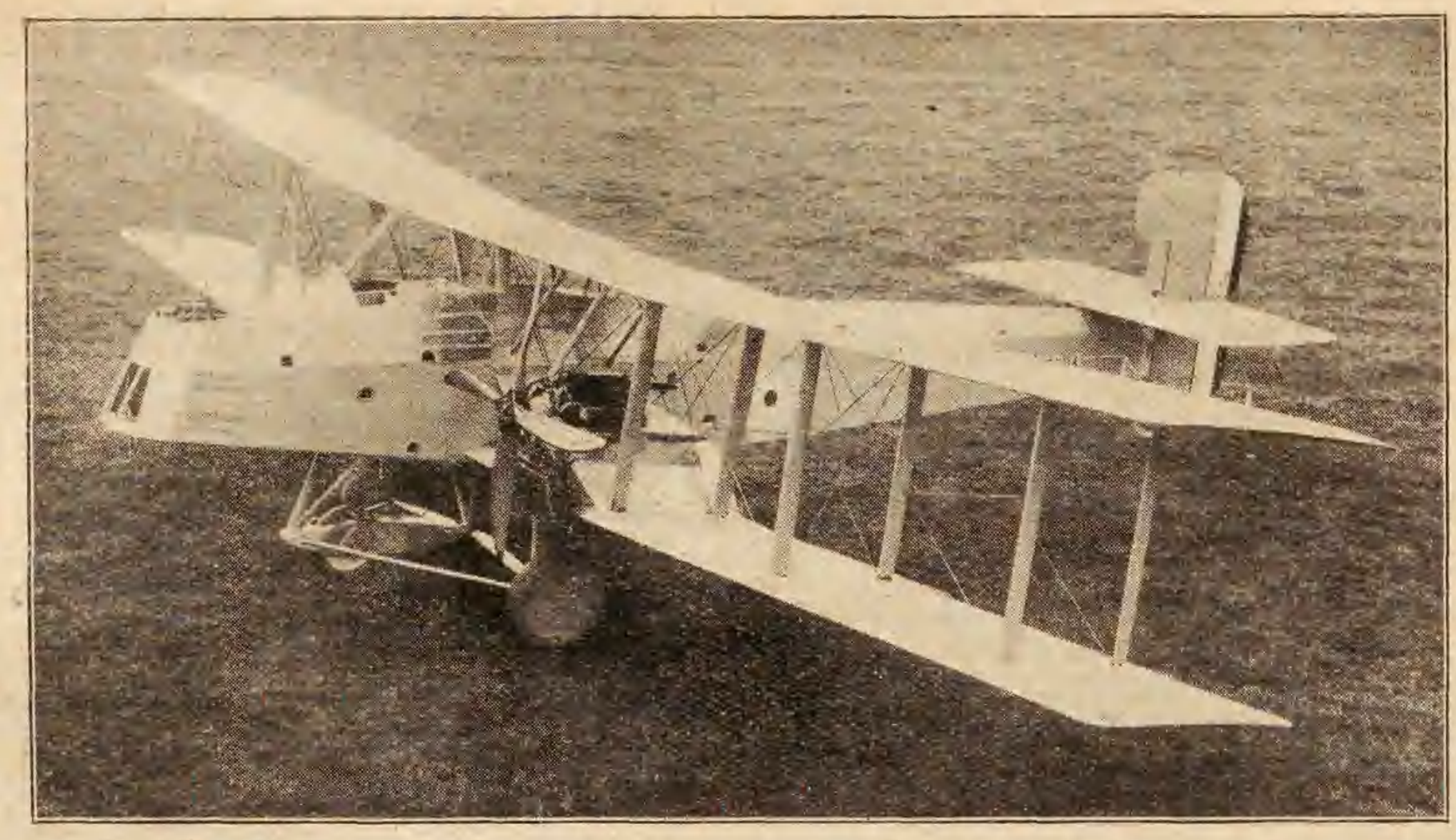
Three views from above of the Boulton and Paul "Bolton" all-metal machine, with two Napier "Lion" engines.

Another feature noted in connection with the engines was the absence of vibration. When both engines were running all-out on the ground it was not possible to detect any vibration of the lower plane, a fact for which no doubt the special design of engine mounting is responsible. While on the subject of the engines, reference may be made to the unusual starting arrangement, which is one of the neatest we have seen so far. Instead of mechanics having to climb about on the machine in order to reach and turn the starting handle, arrangements are made in the "Bolton" for starting the engines from the ground, long shafts running from the engines, inside the *nacelles*, down to the tail end of the *nacelles*, where a starting handle can be inserted and the engines turned over by a mechanic standing behind the trailing edge of the lower plane. Not only is this position very comfortable and allows of maximum effort being applied, but should the mechanic slip his foot will not go through a plane or damage some important part, as is apt to occur in machines where the mechanic has to stand on a wing or other part.

The petrol system consists of main tanks mounted in the *fuselage*, with pumps (driven by windmills) constantly delivering to a feeder tank, also mounted in the *fuselage*, but at sufficient height to give gravity feed to the carburettors. Thus there is no petrol in the engine *nacelles*, while unsightly gravity tanks, externally mounted, are avoided.

The wings are of usual form as regards their external appearance, but are, like the rest of the machine, built entirely of steel, with exception of the covering, which is the usual doped fabric. It would of course, be possible to make the covering of metal also, but it is thought that the extra weight which this would entail would outweigh any advantage arising out of metal covering. The *ailerons* are of the type in which the hinges are placed some distance back from the leading edge, the balance being formed by the forward third of the *aileron* and not by a horn balance projecting forward outside the wing tip.

Several interesting features are incorporated in the tail. Thus in addition to the usual trimming tail plane, a trimming fin has been employed, which works in a manner similar



The Boulton and Paul "Bolton," two 450 h.p. Napier "Lion" engines.

to the trimming tail plane, its sideways displacement having, of course, for its object to equalise any turning moment set up by one engine developing less power than the other. As soon as the pilot discovers that one engine is dropping its revolutions, he turns a wheel in the cockpit and the fin moves over until the machine has no tendency to turn. The rudder is hinged to and moves over with the trailing edge of the fin.

The undercarriage is of a special oleo type, and from observation of the machine taxying and landing it would appear that the shock-absorbing qualities are extraordinarily good, no tendency to bouncing being noticeable. In addition to the two main wheels a third and smaller wheel is placed centrally and some distance ahead of the main undercarriage. This wheel prevents the machine from nosing over in a bad landing, and is partly enclosed in a streamline casing. It is sprung by rubber shock-absorbers.

Although the "Bolton" has not yet been thoroughly tested out, the few flights which have been made indicate that, when certain alterations which are always found necessary with new types, and which have, of course, nothing whatever to do with the metal construction, have been carried out, the new Boulton and Paul P.15 will be a very fine machine indeed. It appears to take off very quickly, and although on the occasion of our visit Courtney was not attempting to make rapid climbs, the machine appeared to get away very well, requiring but a very short run. Its landings also were very good.

We regret that no reference to constructional details is permitted, otherwise an illustrated article on the "Bolton" would, we feel certain, be of more than passing interest, the metal work being an extremely pretty piece of engineering and representing very great progress and advance over anything hitherto done in this or any other country. Time alone can show how metal will stand up to vibration, dampness, etc., but, as far as can be seen at present, there is no reason to suppose that it will give any unexpected trouble. We congratulate Boulton and Paul, and Mr. J. D. North, their chief engineer, on a very fine piece of work, and express the hope that they will continue their pioneer work on all-metal construction.

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			Mails	Goods		h. m.		
Croydon–Paris	41	108	15	30	38	2 54	D.H. 34 G-EBBS (1h. 50m.)	B. (4), D.H. 9 (1), D.H. 34 (4), G. (10), H.P.W.8B (3), Sp. (2), Vi. (1), Vk. (1).
Paris–Croydon	44	149	10	31	40	2 58	D.H. 34 G-EBBQ (2h. 0m.)	B. (8), D.H. 9 (1), D.H. 34 (4), G. (10), H.P.W.8B (3), Sp. (2), Vi. (1).
Croydon–Brussels ...	6	29	—	—	6	2 12	D.H. 34 G-EBBV (1h. 52m.)	D.H. 9 (1), D.H. 34 (2).
Brussels–Croydon ...	9	29	—	—	9	2 52	D.H. 9 G-EBAN (2h. 3m.)	D.H. 9 (2), D.H. 34 (2), Vi. (1), Vu. (1).
Croydon–Rotterdam–Amsterdam.	6	4	6	6	6	3 7	Fokker H-NABJ (2h. 15m.)	F. (6).
Amsterdam–Rotterdam–Croydon.	7	8	6	5	7	2 45	Fokker H-NABN (1h. 53m.)	F. (6).
Total for week ...	113	327	37	72	106			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

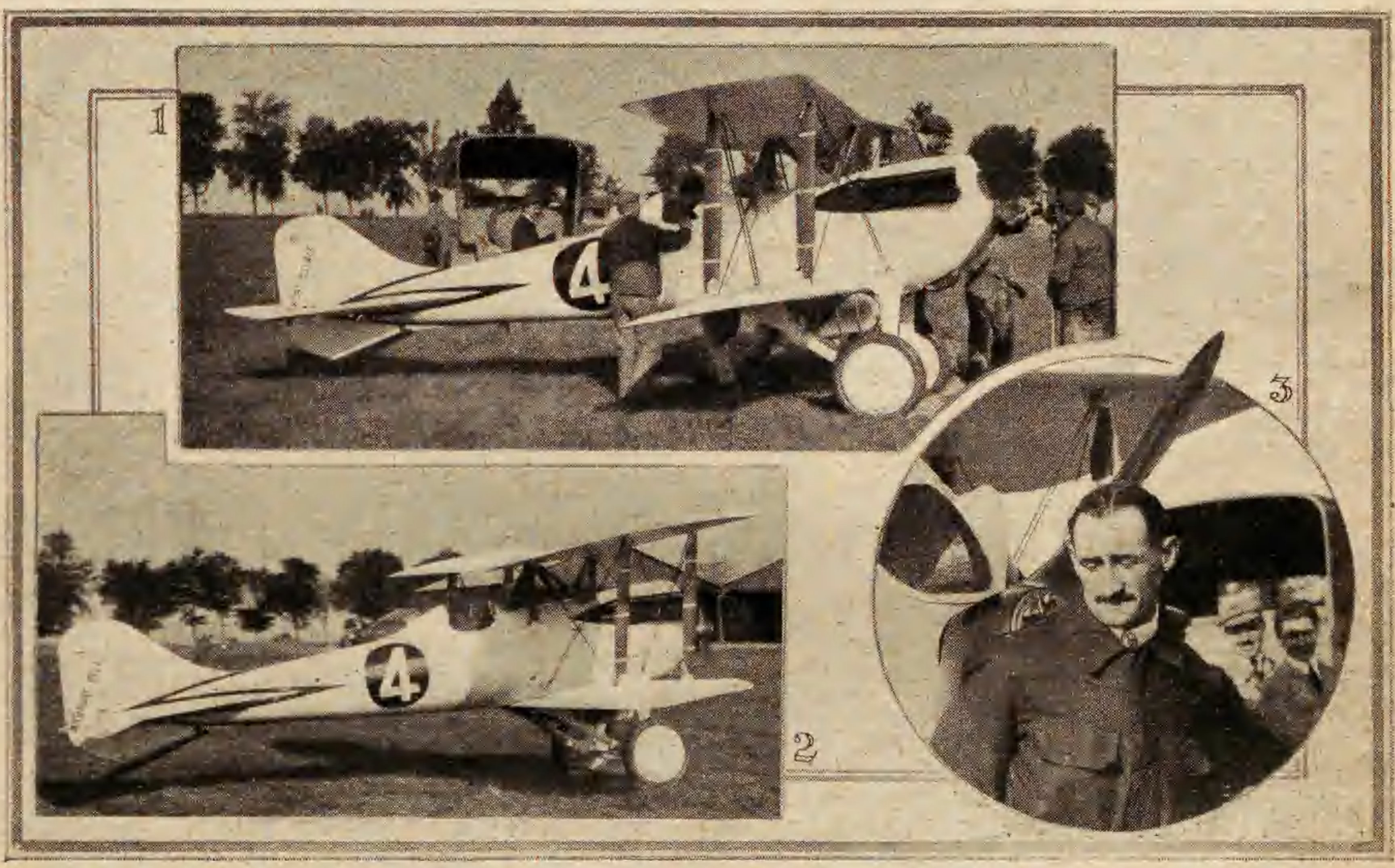
‡ Including certain diverted journeys.

THE RACE FOR THE COUPE DEUTSCH DE LA MEURTHE

France Remains the Holder of the Cup

Once more the race for the Cup presented by the Deutsch de la Meurthe family has been flown, and once more it has been carried off by a Nieuport pilot. Without wishing to detract in any way from the merit of the Nieuport machines, it must be admitted that but for the mishaps which befell other competitors Lasne on the (relatively) old Nieuport would not have won the race. The machine, a biplane with 320 h.p. Hispano-Suiza engine, is a very pretty little 'bus, and quite fast compared with ordinary standards, but in comparison with such machines as the " Sesquiplan " flown by Lecointe and the Mars I flown by James, the Nieuport biplane is but a medium-speed machine. This year's race was unsatisfactory in the extreme, inasmuch as it failed, for reasons to be recounted presently, to decide which is at present the fastest machine in the world. The controversy on this point will therefore continue—probably until next year's Coupe Deutsch, as speed records established in different countries, even when homologated by the F.A.I., never seem to carry the same conviction as does a speed race under equal conditions.

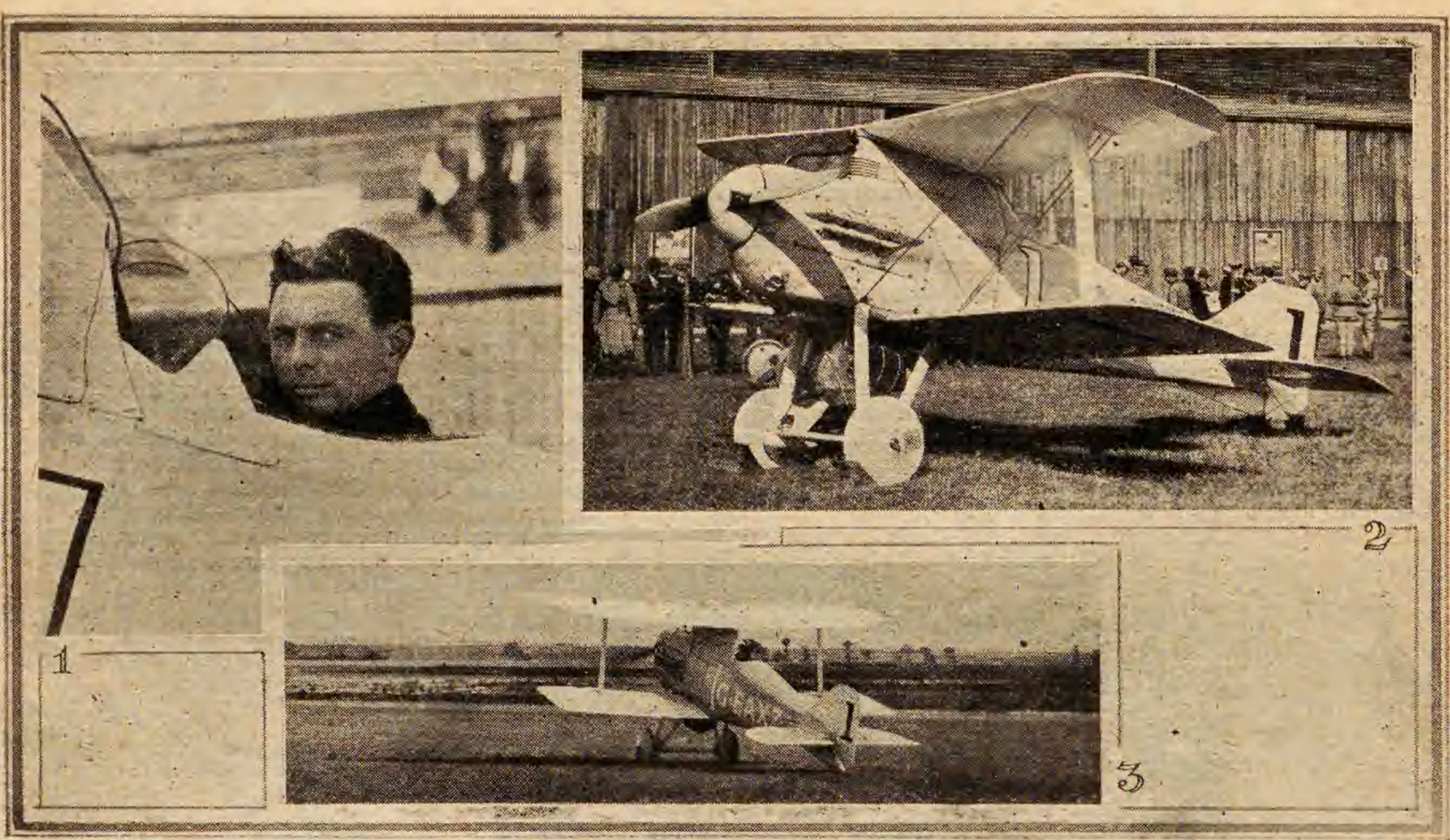
However, to return to the race itself. This year's race for the Coupe Deutsch was favoured with glorious weather. There was but little wind on the morning of September 30, and the visibility was excellent. According to the rules competitors were at liberty to start at any time after 9 a.m., and as the weather was favourable several of them did so during the morning. The first to get away was Jean Casale on the Blériot-Casale, 400 h.p. Lorraine engine. Crossing the starting line at 10 hrs. 10 mins. 48 secs., Casale disappeared in the direction of La Marmogne. His machine did not appear to be very fast, compared with some of the other " projectiles," and when he returned and rounded the pylon after his first lap his time for the 62 miles was found to be 24 mins. 21⅘ secs., or a speed of 153 m.p.h. Shortly after starting on his second lap Casale was seen to be returning, and when he landed it was found that his radiator had sprung a leak. The engine was extremely hot, and there was an unpleasant smell of burning paint. Fortunately, the machine did not catch fire in the air. In the meantime No. 2, the Italian Fiat 700 h.p. biplane piloted by Brack-Papa, had got away in good style, but it was rumoured that he had failed to cross the starting line properly, having apparently crossed behind the time-keepers instead of in front of them. However, he proceeded on his way, ignorant of any mistake, and shortly afterwards was followed by Lasne on the very pretty little Nieuport-Delage biplane, Hispano-Suiza engine. Lasne handled his machine well, and followed Brack-Papa in the direction of La Marmogne. The Italian pilot returned, swung around the pylon in a somewhat wide circle and commenced his second lap, followed shortly afterwards by Lasne, who took his corners in good style. On returning a second time Brack-Papa again took his corners wide, while Lasne kept fairly close to the pylon. At the finish both pilots made good landings, and when the times had been worked out the following announcement was made :—Brack-Papa was out of the running as he had not crossed the proper finishing line, but he would be given another start if he so desired. This he decided to do during the afternoon. In the meantime his lap times were announced to be as follows, although they did not count officially : First lap (62 miles) in 20 mins. 43⅗ secs. (179·5 m.p.h.) ; first two laps (124 miles) in 41 mins. 35⅘ secs. (179 m.p.h.) ; three laps (186 miles) in 62 mins. 27⅕ secs. (179 m.p.h.).



THE COUPE DEUTSCH : The Nieuport-Delage biplane on which Lasne (inset) won this year's race.

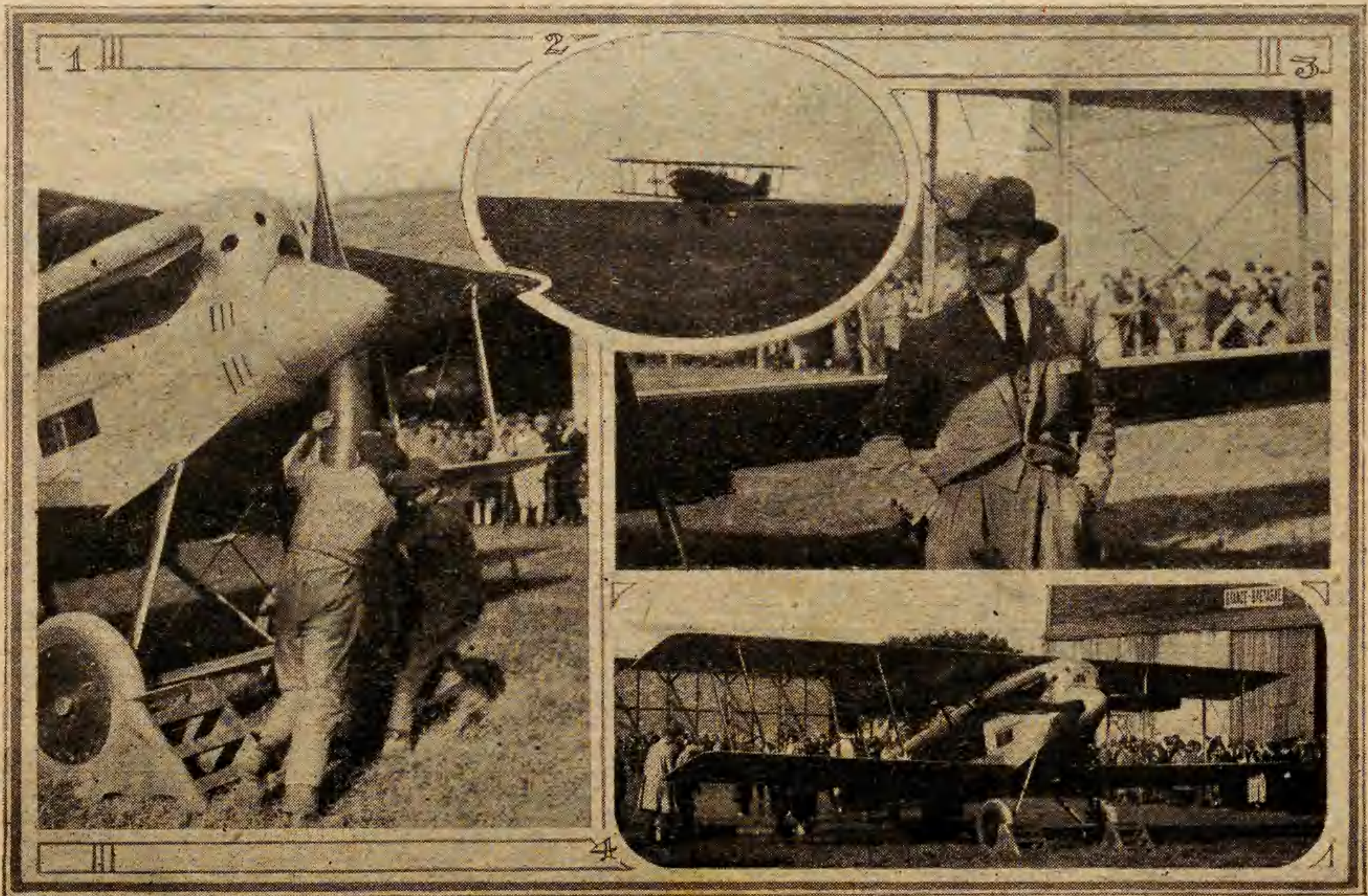
The times made by Lasne were as follows : 100 kms. (62 miles) in 20 mins. 41⅘ secs. (179·8 m.p.h.) ; 200 kms. (124 miles) in 41 mins. 27⅕ secs. (179·5 m.p.h.) ; 300 kms. (186 miles) in 62 mins. 11⅘ secs. (179·6 m.p.h.). Had Brack-Papa's times counted it would have been a very close race between him and Lasne.

After the luncheon hour, when the thousands of French visitors had finished their " pique-nique sur l'herbe," James got the Gloucestershire Aircraft Co.'s Mars I ready, and about 2.30 he took off. After cruising about for a few minutes he crossed the starting line at a terrific speed and disappeared in the general direction of La Marmogne. From the speed at which James crossed the line we began to have hopes that he might lift the Cup, but as the minutes passed without his return anxiety began to be felt. Presently he hove in sight, apparently a good deal off his course, and as he approached the aerodrome it became apparent that he was about to land.

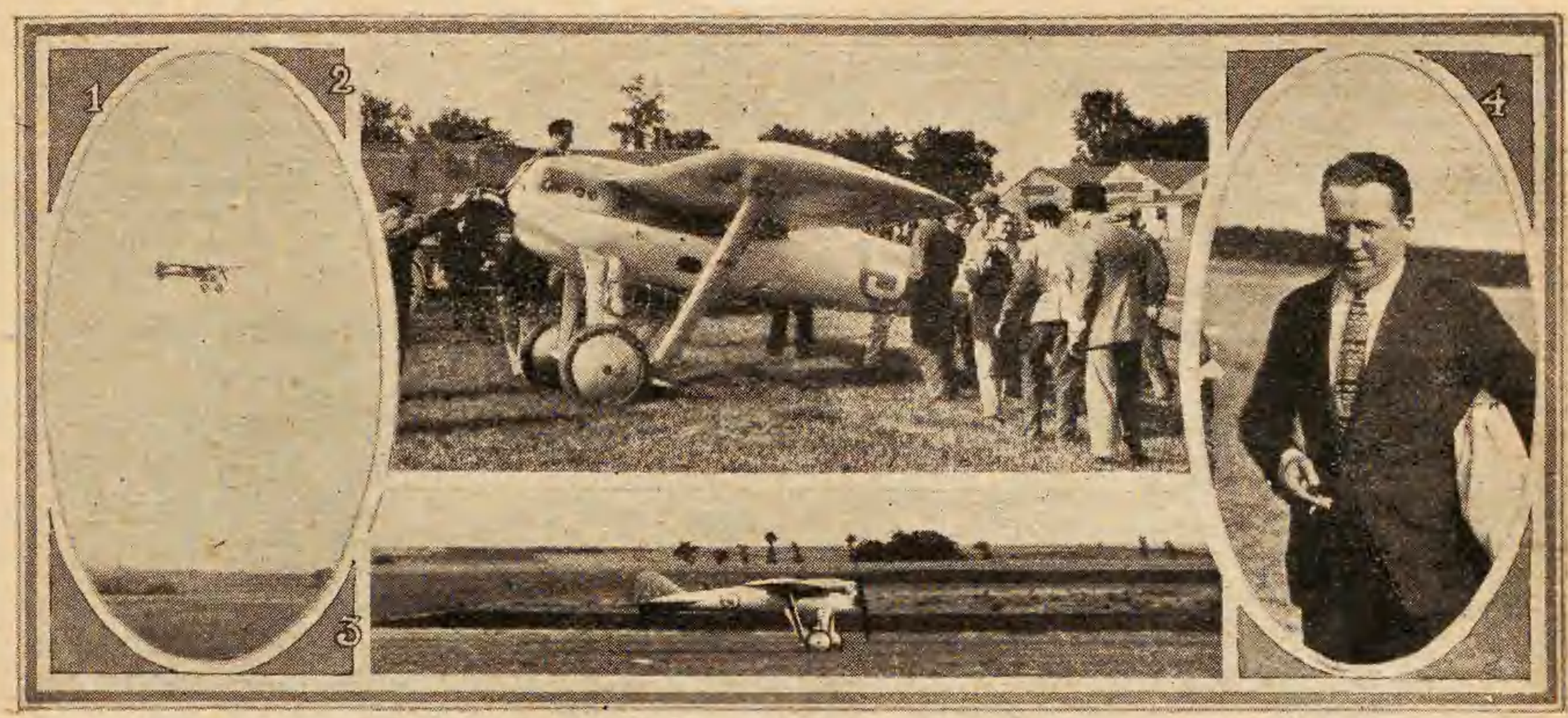


THE COUPE DEUTSCH : 1, The British representative, Mr. J. H. James. 2, The Gloucestershire Aircraft Co.'s Mars I, 450 h.p. Napier "Lion" engine. 3, James landing after his struggle with maps.

This puzzled us somewhat, as the "Lion" appeared to be roaring at the top of its voice. After making a perfect landing James told us what had happened. It appeared that he had had his maps of the course stuck on pieces of thin three-ply wood, and that the draught, getting inside the cockpit, had blown them about a good deal. While trying to keep his course and have a look at the maps the wind caught them and blew them outside, where, in a slipstream



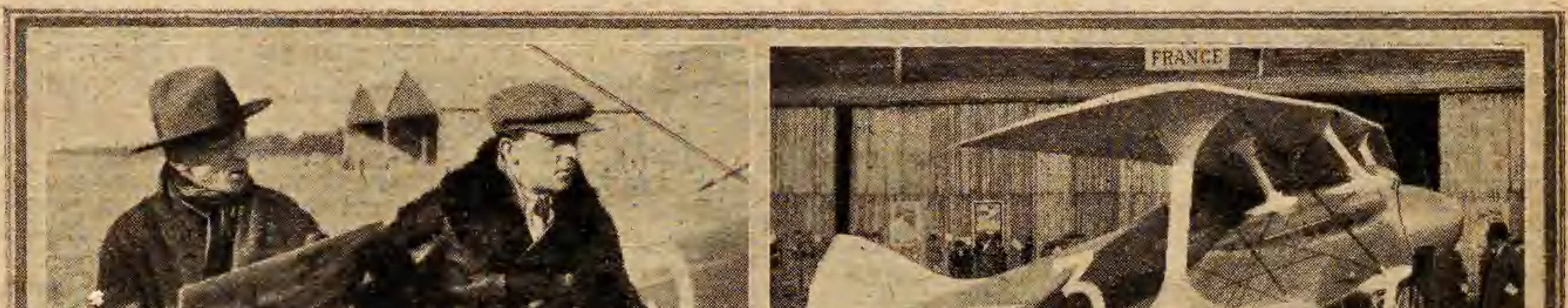
THE COUPE DEUTSCH : The Italian representative. 1, Mechanics struggling with the high-compression Fiat engine. 2, Brack-Papa landing after the race. 3, Signor Brack-Papa, the famous Italian pilot of the Fiat. 4, The 700 h.p. Fiat biplane.



THE COUPE DEUTSCH : 1, The Nieuport-Delage in the air. 2, The "Sesquiplan" flown by Lecointe. A very pretty little machine, similar to last year's, but with a different wing section. 3, Lecointe landing. A few seconds after this photograph was taken the machine turned over, fortunately without injuring the pilot. 4, M. Sadi Lecointe, the famous Nieuport pilot, who had a marvellous escape when his machine turned over on landing.

of somewhere around 220 m.p.h., they naturally flapped about furiously. The pull on the strings around James's neck became so hard that he had to break them, losing his maps. He then began to look around for La Marmogne, but during his struggles with the maps he had got considerably off his course, and when, after "cruising" about for several minutes (at about 210 m.p.h.), he failed to locate the turning-point at Gidy, he decided there was nothing for it but to return to Villesauvage. The mishap was naturally a very great disappointment to the British visitors, as there could be no doubt that James would have stood a very good chance of winning the race. As to the happy-go-lucky spirit which trusts to tying maps on with string in a machine doing over 200 m.p.h., perhaps the less said the better.

Sadi Lecointe, whose chances soared high with James's mishap, got his machine, the beautiful little Nieuport-Delage "Sesquiplan," out about a quarter to four, and after a good get-away crossed the starting line at about 3.50 p.m., going at a great pace, but certainly not giving the impression of being faster than the "Bamel." Less than 20 minutes after his start Lecointe crossed the line again, rounding the pylon in a sort of "Immelmann turn" which was nothing short of marvellous, considering the speed of the machine he was flying. We have referred several times to the absolute mastery of Lecointe in rounding a pylon, and on Saturday he did so in his best style. We doubt if there is another pilot in the world who could get the "Sesquiplan" around as quickly. After proceeding a short distance on his second outward journey Sadi was seen to be returning, and at once it was obvious that he was in trouble and was making for the aerodrome. Just before getting down it was noticed that Lecointe had stopped his engine, and as the machine touched it began to bounce about. Sadi, however, appeared to succeed in steadying it, but while it was still running along the ground at great speed it struck a rut, swerved and turned over. A groan went up from the thousands of spectators, and there were cries of "Sadi! Ah, Sadi!" In spite of the soldiers with fixed bayonets which are thought necessary to keep back a French crowd, the multitude broke from the enclosures and streamed at full speed towards the overturned machine, inside which it was expected Sadi would be lying seriously hurt. When the best runners in the crowd got to



THE COUPE DEUTSCH : The Spad representative. 1, M. André Herbemont, the famous Spad designer, and M. Jean Casale, pilot of the Spad. 2, the Blériot-Casale biplane. 3, Casale alighting with engine trouble.

the machine and lifted the tail Sadi snaked himself out of the diminutive cockpit, stood up and waved his hands, safe and sound and absolutely without a scratch. The wind-screen was flattened down over the cockpit coaming, but Sadi, realising what was happening, ducked in time to get his head inside and was saved. The relief of the French visitors was shared by the British contingent, for Lecointe is a thorough sportsman, and everyone would have been sorry to see him injured. It is a very curious coincidence that just as the accident happened one visitor to the aerodrome was reading the remarks in last week's issue of FLIGHT referring to the retirement of Lecointe and the expression of the hope that he will retire before coming to grief.

A DEUTSCH CUP "TAIL-PIECE": What all the pilots had to endure at Etampes. M. Casale as the smiling victim.

Brack-Papa, who had failed to cross the starting line in the morning, was allowed to have another try, and got away about 4.35. After covering the first lap, however, he retired from the race, evidently realising that he would not be able to beat Lasne's performance. Gen. Sir Sefton Brancker, Col. Frank McClean and Commander Perrin, the Royal Aero Club representatives at the race, asked permission for James to have another attempt, but the request was refused, the reason given being, we believe, that Brack-Papa was allowed a second attempt because in the first he never crossed the starting line, and consequently officially never started, whereas James had crossed the line and could not be allowed to do so a second time. With this decision we are not inclined to quarrel. Rules are rules, and it is difficult to know where to draw the line once the rules are relaxed. With Lecointe out of the running James would, of course, have been a certain winner, his machine being far and away faster than Lasne's. His failure was naturally a keen disappointment to the Gloucestershire Aircraft Co., who have spent a great deal of money on the Mars I, and to Napiers, who had taken a lot of trouble over the engine, which was, as a matter of fact, running perfectly. We hope that while the machine is in France an opportunity will be found for testing it over a measured course, as this should help to set at rest any suspicions that may linger in the minds of French aviation enthusiasts as to the capabilities of the British machine. Lecointe's time over the 100-km. course was 18 mins. 26 secs., or an average speed of 202 m.p.h., which constitutes a world's record for 100 kms. The previous record over this distance was held by Brack-Papa with a speed of 186 m.p.h. Lasne, during the race, also established two new records, that for 200 kms. in 41 mins. 27⅘ secs. and for 300 kms. in 62 mins. 11⅘ secs. The previous figures, obtained by the Nieuport pilot Kirsch in last year's Coupe Deutsch, were 42 mins. 39⅘ secs. and 64 mins. 39⅕ secs. respectively.

CORRESPONDENCE

LIEUT.-COL. SPENSER GREY'S INTER-CITY CHAMPIONSHIP

[2061] I am very gratified to see the interest taken by your journal in my suggestion for an Inter-City Championship.

I must have expressed myself badly as regards the use to which the machines were to be put after the race is over.

My idea is that the aeroplanes or seaplanes should be offered to the Air Ministry for the period of manœuvres, for tests, or at such other times as they may require them.

The machines should preferably always be flown by the proprietary town's pilot, who would naturally only be employed if a member of the Territorial Air Force.

As regards the race itself, though the R.Ae.C. will, of course, decide the conditions, I suggest that each class should have a separate event, in which case all machines would start scratch. A prize would be given for each event, and the I.C.C. cup would be presented for the best individual performance, in the opinion of the judges.

The decision as to what type of machine any particular city or town should buy would be governed by the amount of money raised and the advice of the Air Ministry.

I sincerely trust that your readers will do all in their power to further this project, and I shall be very glad to receive suggestions or criticisms from any of them.

SPENSER GREY.

Death of German Air Chief

GEN. ERNST VON HÖPPNER, the former Chief of the German Air Service, died last week at Berlin at the age of 63. Originally a cavalry leader, and Chief of the Staff to Gen. von Below, he took over the complete control of the German Air Service in November, 1916, at the time our own Air Service had gained the upper hand. As a result the German Air Service made a remarkable recovery in 1917, not only as regards the construction, etc., of machines, but in the strategy and tactics of aerial fighting. He was responsible, also, for the organisation of the Gotha raids. His book, "Germany's War in the Air," written last March, contains much interesting information on the part played by aircraft—both Allied and German—in the Great War.

R.A.F. Club Dances

THE Committee have arranged for a series of dances to be held through the forthcoming winter on the second Wednesdays of each month.

The first Dance will take place on Wednesday, October 11, from 9.30 p.m. to 2.30 a.m., and subsequent dances, subject to sufficient support being available, will be held on November 8, December 13, January 10, 1923, February 14 and March 14.

The charge for dance tickets is 12*s*. 6*d*. for each member or guest, a price which includes a buffet supper with "cup" ices, and coffee or hot soup on leaving. If preferred, a ticket to include dinner and the dance will be available at 17*s*. 6*d*. per head.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

SEVERAL more entries have now been received for the *Daily Mail* gliding competition at Itford Hill, Sussex, and a considerable number of machines, although not definitely entered at the moment of writing, will undoubtedly be entered before the closing date, Saturday, October 7. Commander Perrin, who has just returned from France, learned that at least four French gliders will be entered. One of these is the Farman flown by Bossoutrot in the French competition at Combegrasse, and another is the Dewoitine monoplane on which Barbot (whom the *Daily Mail* will insist on calling Barpot) flew for 20½ minutes. This machine is a cantilever monoplane with thick wing section, and is stated to be very scientifically designed. At present it is not known what the other two machines will be.

* * *

MR. H. E. WAITE, of Morecambe, Lancashire, has entered a monoplane with some form of flapping wings, having a span of 54 ft. Mr. Waite is the constructor of the machine, and will pilot it himself in the competition.

* * *

MR. C. FROBISHER, of Sheffield, has entered a monoplane of 30 ft. span, the wings of which, it is stated, will be worked by pedals. This machine has been built by the Sheffield School of Aeronautics and Engineering. The weight is given as about 100 lbs. The machine will be piloted by Mr. Frobisher.

* * *

A BIPLANE of 26 ft. span, and weighing approximately 110 lbs., has been entered by Mr. A. P. Maxfield, of Birmingham, who will pilot the machine himself.

* * *

IT seems that flapping wing machines will be much in evidence at the competition. Another ornithopter monoplane, whose wings will be operated by foot-power, has been entered by Mr. H. S. Dixon, of Ealing Common. The machine is stated to weigh but 50 lbs., although the span is 30 ft. We hope Mr. Dixon will win in the foot-power *versus* foot-pounds match.

* * *

MIJNHEER FOKKER has intimated his intention of entering his two biplane gliders for the competition. It was on one of these, it will be remembered, that Fokker made a flight of 13 minutes' duration (*hors de concours*) in the Rhôn. The machines are characterised by great simplicity, and it is stated that they took only 10 days to build.

* * *

THE de Havilland glider, a full description of which appears in this issue, has not yet been entered, but it is practically certain to be among the starters on October 16. In addition to the entries mentioned above, there is reason to believe that at least another half-dozen will be entered by Saturday, so that, given reasonably favourable weather, the competition should provide a great deal of sport, even if no sensational flights should be made.

WHICH IS THE "BEST" WING SECTION FOR A GLIDER?

Some Fundamental Considerations in Choice of an Aerofoil

FROM the number of enquiries which we have received, it appears that among those who are interested in gliders and gliding there are many who find considerable difficulty in visualising what, exactly, are the characteristics one must aim at to get the best results. In taking all factors into consideration one is, as a matter of fact, faced with almost as many conflicting problems as in the design of power-driven machines, but by leaving out some of the factors it is, at any rate, possible to fix one's ideas and to sort out some of the more important features which must be incorporated in a design if good results are to be obtained.

From enquiries received it would appear that there are two pitfalls into which the unwary are apt to fall. One is to assume that if a certain wing section has a very high value of the L/D ratio it must necessarily make a good glider, because the gliding angle is very small. The other view is that one must have a high-lift wing so as to get a low gliding speed. The actual facts are, of course, that what one should aim at is to get a wing section which will combine both *at the same angle of incidence*. This should be clear if one remembers that a high L/D, or small gliding angle, may give a very flat glide, but that if the lift coefficient corresponding to this gliding angle is small the gliding *speed* will be high, and consequently the rate of descent may also be high. Now in order to make use of winds of relatively small velocity and of small upward trend, the rate of descent should be as small as possible, and this is attained by making the gliding *angle* and the gliding *speed* small, at the same angle of incidence. Therefore, the wing section which combines the highest L/L with the highest lift coefficient will give the lowest rate of descent.

It may not be without interest to examine, briefly, the considerations which lead to this conclusion, and to establish the very simple ratios which give the best results. In doing this we shall attempt to be as clear as possible without going into "mathematics" other than the most simple. The only thing which we take for granted is a slight knowledge of the fundamental principles of trigonometry and algebra.

The gliding angle ϵ is, of course, given by the well-known trigonometric ratio $\tan \epsilon = \frac{D}{L}$, where D is the drag and L the lift of the wing. Expressed in terms of the drag and lift coefficients, k_D and k_L respectively, the gliding angle is $\tan \epsilon = \frac{k_D}{k_L}$. The rate of descent, which we will call V_v (*i.e.*, vertical velocity), is given by $V_v = V \sin \epsilon$, where V is the air speed of the machine. For small angles, such as would come within the range of gliding angles of a glider, the sine and the tangent of the angle are sufficiently nearly equal to allow of substituting $\tan \epsilon$ for $\sin \epsilon$, and we can, therefore, write $V_v = V \tan \epsilon$ instead of writing $V_v = V \sin \epsilon$. In order to find the gliding speed V we make use of the well-known fundamental formula $W = k_L \rho A V^2$, where W is the weight of the machine in lbs., k_L is the lift coefficient of the wing section used (in "absolute" units) ρ is the density of the air, A is the wing area in square feet and V the velocity, either in m.p.h. or in ft./sec. When V is in m.p.h. the value of ρ in the equation is 0·0051. When V is in ft./sec. the value of ρ is 0·00237.

Now it will be seen that this fundamental formula can be written $V = \sqrt{\frac{W}{k_L \times \rho \times A}}$, from which V can be found at any loading and lift coefficient. We have already established the formula $V_v = V \tan \epsilon$, and have seen that $\tan \epsilon = \frac{k_D}{k_L}$. If we substitute these two values we get

$$V_v = \sqrt{\frac{W}{k_L \times \rho \times A}} \times \frac{k_D}{k_L}, \text{ or } V_v = \sqrt{\frac{W}{\rho \times A}} \times \frac{k_D}{k_L{}^{3/2}}$$

The quantity under the square-root sign is the wing loading. Consequently the rate of descent is smallest (for that wing loading) when the ratio $\frac{k_L{}^3}{k_D{}^2}$ is a maximum. This ratio can, of course, be written as $\left(\frac{k_L}{k_D}\right)^2 \times k_L$, or as $(L/D)^2 \times k_L$. In order, therefore, to determine which wing section gives the lowest rate of descent for a given wing loading we must find the one which gives the highest value of the ratio $(L/D)^2 \times k_L$.

An examination of the characteristics of a very great number of gliders reveals the fact that the great majority have a wing loading of approximately 2 lbs./sq. ft. If, therefore, this figure is assumed as a fair average, we can compile tables of gliding angles, gliding speeds, rates of descent, etc., for a number of different wing sections. This wing loading has been assumed in the following tables, in which the first column gives the angle of incidence; the second gives the L/D ratio at that angle of incidence, and the third the corresponding lift coefficient in "absolute" units. In the fourth column are tabulated the squares of the L/D ratios, and in the fifth the square of the L/D ratio multiplied by the lift coefficient. The sixth column contains the velocity corresponding to the different lift coefficients (obtained from the equation $V = \sqrt{\frac{W}{k_L \times \rho \times A}}$). Finally, the last column contains the value of the rate of descent corresponding to the various gliding angles and gliding speeds, for the assumed wing loading of 2 lbs./sq. ft.

Owing to its popularity for power-driven aircraft and its good efficiency the section known as RAF 15 might be expected to be suitable for a glider. It is observed, however, that the lift coefficients corresponding to the high values of L/D are small, and possibly the rate of descent will therefore be fairly high. The first section whose data are tabulated is the RAF 15, and it will be seen that the highest value of $(L/D)^2 \times k_L$ is 75·7 and that this value occurs at an angle and lift coefficient which correspond to a speed of 36·4 m.p.h. when the wing loading is 2 lbs./sq. ft. The rate of descent is 3·32 ft./sec. For this wing loading the RAF 15 section gives a landing speed of 27·6 m.p.h.

It was mentioned at the beginning of these notes that the lowest rate of descent would not necessarily be obtained at the angle giving the flattest glide, and it will be seen that for RAF 15 this statement is borne out. The maximum L/D of this section occurs at 4°, but the corresponding gliding speed is 41·6 m.p.h., which gives a rate of descent of 3·58 ft./sec.

For the section Göttingen No. 441 the lowest rate of descent is 3·38 ft./sec., but this corresponds to a speed of 30·6 m.p.h., and the landing speed is lower, being 22·1 m.p.h. Particulars of Göttingen No. 441 section were published in our issue of September 21. It has, we believe, been extensively used on German gliders, and it will therefore be of interest to examine several British sections so as to discover whether or not an even better section can be found.

The section known as airscrew No. 3, the data for which were published in Reports and Memoranda No. 322, shows extraordinarily high values of $(L/D)^2 \times k_L$, the best being 118 as compared with the 75·7 of RAF 15 and 74·4 of the Göttingen 441. The lowest rate of descent is 2·68 ft./sec., and the rate does not change greatly over a range of from 2° to 8° incidence. This section is somewhat thin, and would require a braced wing structure. As a braced monoplane, however, airscrew No. 3 should be very suitable.

Airscrew No. 4 gives a very slightly higher rate of descent, and its L/D (or gliding angle) is not quite so good. It is, however, a much thicker section (maximum thickness 0·127 of the chord), and could be used on a cantilever monoplane. It gives a landing speed of but 21·5 m.p.h.

Airscrew No. 5 gives a slightly higher rate of descent, and its best gliding angle is 1 in 14·7. It is, however, a very thick section, and might be used in the centre of a large-span wing, end sections of a thinner section being attached to it.

The foregoing remarks should help to give those who have not previously given the subject much thought a general idea of the things to be aimed at in choosing a section for a glider. It will readily be understood that other considerations than aerodynamic ones have to be considered. Thus a thin wing will be heavier per unit of area than a thick wing for the same strength, and this has to be taken into account in deciding the respective merits.

As to the actual piloting of a glider, a few general remarks may not be without interest. If our glider is fitted with airscrew No. 4 section, and we wish to remain in the air as long as possible, we would obviously fly the machine at the speed corresponding to the lowest rate of descent, *i.e.*, at 32 m.p.h. Even in a gusty wind the pilot would try to keep the machine at this speed; that is to say, in a gust he would elevate and in a lull he would push the stick forward. Gliding is largely a matter of flying at a constant speed, and in this connection it is of interest to note that Smith and Sons have already introduced an air-speed indicator which reads from 10 m.p.h. upwards, and is therefore specially suitable for gliders.

If a pilot wished to cover the longest possible distance, he would fly at the angle giving the flattest glide, *i.e.*, at maximum L/D. This applies to flying in still air. In a wind the pilot would attempt to gain height while gliding into the wind, and when he felt himself getting outside the region of ascending air currents he would turn down wind and glide for as long a distance as possible.

R.A.F. 15

Angle of Incidence. (Degs.)	L/D.	k_L. (Absolute.)	$(L/D)^2$	$(L/D)^2 \times k_L$.	V. (m.p.h.)	V_V. ft./s.
4	17·1	·226	292	66·0	41·6	3·58
5	16·7	·260	279	72·5	38·9	3·42
6	*16·1*	*·296*	*259*	*75·7*	*36·4*	*3·32*
8	14·3	·369	202	74·5	32·6	3·36
				Landing speed ..	27·6	
			Göttingen No. 441			
—2	15·2	·275	231	63·5	37·7	3·65
0	14·6	·34	213	72·5	34·0	3·42
2	*13·3*	*·42*	*177*	*74·4*	*30·6*	*3·38*
4	12·2	·48	149	71·6	28·6	3·44
				Landing speed ..	22·1	
			Airscrew No. 3			
2	19·7	·274	388	106·4	37·8	2·82
3	*19·4*	*·313*	*376*	*118·0*	*35·4*	*2·68*
4	18·3	·351	335	118·0	33·4	2·68
6	16·5	·425	272	116·0	30·3	2·70
8	14·8	·490	219	107·4	28·3	2·81
				Landing speed ..	25·3	
			Airscrew No. 4			
2	17·5	·308	306	94·5	35·7	3·0
3	17·5	·345	306	106·0	33·5	2·83
4	*17·1*	*·384*	*292*	*112·0*	*32·0*	*2·75*
6	15·5	·453	240	109·0	29·4	2·79
				Landing speed ..	21·5	
			Airscrew No. 5			
2	14·7	·391	216	84·5	31·7	3·17
4	*14·0*	*·462*	*196*	*90·5*	*29·1*	*3·06*
6	13·0	·536	169	90·6	27·1	3·05
8	12·0	·599	144	86·3	25·6	3·14
				Landing speed ..	22·2	

THE NEW DE HAVILLAND GLIDER

Parasol Monoplane with Wire Bracing

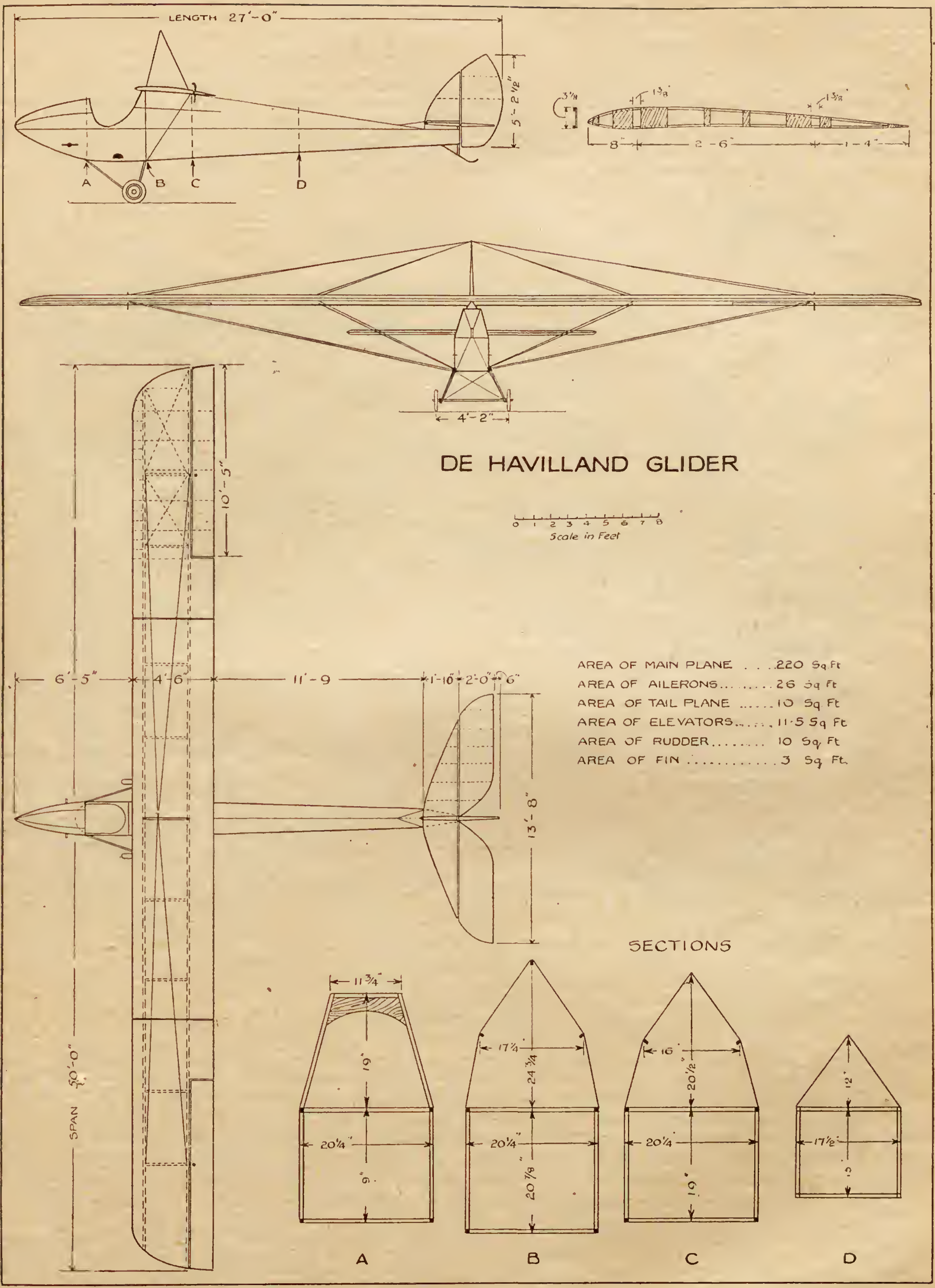
THE first of the two monoplane gliders which are being constructed at the Stag Lane works of the de Havilland Aircraft Co. will be finished this week, and it is hoped that some preliminary test flights may be made during the next week or so. On Monday we paid a visit to the D.H. works, and the glider was then erected and the bracing wires of the wings were being rigged and finishing touches given to various minor parts. At present the machine is fitted with a vee under-carriage, but probably later on, when the pilot has got used to the machine, a modified form, fitted inside the fuselage, will replace the present tubular vees so as to save resistance.

From the accompanying scale drawings it will be seen that the de Havilland glider is characterised by a parasol monoplane wing of very high aspect ratio (11 to 1), and that in spite of the fact that the wing has external wire bracing the appearance is very clean. The wing section used is R.A.F. 15, but a slight departure from the standard section has been made by stepping down slightly the ordinates of the top surface. This has been done in order to reduce spar weight, as it was found that with the spar section employed (I-section) the standard section would give rather too heavy spars. Both front and rear spars are of spruce, and the ribs are built up of spruce flanges, approximately ¼ in. square, the form of which is preserved by webs or distance pieces tacked to one side of the spruce flanges, as shown in one of our sketches.

The internal bracing is in the form of small-gauge piano wire, and the use of wire strainers has been avoided by using U-bolts passing horizontally through the spars. The system of bracing is, however, different from that employed in the old Blériots, inasmuch as alternate bays have the drag wires anchored to ordinary wiring plates. Thus the trueing-up is not quite the work of art it used to be in the Blériots of old.

The monoplane wing is very simply mounted on the fuselage by two eye bolts engaging with corresponding forked end bolts at the apices of two formers or bulkheads rising up from the top longerons of the fuselage proper. The wing thus rests on the fuselage at two points only, and these on the centre line. The bracing is therefore relied upon to maintain the wing in its proper transverse position relatively to the fuselage.

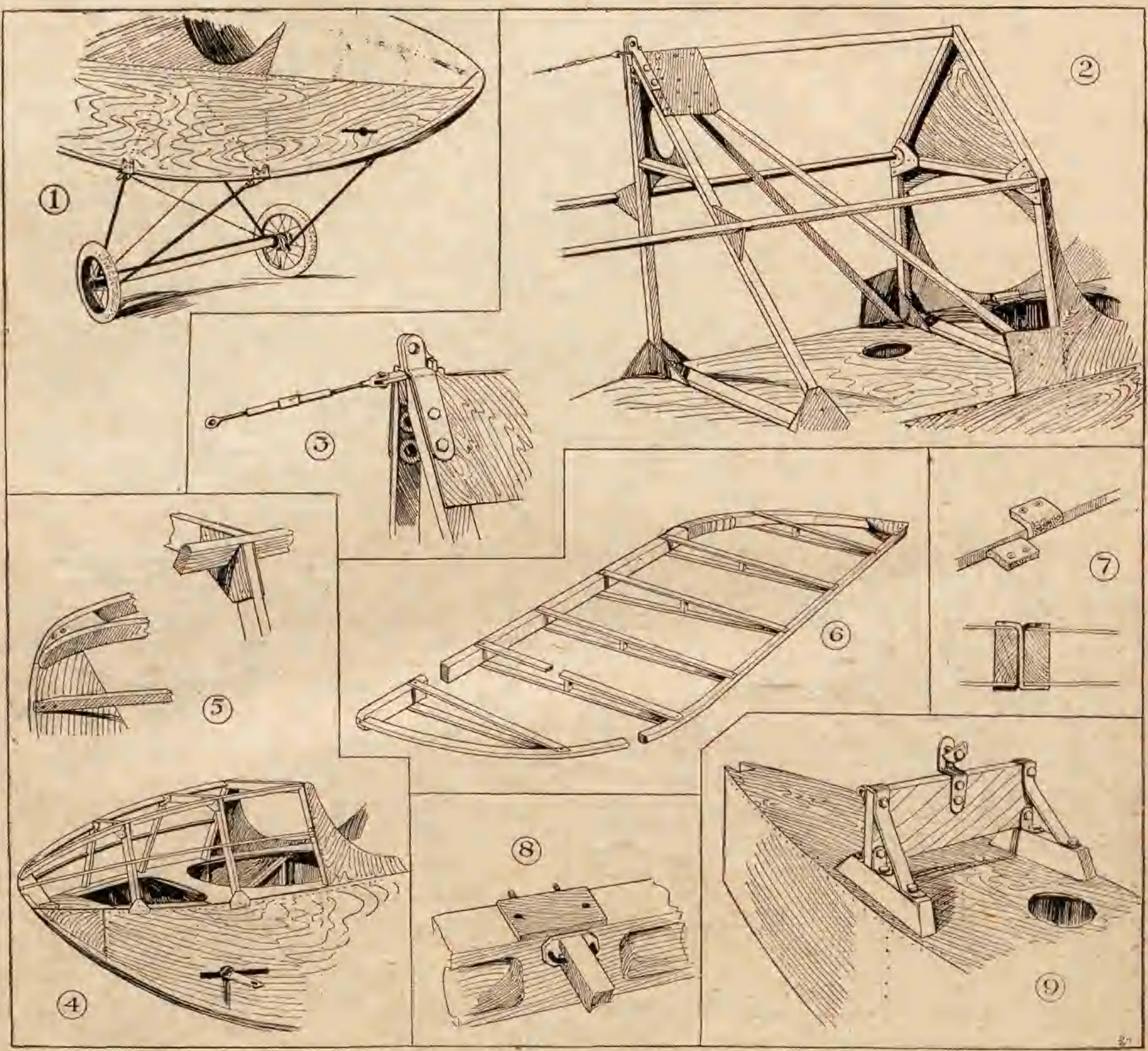
As far as the stresses in the wing are concerned, the spars may be regarded as continuous beams, as the two end sections are not pin-jointed to the large-span centre section.



THE DE HAVILLAND GLIDER: Plan, side and front elevations, to scale.

Incidentally it may be mentioned that these joints in the spars occur at the point of contraflexure (*i.e.*, where the bending moment is zero), so that no great strength is required in the joint.

The wing bracing is in the form of solid piano wire, all lift wires being duplicated, while the top wires are all single. The spars are braced at two points between the centre attachment and the tips, so that in spite of the large span the lengths of beam between supports are not great. The lift wires are attached to the under-carriage fitting on the lower longeron of the fuselage, and on the same fitting is a lug, projecting downwards and slightly to the rear, which is to serve as an attachment for the starting rope.



SOME CONSTRUCTIONAL DETAILS OF THE DE HAVILLAND GLIDER : 1. Front portion of the fuselage and the Vee undercarriage. 2. The bulkheads or formers to the apices of which the wing is attached. 3. Details of the top of the rear bulkhead, showing attachment of the wire which forms the ridge of the triangular top of the fuselage. 4 shows construction of superstructure over pilot's cockpit, and 5 some of the smaller details. In 6 is shown one complete elevator flap, with trailing edge cut through to show laminated construction. The leather elevator hinges are indicated in 7, and in 8 is seen the U-bolts and compression struts of the internal wing bracing. 9 shows the bulkhead on which the front edge of the tail plane is mounted.

The covering of the wing is white cambric, doped with the new Cellon glider dope.

The anti-lift wires are attached to a fin or pylon mounted above the wing. Lateral control is by ailerons, and in connection with these it may be mentioned that the "differential" type, patented by the de Havilland Company, is used. With this arrangement the aileron which moves up travels through a greater angle than that moved through by the opposite aileron in travelling down. Experience with power-driven machines has proved this type of aileron control to be very efficient, and as ample control is a great advantage in a glider it has been used in preference to the ordinary type.

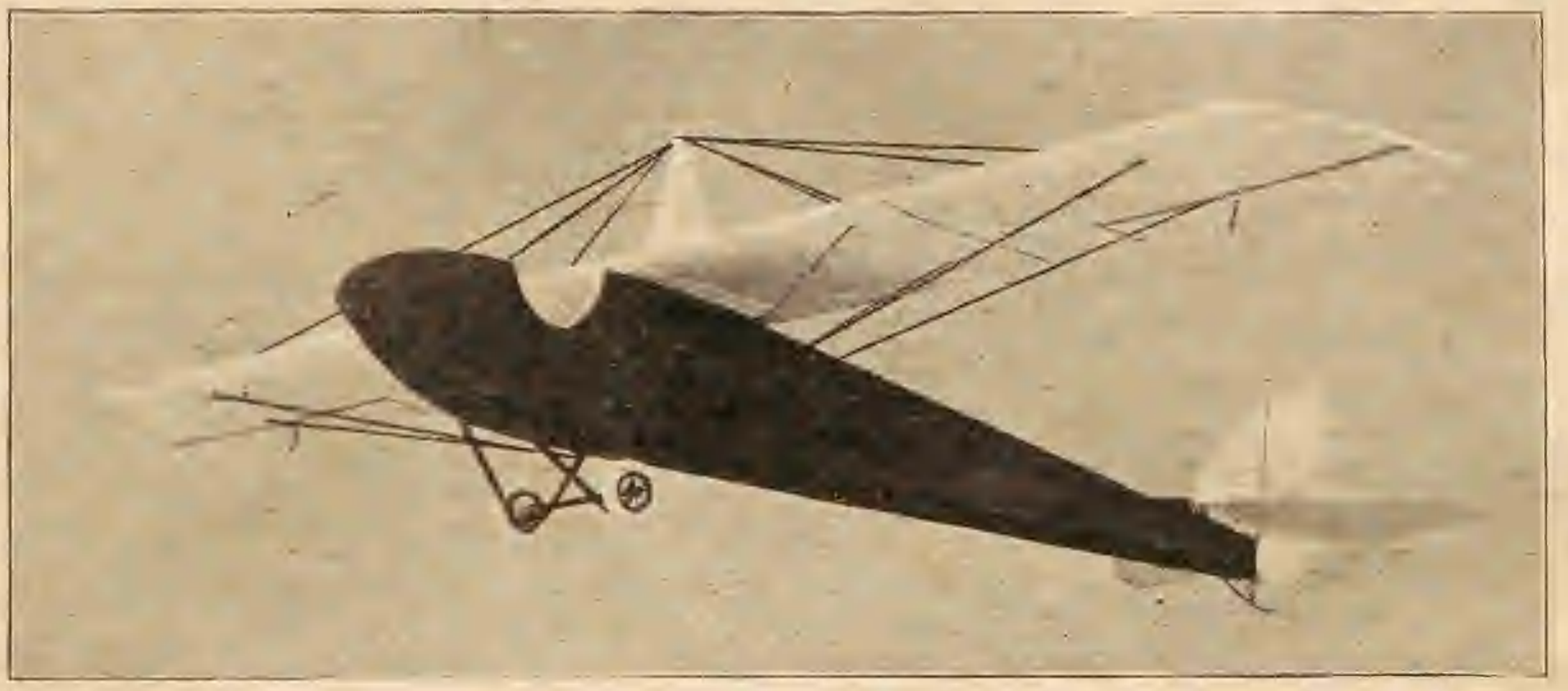
The fuselage, as regards its main portion, consists of four thin spruce longerons, joined by struts and covered with thin (1 mm.) three-ply wood. The struts run diagonally over the greater portion of the fuselage, but here and there, where local considerations demand it, the diagonal struts are reinforced by light bulkheads. It might be pointed out that these struts are merely butted on the longerons and not attached to them except *via* the ply-wood covering, the struts being intended to serve as stiffening pieces for the ply-wood rather than as bracing members, the ply-wood performing the function of bracing.

The fuselage proper is very shallow, and in order to bring it up to the wing an auxiliary structure, consisting of light formers, has been built on to its top. It might be objected that a lighter structure would have resulted from making the fuselage structure itself the required depth, but although in theory this would appear to be so, it was found in practice that to effect the necessary reduction in weight the longerons and ply-wood would have to be of such small dimensions that they would become impracticable. Consequently a shallow box was chosen for the stress-resisting part, and the rest was built on in the lightest form possible. The ridge along the top of the fuselage is formed by a wire running from the rear wing bulkhead to the tail plane, and fabric covering is put over the triangular section top thus formed.

The tail plane, elevators, fin and rudder are of very light construction indeed, and are covered, like the wings, with cambric. The elevator hinges are in the form of leather straps, similar to those used on draught screens, clothes-horses, etc., and provide quite the most light and efficient form of hinge possible. The angle through which the elevators can be moved is very great (*i.e.*, 90° each way), and the gap left between tail plane and elevator spars is always kept closed. The tail plane is mounted on a small transverse bulkhead reaching some 5 ins. above the flat top of the fuselage proper, and is secured to it by two eye bolts. The rear spar of the tail plane is bolted to the fin post. Incidentally it may be pointed out that the curved leading edge of the tail plane is formed by several laminations of spruce, which form of construction is very strong and has the advantage that curved members can be formed without steaming.

The controls are of usual type, both the foot bar and the "joy-stick" being made from steel tube. The control cables pass to the tail on the outside of the fuselage, while those to the ailerons run up along the bulkhead behind the pilot, around pulleys, through the front portion of the wing and to the control cranks inside the wing. The pilot's cockpit is just in front of the leading edge of the wing, and here, as in the aft portion, the required depth of fuselage is provided by a light super-structure. The absence of "gadgets" in the cockpit makes one wish a similar simplicity were attainable in power-driven aircraft, where the pilot usually is so surrounded by instruments that one often wonders how he ever gets any time for piloting. The only instrument fitted at present is an air-speed indicator. This is one of the new instruments just put on the market by Smith and Sons, and is designed to give readings from 10 m.p.h. upwards. Also the "lag" has been reduced to a minimum, so that the instrument should be a valuable asset on a glider which has to be flown at practically a constant speed.

As already mentioned, the de Havilland glider is at present provided with a Vee under-carriage, but later a modified type, partly housed in the bottom of the fuselage, may be fitted. The present one has Vees of steel tube, with small scooter wheels carried on an axle slung on rubber cords from the bottom of the Vees. A tail skid built up of several laminations of wood is mounted on the downward extension of the fin post, and is anchored at its free end to a leather strap screwed to the lower longerons.



THE DE HAVILLAND GLIDER: Photograph taken from below of a scale model of the machine.

At the time of our visit to the de Havilland works the glider had not yet been weighed, but it was expected that the weight empty would be in the neighbourhood of 250 lbs., in which case the loaded weight will be approximately 400 lbs., or a wing loading of under 2 lbs./sq. ft.

The machine is finished in black and white, the wings and tail being left the original colour of the fabric, while the fuselage and under-carriage are black. At the moment the glider has not been entered for the *Daily Mail* competition, but we hope it will be entered before the closing date, October 7.

AIR TRANSPORT*

IN his opening remarks Gen. Brancker briefly referred to the past history of air transport in England, and how, after the slump in 1920-21, when the Government came to the rescue with subsidies, the London-Continental air traffic developed to its present position, in which a new system has been organised whereby the three operating companies each run a separate service—to Paris, to Cologne and to Berlin. The superiority of the British pilot was, he said, the only thing of importance that stands out during that period. He next touched upon the advance made in the design of machines, from the converted D.H.9 of 1919, carrying pilot and 600-lb. load with 400 h.p., to the machines now in use, carrying eight or nine passengers with 400 h.p.

Referring to the utility of air transport, he stated that there are two distinct usages of air transport: first, it provides a military reserve, and secondly, it is a means of quickening communications. "There have been rash statements," he said, "about the military value of air transport. To judge from some of the statements made during the last year, you would think that if the Government gave me unlimited means I should next year produce a huge reserve for the Royal Air Force. That is wrong.

"From a military point of view there are three classes of British air transport to be considered. First are the air lines running within the British Isles, and these do not exist at present. The second is the cross-Channel and lines operating on the Continent of Europe; that we are just starting in the three services I have already mentioned. The third class is a form of imperial lines connecting up the Empire, which is most important.

"The first category is much the best from a military point of view. All your engines, spares, pilots and all that is necessary for an air service, if they are running within the British Isles, are available at five minutes' notice and ready from a military point of view. Against that they are the most difficult to run from an economic point of view; for this country is small, has a bad climate for flying and is well supplied with railways."

* Abstract from a lecture delivered by Maj.-Gen. Sir William Brancker, K.C.B., Director of Civil Aviation, before the Over-Seas League, October 2, 1922, Admiral Mark Kerr taking the Chair.

The second category, he said, was also good from a military point of view, as in an emergency we could get the pilots and machines back from any part of Europe in 24 hours' notice. Imperial communications would not help us at all, as the material is not immediately available, but they provide reserves wherever they are.

Gen. Brancker pointed out that ground organisation was the most important factor, requiring a lot of money to provide, but once this is done the aeroplane will achieve much. When we get the big lines across Europe and the world, then by degrees we will build up a national reserve. Air transport, before it can forge ahead, however, must pay its own way, which today it cannot, and so long as it has to be assisted it cannot extend as it ought to.

The various items which air transport will provide—pilots and mechanics, aerodromes with ground staff, design offices and factories—will be available in time of war, in addition to the machines, as night bombers or troop carriers.

"Next year," he proceeded, "we shall start a certain number of civilian flying schools for the training of reserve officers. The Royal Air Force will pay for these, and I hope we shall keep five or six schools going. They, in turn, will be able to train others at comparatively reasonable rates. This will give us a body of pilots growing up, which is something we have not got today."

Referring to the quickening of communications, he pointed out that on the London-Paris service we are only saving a few hours, but it is in long distances that a great saving of time will be effected.

Referring to linking up England and India by air, he said he did not think anyone has realised the importance of a daily post to India occupying five or six days, which is possible with 30 aeroplanes, a certain number of aerodromes *en route*, and financial assistance at the start. We have a certain number of these long-distance routes at present—Cairo-Baghdad, Toulouse-Casablanca (saving many days), and Königsberg-Moscow (in two days and one night against the present 7 to 14 days).

Airships, he stated, we must always consider in our transport. They are more expensive to build, fly more slowly, and are susceptible to bad weather, but they have the advantage that they can fly by night. Airships will probably take mails to India in 72 hours, against six days by aeroplane. When aeroplanes fly by night we will get an increased speed. The aeroplane and the airship, however, are not rivals. The aeroplane is a close range machine of, say, 500 miles, but an airship will do two or three thousand miles. Therefore, in the future, through—mails to India and Australia, and from India to Egypt, may go by airship, and to all the other places around the mails will be carried by aeroplanes, and airships and aeroplanes will thus work together.

"Safety is abolutely necessary, and can be obtained. Until the public really believe in the safety of aviation, you won't get a sufficient body of traffic to make it an economical means of transport. Air transport, however, is safe today if properly looked after. You have to be careful with your pilots, look after the maintenance of the aeroplane, have well organised routes, careful weather reporting with proper wireless equipment and good management. Given all these things, I firmly believe air transport is as safe as any other form of transport."

He next dealt with reliability—*i.e.*, running to time. One of the difficulties in the past has been casual management. Until we get air transport running to time the public won't believe in it. We are slowly bringing this about on the British Air Services.

During August we had 95 per cent. of efficiency—that is, we got through within four hours between London and Paris and London and Brussels, 371 flights, all but ten being completed in the four hours. Of involuntary stoppages during July and August about one-third were due to bad weather, which can be got over by increased safety and improved wireless reporting. Seventeen were due to shortage of petrol, which is also a matter that can be overcome. About one-tenth were due to faults in the oil system, another difficulty which is not insurmountable; and about one-quarter were due to engine trouble—little things which meant coming down and putting them right. In all these there was only one case where an aeroplane was forced to come down, only one which gave any danger, and in that one no one was hurt.

On the question of design, Gen. Brancker said we are getting aircraft more and more stable, and soon we shall have machines which will look after themselves, leaving the pilot free to look after his engine and steer. As regards comfort, he maintained that air transport is more comfortable and convenient than any other kind. Air-sickness he did not think was so unpleasant as sea-sickness, and it is more scarce. Experiments are being made to improve the cabins and introduce silencers, which will get rid of the noise of the engines.

Safety, reliability and comfort all have to be obtained before the public will travel by air as they now travel by train, but unfortunately all three factors militate against economy. That is why we must get the Government to help. Once these three factors are established, people will take up air transport with a rush, and, with a large number of people travelling, prices can be dropped—and then the subsidy can be dropped.

The maintenance of the machine, he pointed out, was one of the great costs of aircraft. The engine wears out quicker than the aeroplane, and that is one of the economical lines in which we have to make progress—to improve our engines. He thought the next few years would see considerable progress made in this respect.

A great factor to assist the using of the short routes to Paris, Brussels and Cologne, etc., will be when we take to night flying, when we shall beat the trains and at once get bigger traffic by air. Night flying is not so difficult as is made out.

The general policy is to extend these cross-Channel routes without spending more money: Paris to Lyons, etc., Berlin to Russia, and eventually to Constantinople, but only when the traffic justifies it. A few months ago an Advisory Board on Civil Aviation was created, and they have started to investigate the possibilities of these Imperial routes, and have submitted a report on the London to India route, and have prepared a route from India to Australia. They have provided for the spending of £100,000 on the Indian route and a certain amount of money on research work to develop machines for hot, damp climate—probably metal machines.

From Baghdad to India it is perfectly plain, and from Baghdad we have three alternative routes. One *via* Constantinople, which we cannot use at present; another *via* Angora, which is difficult; and the third to Alexandretta, which is probably the one that eventually will come, and he hoped to see a British line to Alexandria and to India, and an international line along the south of Asia Minor, across the Islands to Brindisi and thence to London. We could start on that tomorrow, except for financial considerations, and those cannot be overcome without the public, and the public won't use it until it is reliable; and so it is a rather vicious circle.

The International Convention of air navigation had its first meeting last July. France, Belgium, Japan, ourselves, Greece, Persia, China and some other small nations are represented.

We have also to get Germany and the other enemy states in as well; for at present Germany, Austria-Hungary and Bulgaria stretch across Europe and prevent us getting to the East, and unless we have an agreement allowing us to pass, then, according to International law, it is possible for these old enemy countries to prevent us flying over their country to the East. The next meeting is to be in October, and afterwards we will meet in the various capitals of the countries concerned. "It is extraordinary to know," he continued, "that today there is more mutual trust and co-operation between the various nations on that Convention than any I have ever heard of elsewhere, and I think aviation is going to be a great factor in helping to keep the peace. I am not sure that this International Convention will not be one of the biggest weapons of the League of Nations to keep things going properly."

One of the steps towards economy is the metal propeller, which is just beginning to replace the wooden one. From this, no doubt, we shall go on to complete metal construction. Designers are beginning to discover that they are getting not only better wearing machines with metal, but that by its use they save in weight. They are 20 per cent. lighter on some of these metal machines, which saving in weight can be added to the carrying load. We have also to get the variable-pitch propeller and the variable camber. When that is accomplished we will get off the ground and land with a bigger load and less horse-power.

Also in two or three years we shall be using engines that take heavy oil instead of petrol. Heavy oil costs about one-fifth the price of petrol, which will mean a great saving.

There are two dangers to be faced in the future—one the difficulty of flying over mountains, and the other the danger of collision on crowded routes.

Concluding, he said: "Air transport will pay in time. Even if it did not pay it is a necessity. If tomorrow you occupied new territory and wished to lay down a railway, or put in a cable or telegraph line, and some one proved to you that the railway would not pay for ten years, it would not stop you from doing the work. You will find the same applies to aviation, particularly in regard to the British

Empire. We shall find we must have air transport between ourselves and the British Dominions. Whether it pays or not, we must have it. In the future, the British Empire cannot remain as it is unless you quicken up communications by means of air transport."

The influence of aviation on war is remarkable. We have to realise that we have relied on our 27 miles of water all our lives. We have been able, owing to this, to avoid keeping up great armaments. Because of it we have never been invaded, and it saved us again in this last war. We have now come to the point when it protects us no longer. The Channel is practically eliminated from a war point of view. Twenty years hence and we will be in the same position as other Continental countries are today. . . .

"There is another unfortunate point about aviation as regards war. Strategists have told us that the offensive has power over the defensive on the ground. That is obvious, for if you are going to defend over one hundred miles of front, you have to cover it all. But the attacker can concentrate on a portion of the line only, say ten miles, and with the full weight of his troops break through. The defence is always beaten for that reason. In the air you have another unfortunate factor—not only have you width but you have height also. If the advantage of the offensive over the defensive is in a ratio of two to one, then to bring in the air you have a third dimension, which will probably put up the ratio to six to one. That is another ugly fact of war. Only by being able to take the offensive can we be safe, and we can only do that if we are strong in the air; and this again can only be so if we build up a great air transport industry. The R.A.F. must become the most important service. No nation will be able to afford a standing air force sufficient to meet all demands, so our air transport must provide the necessary reserve.

LONDON TERMINAL AERODROME

Monday Evening, October 2, 1922.

Today saw the inauguration of the new air service to Cologne by the Instone Air Line, although the venerable Vickers-Vimy, "City of London," actually left here for Cologne yesterday in order to be in Cologne to start the service from that end. Owing to thick fog at Brussels, however, she was unable to get through to Cologne the same day. This was extremely bad luck, as the machine carried a party of journalists who were "writing up" the trip. Today's London-Cologne machine, delayed by bad visibility, did not start till 1.44 p.m., and did not manage to get beyond Brussels, which was reached at 4.3 p.m.

Handley Page had full loads in both directions between London and Paris yesterday, but, owing to the bad weather, neither machine was run. The W.8 due out of Paris for London started, but had to return, and the machine from London was cancelled. Two of the passengers, however, were intent on getting to Paris that day, and engaged one of the Surrey Flying Service's "air-taxis" to fly them to Lympne to catch the cross-Channel boat at Folkestone.

Today Handley Page Transport have 15 passengers for Paris, and some of these were transferred to one of the French lines, as, under the new subsidy scheme, it does not pay to run an extra machine for a couple of passengers at £6 6s.

The Daimler Airway are continuing to run the early-morning newspaper machine to Paris for at least another fortnight, and, by arrangement with Handley Page, this machine is used by the Handley Page Transport as a "spare" for the journey from Paris to London. This arrangement should be mutually advantageous, as there are now more passengers from Paris than from London, and, with the Daimler booking office in Paris still in existence, there should be little difficulty in obtaining good loads for this machine.

The London-Berlin "Airway"

The service which the Daimler Airway have undertaken between London and Berlin is to be opened in stages. The first stage is to open on Monday next, when a Daimler machine will leave London for Rotterdam at 9 a.m. By arrangement with the K.L.M. the time of the latter company's machine will be altered to 11.30 a.m., while the machine from Amsterdam will leave in the morning instead of in the afternoon as at present—the Daimler machine returning in the afternoon. As the fare has been cut to £4, it is hoped that there will be an increasing number of passengers using this line. The next stage of the London-Berlin route, from Rotterdam to Hamburg, will, it is expected, be opened about the end of the month.

The only machine to cross the Channel on Sunday, when the weather conditions were bad, was a "Goliath" on the C.M.A. Air Lines, which left Croydon in the afternoon and landed at Berck. As the passengers were all *en route* for Le Touquet, this was quite a satisfactory performance.

Increase in "Live Stock" Traffic by Air

The C.M.A. Air Lines carried a consignment of live frogs from Paris to London during the week. The frogs had come by air from Budapest, and were consigned to Manchester, where they were to be used for experimental purposes, having been inoculated before they left Budapest. This line also carried 50 crates of chickens from London to Paris during the week. In fact, the traffic in "live stock" is increasing steadily on all lines.

The Instone Air Line have been having another run of bad luck recently. On Thursday last Mr. Barnard was bringing the "Vimy" back from Paris to London, loaded with spares, when he was forced to alight in a field a short distance from Le Bourget. It appears that the machine had been too heavily loaded, and, after some of the load had been removed, it was flown back to Le Bourget and started for London again the following day. It was, however, forced to descend again at Lympne, and did not reach Croydon until Saturday, when it was got ready for the initial flight to Cologne on Sunday.

Earlier in the week Mr. Bradley was flying a D.H.34 from Paris to London, with a spare Rolls engine in the cabin, and was forced to land at Berck. When attempting to leave again, he hit a telegraph pole, and, although he himself escaped with a few scratches, there was little left of the machine.

An improved type of Vickers "Viking" arrived at the aerodrome from Brooklands during the week, piloted by Capt. Broome. This machine was *en route* for Madrid to the order of the Spanish Government, and is, I understand, the first of a batch of similar machines for that country. Incidentally, I hear that the machines of this type sold to the Dutch for service in the Dutch East Indies have proved so useful that another order for the improved type has been received.

News that a big Vickers troop-transport has been flying at Farnborough is interesting because a sister machine is the Vickers 24-seater "air express," with two Napier engines. This big commercial-type Vickers machine is expected at the air-station shortly. On test, the troop-transport machine is said to have lifted a dead weight in ballast of 53,000 lbs., but I hear that she is somewhat on the slow side.

A number of air-racing enthusiasts travelled to Paris by air on Friday and Saturday to see the race for the Deutsch Cup, and were to have returned by air on Sunday had the weather been kind. One of the Daimler machines, flying from London to Paris, carried an invalid who was unable to move, a lounge being constructed for her in the cabin. The motor-car in which she arrived at the air-station was run out to the machine and the patient lifted in. I understand that the Daimler Company had placed one of their cars at her disposal in Paris in order to take her from Le Bourget to Nancy, where she is to undergo some cure.

Night-Flying between London and Paris

Maj.-Gen. Sir W. S. Brancker has arranged for an experimental night air service to be run for a month between London and Paris. It is intended to start this service—probably, it is said, with an R.A.F. machine—when the hours of darkness make it possible for the aeroplane to leave Croydon at about 5 p.m., and arrive in Paris in time for dinner. The return trip will be made the following night, so that there will be alternative trips from and to London. The object of this experimental service is to ascertain the reliability of night-flying, and also to enable the insurance companies to get some idea of the risks involved, it being hoped that better rates will be quoted for night-flying machines after the experiment than is now the case.

The fine weather on Friday started a little boom in joy rides, and the Surrey Flying Services were almost as busy that day as they are on a fine Saturday. This company are pushing ahead with their programme of new Avros and D.H.9's for the extension of their activities in the spring.

Maj. Wronsky, the representative of the German Air Transport company, and Mr. Plessman, of the K.L.M., who have been in London making arrangements for the running of the London-Berlin airway, in conjunction with the Daimler Company, flew to Amsterdam on the K.L.M. morning machine on Friday, having completed the preliminary arrangements for the service. It is now expected that there will be no great obstacles in the way of the running of British "air expresses" through Germany.

ROYAL AIR FORCE

London Gazette, September 29, 1922

General Duties Branch

Group Capt. (actg. Air Commodore) A. E. Borton, C.B., C.M.G., D.S.O., A.F.C., to be Air Commodore; Oct. 1. Observer Offr. J. E. MacLennan (Lieut., Cameronians) is granted permanent commn., retaining present substantive rank and seny.; Nov. 17, 1921 (since re-classified).

The follg. Cadets, having passed through R.A.F. (Cadet) Coll., are granted perm. commns. as Pilot Offrs, with effect from, and with seny. of, Aug. 16:—L. K. Barnes, D. MacFadyen N. Vintcent, W. L. Dawson, J. E. S. Caithness, V. B. Bennett, C. H. A. Stevens, C. B. R. Pelly, S. G. Connolly, G. H. Huxham, D. L. G. Bett, M. C. Hayter, E. B. Coventry, C. B. B. Maturin, C. S. Riccard, E. A. Healy, E. A. Hodgson, C. H. Ratcliffe, E. B. Forster, A. King-Lewis, J. S. Charlton, A. G. S. Johnson, R. R. S. Waller.

Flight Lieut. H. E. P. Wigglesworth, D.S.C., is granted perm. commn., retaining his present substantive rank and seny.; Oct. 24, 1919. (*Gazette*, Oct. 24, 1919, appointing him to short service commn., is cancelled.) F. R. Offord is granted a short service commn. as Flying Offr., with effect from, and seny. of, Sept. 6. The follg. are granted short service commns. as Pilot Offrs. on probation, with effect from, and with seny. of, Sept. 9:—E. C. Roark, W. H. Ryder. The follg. Pilot Offrs. on probation are confirmed in rank:—C. F. H. Grace, E. Marler, R. L. Palmer, J. S. Phillips, H. J. Wykes; June 29. L. A. L. Firmin; July 2.

Wing Cdr. D. L. Allen, A.F.C., is placed on half-pay, Scale A, from Sept. 18 to 19 inclusive. (Substituted for *Gazette* Sept. 22.) Flight Lieut. W. J. de Salis, D.S.C., is placed on half-pay, Scale B; Sept. 28. Flying Offr. W. Catchpole, A.F.C., is placed on half-pay, Scale B, from Nov. 15, 1921, to Dec. 2, 1921, inclusive. (Substituted for *Gazette*, Dec. 20, 1921.)

The follg. Flying Offrs. are transfd. to the Reserve, with effect from the dates indicated:—Class A: J. B. Stockbridge; Sept. 16. E. Jackson; Sept. 30. Class B; G. L. G. Watson, M.M.; Sept. 19.

Observer Offr. L. Ritson is placed on retired list on account of ill-health contracted on active service, and is granted rank of Capt.; Sept. 27.

Medical Branch

The follg. are granted short service commns., n the ranks stated, with effect from, and with seny. of, Sept. 11:—

Flight Lieut.—T. McClurkin, M.B.

Flying Offr.—E. D. Gray, M.A., M.B.

G. S. Ware, M.B., is granted a temp. commn. as a Flight Lieut., with effect from, and seny. of, Sept. 11.

Temp. Lieut. A. Rhodes, L.D.S., Gen. List, is granted temp. commn. as Flying Offr. while attached to R.A.F. from Army for Dental duties; Sept. 14. He will continue to receive emoluments from Army funds.

Nursing Service

Sister M. Welch to be Matron; Sept. 13.

Sister K. C. Watt to be actg. Matron: Sept. 13.

* * * *

August Continental Air Traffic

From the Air Ministry we learn that traffic on the Continental airways reached a record figure during the month of August. Not only did the numbers of machines flying to and from Croydon surpass any previous monthly figure, but the numbers of passengers travelling by air and the weight of goods transported also exceeded the highest totals hitherto recorded.

As compared with July, when the passengers on all routes were, 1,591, the August travellers increased by more than 1,000, the exact number using air services being 2,682, of which 82 per cent. were carried by the British companies, while the French and Dutch companies received about 18 per cent. A year ago the British companies' proportion was just over 45 per cent., so that there is not merely an increase in numbers, but also clear indications of the preference of air travellers for British-operated services. The number carried by British lines was 2,203. The weight of air-borne goods also rose to 77·8 tons, an increase of several tons on the July figures, which were a record. A special feature of this traffic was that there was a daily average of slightly more than 1 ton of newspapers from London to the Continent during the month. Nearly the whole of the outgoing newspapers were carried by British aircraft. Incoming newspaper traffic was small in proportion, but the total newspaper traffic, weighing 37·4 tons, formed the largest class of goods transported by air. Other goods traffic amounted to 40·4 tons, of which British and French machines each took 17 tons. Dutch aircraft carried in all 6·4 tons.

The number of machines flying on the Paris, Brussels and Rotterdam services increased to 912 from 711 in July, a figure which was itself a record. The daily average of machines was therefore over 30. British companies operated 598 of the total, while French firms' machines numbered 210 and the Dutch company accounted for the remainder of 104. The number of departures from the London Terminal Aerodrome, Croydon, was 457, and the arrivals 455.

The efficiency of British-operated machines was again very high, over 95 per cent. of the flights by British aeroplanes on the London-Paris route being completed within the stipulated period of four hours, while practically 90 per cent. of the flights were made in less than three hours. The percentage of useful passenger accommodation and general cargo space utilised during the month on British aircraft was 48 per cent., which is a slight increase on the proportion during July.

The approximate distance flown by aircraft during the period was 185,000 miles, of which 115,000 miles were covered by British machines.

There were no casualties or injuries to passengers or crews during the month.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

(London Aero-Models Association.)

On Friday, October 6, an Extraordinary General Meeting will be held at Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, at 7.30 p.m.

On Saturday last, September 30, the Competition for Mr. Felix Kelly's Cup was held on Wimbledon Common, and Mr. D. A. Pavely won same with a splendid flight of 70 secs. Mr. Rippon was second.

Mr. Pavely. Type O-P′-1-1. First flight, 59 secs.; second flight, 70 secs.; third flight, 68$\frac{3}{5}$ secs.

Mr. Rippon. Type O-1-P′-1. First flight, 18$\frac{2}{5}$ secs.; second flight, 29 secs.; third flight, 32$\frac{2}{5}$ secs.

On Sunday, October 22, a Special Flying Demonstration will be given by the members at Bunkers Hill (Hamsptead Heath Extension), at 11 a.m., and it is hoped members will make a special effort to be present with their models.

On October 29, competition for Mr. Pilcher's Challenge Cup. Full particulars in Flight, September 28.

At the meeting held on Friday last at Headquarters an interesting discussion took place on Model Gliding, Dr. Hankin being present. He emphasised the great need of practising gliding in descending currents, thus obtaining true soaring. The machines should have the centre of gravity behind the centre of pressure. He also very kindly offered prizes of £1, 15s., and 10s. for a Glider Competition, to be contested under the following conditions:—

1. Glides to be made up-wind, the winning glide to be at least 200 yards in length.
2. The models must pass between or over two posts placed 30 yards apart and 200 yards from starting point.
3. The ground chosen to be either level or slightly uphill.
4. To ensure good comparative results all models to have 1½ sq. ft. of horizontal surface (planes and tail).
5. To be held Nov. 26, on Wimbledon Common at 12 noon.
6. All models must be hand launched.

Mr. Levy very kindly offered a Consolation Prize of 5s. in the event of Dr. Hankin's prize not being won.

A. E. Jones, Hon. Sec., 48, Narcissus Road, West Hampstead, N.W. 6.

* * * *

SIDE-WIND

The Rolls-Royce car has long been considered a kind of super-vehicle and a model for comparison; indeed the term "Rolls-Royce" has almost become a synonym of super-excellence in any department of luxury manufacture. The fact that the Rolls-Royce Company have decided to produce a smaller model has come as a piece of particularly interesting news, and the *élite* of motordom will be all agog to see the new and lower-powered vehicle. It is, of course, a "six," and follows the general lines of conventional design, but incorporates the wonderful workmanship and pleasing outline, together with beautiful balance and smooth running and acceleration, which have made the Rolls-Royce the criterion of car luxury. The new car has cylinders 3-in. bore by 4½-in. stroke, and shows an R.A.C. rating of 21·6 h.p. The output will be limited in quantity. The chassis price has been fixed at £1,100, and the open touring car will cost £1,590. There will also be a landaulet at £1,745, a limousine at the same price, a cabriolet (owner drive) at £1,880 and a chauffeur-driven cabriolet at £1,900. The equipment includes lamps, speedometer, clock, spare tyre, wind horn and mascot. They will be seen at the show-rooms of Rolls-Royce, Ltd., at 14-15, Conduit Street, London, W. 1.

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(Continued from p. xvi.)

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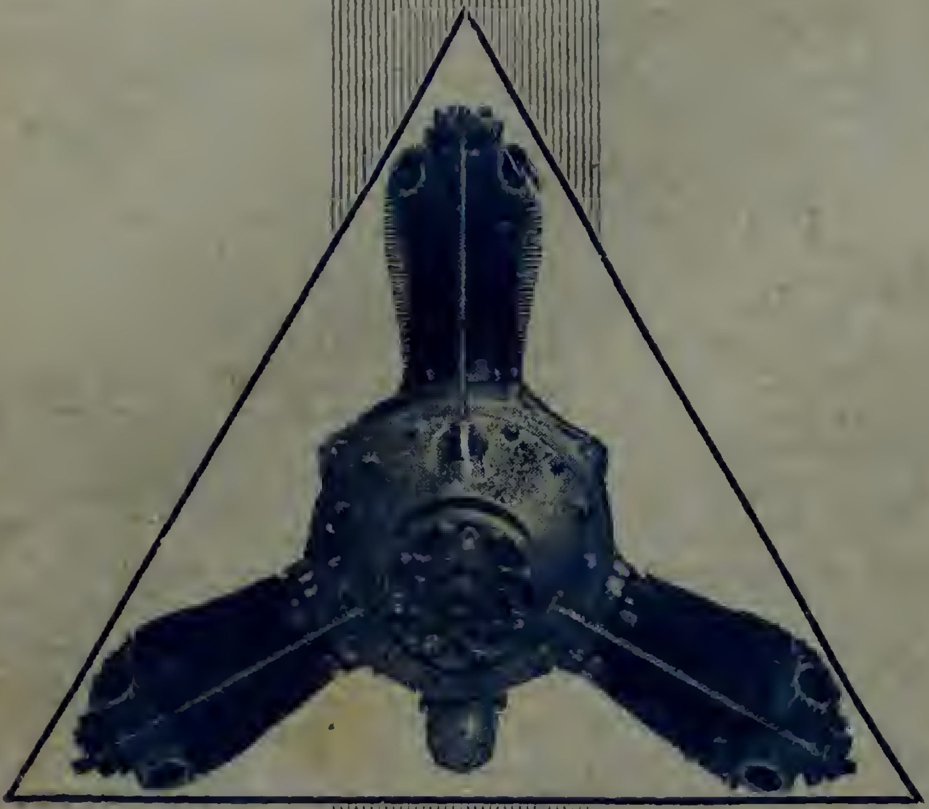

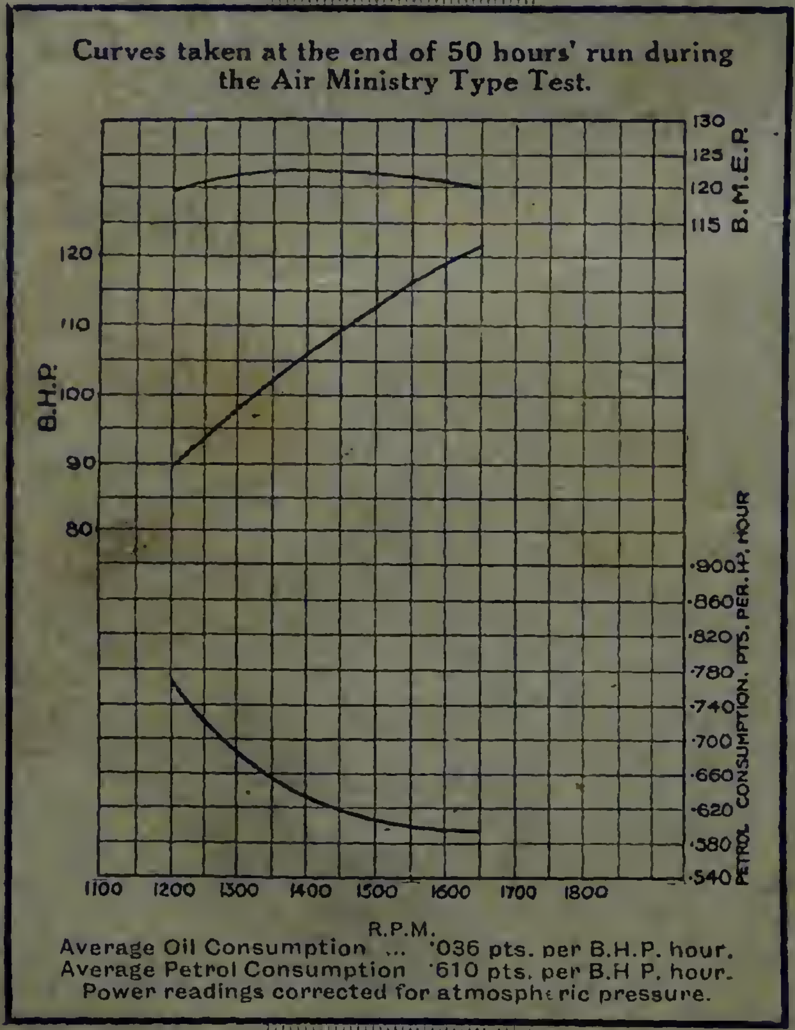

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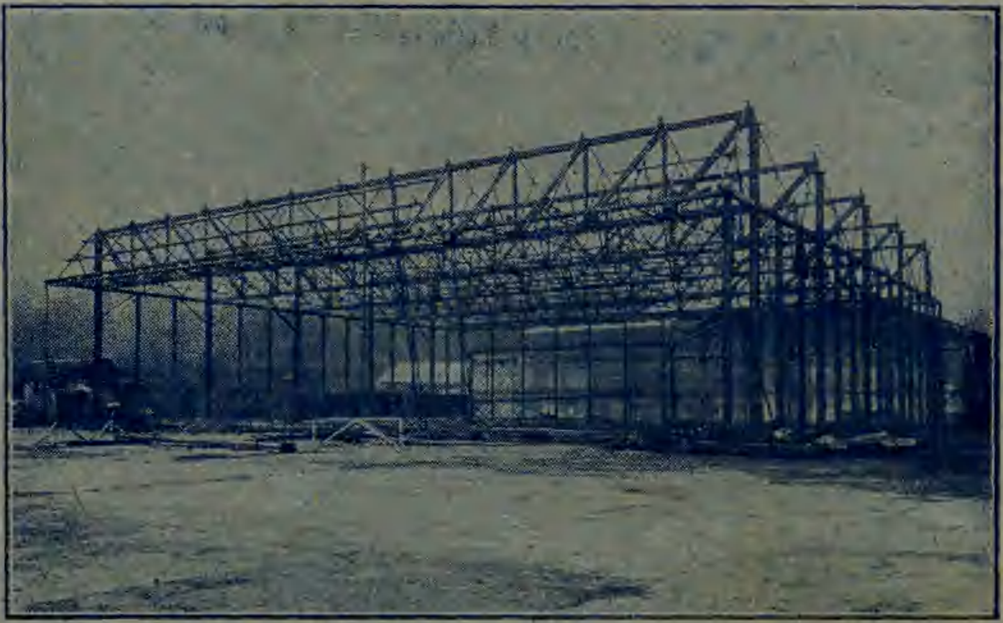

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Oct. 16–21	Daily Mail £1,000 Gliding Competition
Oct. 26	Royal Aero Club Dinner at Savoy Hotel, celebrating the Schneider Cup victory and first King's Cup Race
Nov. 30	Closing date for FLIGHT Glider Designing Competition
Dec. 15–Jan. 2	Paris Aero Exhibition
1923.	
June	International Air Congress, London
Dec. 1	Entries close for French Aero Engine Competition
1924.	
Mar. 1	French Aero Engine Competition
Mar. 15	Entries close for Dutch Height Indicator Competition

EDITORIAL COMMENT

Internal Air Services

ANOTHER step in the right direction will have been made when, towards the end of this month, the new air service between London and Manchester is opened by the Daimler Airway. The arrangements in connection with the new service, it is stated, were completed on October 5 by Maj.-Gen. Sir Sefton Brancker, Director of Civil Aviation, and, as already mentioned, it is hoped to start activities in a couple of weeks' time. While England has generally been looked upon as rather unfavourably situated, both in regard to climatic conditions and in being already extremely well provided for in the matter of fast and frequent train services, there are those who hold that with proper ground organisation there should be no great difficulty in running an air service with good regularity between London and towns in the north.

The new line to Manchester starts at the very worst time of the year from a meteorological point of view, and thus if the service prove a success all the more credit will be due to those whose foresight and courage in opening the route have made its inauguration an accomplished fact. We understand that it is the intention to use on the new route machines of the D.H.34 type, with 450 h.p. Napier engines, and which carry 10 passengers. These machines are very fast, and as speed will certainly be an important factor over a route already so well served as is the London–Manchester, the choice is probably a wise one.

In our view the chief merit of the new route lies in the fact that it links up parts of the country other than London with the Continent by air. It is probable that the business man in Manchester who wishes to do business in London will still continue, for some time at any rate, to travel by train, and will send his mails and goods by train. The saving in time, when counting—in the time occupied in getting to and from the aerodromes, is not such as to offer any great inducement to use the air; but if a man in Manchester is doing business with Paris, Brussels, Rotterdam, Amsterdam, Cologne, etc., and is able to reduce the time taken to reach any of these cities by two-thirds or so, then, provided the charges made are not greatly in excess of those made by the railways, he will certainly see the advantage of patronising the air services.

With the new line established—and assuming that as good regularity can be maintained on the London–Manchester section as on the London–Paris—it will be possible for a Manchester business man to leave his office about a quarter-past seven in the morning, be at the aerodrome in time to catch the morning machine from Manchester, which is to leave at eight, arrive in London in time to catch the machine for Paris, Brussels and Cologne, or Rotterdam and Amsterdam, and be in either of these cities that afternoon. In the opposite direction the machine will leave Croydon in the afternoon, after the machines from the Continent have arrived, and similar advantages will be gained.

For goods and mails perhaps even greater benefit will be found to attend the use of the air services, especially for the more distant places, and thus the establishment of the new line will not only be of benefit to Manchester, but also to the existing lines, by including, as it were, that city in their programme. When and if the extension to Hamburg and Berlin comes into operation the benefits will be still greater, and by then we may hope to see other inland British services come into being. In the meantime, the London–Manchester is a line which will provide a good deal of practical experience of inland flying, and should thus be looked upon as a valuable full-scale experiment from the aviation side, while offering great advantages if conditions prove suitable for its continuance or even extension.

◆ ◆ ◆

The Shoe Beginning to Pinch

As we have constantly maintained would be the case, and stated repeatedly in these columns during the last couple of years or so, the restrictions placed upon German aviation by the Inter-Allied Commission, and more recently by the Committee of Guarantees, have not had the effect for which they were designed. When Germany found herself unable to design and construct aircraft, except certain "restricted" types, she began to look around among the countries surrounding her for ways and means of getting around the restrictions. In Russia, and in other countries, Germany found no difficulty in making tentative arrangements for the establishment of aircraft factories, nominally to be of the nationality of the country in which the works were to be established, but in reality to be backed by German capital, run by German heads and to construct types designed by German designers. Feelers were sent out to several countries, and in one or two instances we believe that actually new firms have been established in neighbouring countries.

A few months ago the German Government issued the announcement that in the future, when their present restrictions have elapsed, no aircraft which did not conform to the same restrictions as those imposed upon German machines would be allowed to fly across or land in Germany. This was a very clever move, as it placed other countries on the same footing as Germany with regard to flying. Incidentally it results in handicapping the Allies, notably England and France, as much as Germany was handicapped, and now that both France and England wish to run services into or across Germany, the shoe is beginning to pinch, and pinch badly. Apparently France, seeing how the restrictions have failed and finding herself unable to extend her services east across Germany, has decided to propose, at the forthcoming meeting of the International Commission for Air Navigation, the suspension of Article 5 of the Convention, so that nations may be at liberty to negotiate separately with Germany on the matter of establishing airways. Opposition to this proposal is not likely to be put forward by Britain, and it is therefore to be hoped that an arrangement may be arrived at which will place Germany on a more reasonable footing with other countries as regards air navigation. As we have already pointed out on several occasions, the present restrictions have merely proved to be a very bad case of cutting off one's nose to spite one's face.

◆ ◆ ◆

London–Constantinople

The possibilities of the "air-taxi" are rapidly becoming recognised. The de Havilland Hire Service has been doing a great deal of work during the last year or so, and what is really the salient feature is that these services are paying—without a subsidy. Flights are undertaken at a moment's notice to anywhere, and as a particularly illuminating example—whatever the final result—may be mentioned that of hiring an "air-taxi" from London to Constantinople by the Government for an official who had to be in Constantinople in the shortest possible time. The machine, the D.H.37, Rolls-Royce engine, belonging to Mr. A. S. Butler, was piloted by Mr. Cobham, who has already done a very great deal of taxi work both in Europe and Northern Africa. With a speed of round about 130 m.p.h., and the question of cost being of secondary importance, the aeroplane has no rival over such long distances, and was chosen just as a matter of course.

◆ ◆ ◆

The Gliding Competition

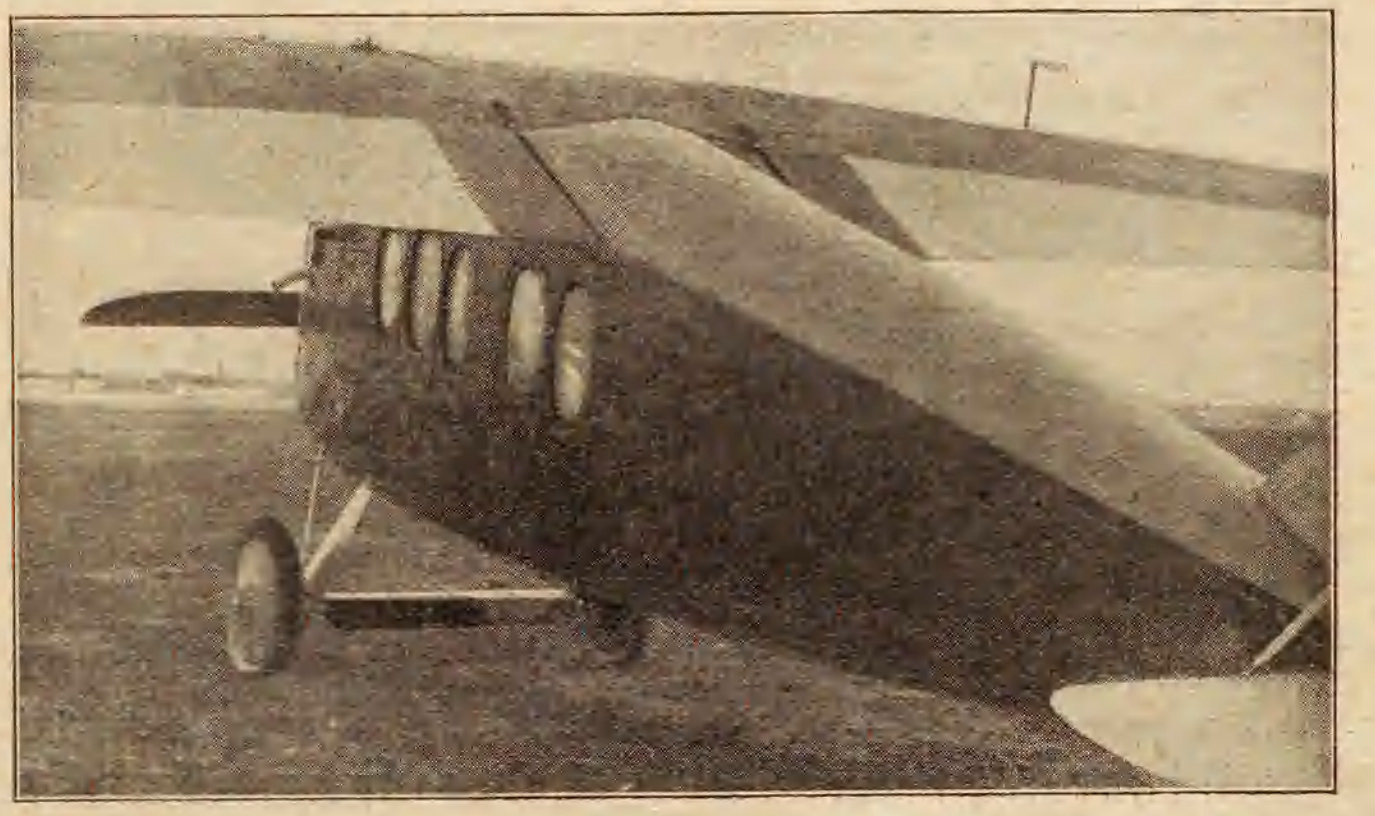
On Monday of next week, October 16, the gliding competition for the *Daily Mail* Prize of £1,000 will commence at Itford Hill, Sussex. We regard the event as one of considerable importance, inasmuch as the sport of gliding has caught, to a surprising extent, the public imagination, and literally everybody is at present talking gliding. From interest in gliding to interest in aviation in general is but a short step, and therefore the fostering of the sport of gliding and soaring will necessarily result in—quite apart from the establishment of a very fine sport—a general and widespread interest in flying generally.

Concerning the competition itself we publish particulars elsewhere, and we shall not, therefore, go into details here, except to point out that it might have been advisable to have devoted one of the £50 subsidiary prizes to some performance other than duration. For instance, one prize might, we think, have been profitably offered for distance covered. The main competition is already devoted to duration by demanding that the machine return to within a circle of 800 yards of the starting-point, and we think that variety might have been lent to the proceedings by devoting one of the minor prizes to some other object. However, that is but a small matter, and we congratulate the *Daily Mail* and the Royal Aero Club on having, in such a short time, secured such a considerable and representative number of entries for the competition. If the competition is repeated next year there will be time enough to devise different rules, and to subdivide the prizes as is done in Germany.

THE ALBATROS COMMERCIAL MONOPLANE, TYPE L.57

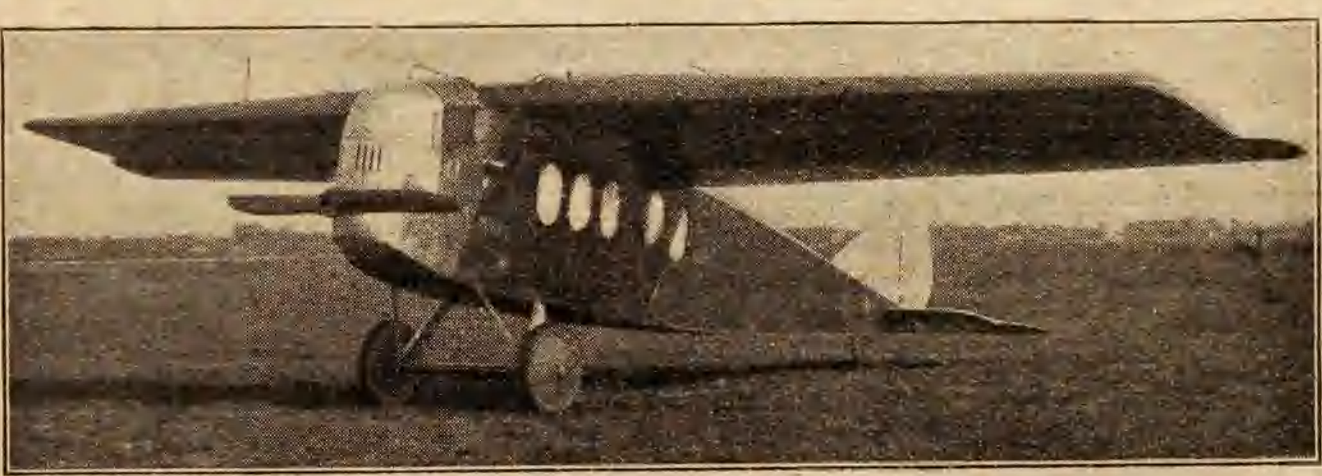
275 H.P. Rolls-Royce "Falcon" Engine

In our issue of December 9, 1920, we published scale drawings and a brief description of a new monoplane which had then just been designed by the engineers of the German Albatros Company of Berlin. The machine was a cantilever monoplane, known as the L.57, designed to carry six passengers. At the time it was intended to market the new machine with three different power plants—160 h.p. Mercédès, 185 h.p. B.M.W., or 200 h.p. Benz. Owing to the restrictions placed by the Allies on German aircraft construction, the machine was not built for some considerable time, and it was not, in fact, until quite recently—towards the end of September of this year—that the first machine was finished. We have been fortunate enough to secure what we believe to be the first photographs to be published of this new German commercial aeroplane, which, with the accompanying description, should be of interest to British readers.



THE ALBATROS L.57 : Note how fuselage deck fairing is carried into the curve of the wing.

An examination of the accompanying photographs shows that various minor alterations have been made to the Albatros since the general arrangement drawings were first published in FLIGHT in 1920. In the main, however, the L.57 remains as originally designed, with the important exception that a Rolls-Royce "Falcon" engine has been fitted in place of one of the three German types originally contemplated.



THE ALBATROS, TYPE L.57 MONOPLANE, ROLLS-ROYCE "FALCON" ENGINE : Three-quarter front view.

As regards the changes in the machine itself, these are mainly : Fin and rudder of different shape, and the centre of thrust raised considerably, sweeping the lower *longerons* upwards more, and a smaller downward curve of the top of the engine cowling. As originally designed, the lower rails of the *fuselage* were nearly straight, the upper rails sweeping down at both ends and giving the machine a "hunch-backed" appearance. As actually built, the *fuselage* is more nearly symmetrical in side view, and the centre of thrust considerably higher.

Constructionally, the Albatros L.57 follows more or less on the lines of pre-War machines made by this firm. That is to say, the *fuselage* is covered with three-ply, as were those of the earlier machines, one of which was demonstrated in this country by Herr Thelen, the famous Albatros pilot, shortly before the outbreak of war. In the new machine, however, this form of covering has been extended to include the monoplane wing, the greater portion of which is covered with three-ply. Only the portion from the rear spar to the trailing edge is covered with fabric. The wing is attached to the top rails of the *fuselage* by six large bolts, and can therefore be quickly dismantled for transport.

A cabin with seating accommodation for six passengers is provided immediately underneath the wing, and two doors in each side give access to the passenger compartment. Above the cabin, in the central portion of the wing (which at this point is about 2 ft. deep), is a luggage compartment, while a short distance out from the *fuselage*, also inside the wing, are the petrol tanks from which the fuel is supplied to the engine by gravity feed.

The pilot's cockpit is placed high in the *fuselage*, immediately in front of the leading edge of the wing, and partly above the engine. The pilot's seat is on the port side, while on the starboard is a seat for a spare pilot, navigator or engineer.

The main characteristics of the Albatros L.57 are as follows : Length o.a., 34 ft. Span, 46 ft. 6 ins. Area, 375 sq. ft. Weight, empty, 2,600 lbs. Useful load, 1,940 lbs. Total, loaded weight, 4,540 lbs. Wing loading, 12.1 lbs./sq. ft. Power loading, 16.5 lbs./h.p. Duration, 3½–4 hrs. Climb to 6,500 ft. in 25 mins. Speed, 96 m.p.h.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

GLIDING COMPETITION.

THE Gliding Competition which is being organised by the Royal Aero Club, for the prize of £1,000 offered by the Proprietors of the *Daily Mail*, will take place at Itford Hill, near Lewes, from October 16-21, 1922.

Members wishing to witness the Competition may obtain permits on application to the Club.

Subsidiary Prizes

£50 (presented by Lieut.-Col. Alec Ogilvie, C.B.E.) to be awarded to the British Competitor who remains the longest time in the air in one flight in accordance with the Regulations on the first day of the Competition, the flight to be of at least one minute's duration.

£50 (presented by the Royal Aero Club) to be awarded to the British Competitor in a British Glider who remains the longest time in the air in one flight, in accordance with the Regulations on any day from October 16-21, 1922, the flight to be of at least five minutes' duration. This prize is only open to British Competitors who do not win either of the prizes presented by the Proprietors of the *Daily Mail* and Col. Ogilvie.

List of Competitors.

Identification No.	Entrant.	Pilot.	Machine.
1	E. T. Prosser	E. T. Prosser	Bi.
2	Handasyde Aircraft Co. and F. P. Raynham.	F. P. Raynham	M.
3	G. W. Cain	G. W. Cain	M.
4	De Havilland Aircraft Co.	Capt. H. S. Broad	Br. M.
5	Charles Christopher	Charles Christopher	M. Orn.
6	H. E. Waite	H. E. Waite	M.
7	J. M. Hargreaves	J. M. Hargreaves	Bi.
8	British Helicopter Co.	F. J. W. Purton P. A. Purton	M. Hel.
9	J. J. O'Freddy	J. J. O'Freddy	S. Bi.
10	C. Frobisher	C. Frobisher	M.
11	A. P. Maxfield	A. P. Maxfield	Bi.
12	H. S. Dixon	H. S. Dixon	M. Orn.
13	George England (1922), Ltd.	E. C. Gordon England.	M.
14	A. H. Knott	A. H. Knott	M.
15	J. Jeyes	J. Jeyes	Klemperer M.
16	J. H. Robertson	J. H. Robertson	M.
17	Sq.-Lr. Maurice E. A. Wright, A.F.C., R.A.F. F. T. Courtney Capt. W. H. Sayers	Maurice E. A. Wright F. T. Courtney	M.
18	Capt. F. W. Merriam, A.F.C.	F. W. Merriam	M.
19	A. H. G. Fokker	A. H. G. Fokker W. G. R. Hinchliffe	2 Bi. 1 M.
20	Lt.-Col. C. O. Smeaton, C.B.	C.O. Smeaton	M.
21	W. L. Jennings	W. L. Jennings	Br. M.
22	L. Peyret	Maneyrolle	M.
23	S. H. G. Brown	S. H. G. Brown	M.
24	Inventions Development Co.	R. M. Balston	M.
25	H. R. Singh	H. R. Singh	M.
26	Dewoitine Co.	G. Barbot	M.
27	Capt. R. H. Stocken	R. H. Stocken	M.
28	A. Jackson	A. Jackson	M.
29	N. R. Gordon	N. R. Gordon	M. Orn.
30	P. W. Kingwell and Son	G. Collier	Bi.
31	Sq.-Lr. A. Gray, R.A.F. F./O. W. J. Buchanan, R.A.F.	A. Gray	M.
32	C. Winchester E. Brynildsen	C. Winchester E. Brynildsen	Bi.
33	E. D. C. Herne	E. D. C. Herne	M.
34	J. G. Lee	J. G. Lee	Bi.
35	T. P. Hetherington	T. P. Hetherington	M.

Bi. = Biplane. M. = Monoplane. Br. M. = Braced Monoplane. M. Orn. = Monoplane Ornithopter. Sail. B. = Sail Biplane. M. Hel. = Monoplane Helicopter.

Officials

Judge.—Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P.

Stewards.—Lieut.-Col. M. O. Darby; Lieut.-Col. Alec Ogilvie, C.B.E.; Maj. O. T. Gnosspelius.

Clerk of the Course.—H. T. Wright.

Timekeepers.—Lieut.-Col. W. A. Bristow; Capt. R. J. Goodman Crouch; W. O. Manning.

Marshals.—Capt. L. T. G. Mansell; A. J. A. Wallace Barr; A. R. Dresser; Lieut.-Col. C. S. Risk, D.S.O.; Flight-Lieut. R. Halley.

Press Steward.—Geoffrey Dorman.

Secretary.—Harold E. Perrin.

Assistant Secretary.—B. Stevenson.

CLUB DINNER

The Committee has decided to hold a Dinner at the Savoy Hotel, London, on Thursday, October 26, 1922, to celebrate the British victory of the Supermarine-Napier flying-boat, piloted by Capt. H. C. Biard, in the Jacques Schneider International Seaplane Race at Naples, and the holding of the Circuit of Britain Air Race for the Cup presented by His Majesty the King.

The price of tickets (exclusive of wines, etc.) is £1 1s. each. Members may also obtain tickets for their friends (including ladies) to the extent of the accommodation available.

In order to assist in the arrangements, early application for tickets is requested.

London-Manchester Air Service

THE first British air service which will connect Manchester and London by air is to be opened by the Daimler Airway towards the end of the month.

Maj.-Genl. Sir W. S. Brancker, Director of Civil Aviation, completed arrangements recently whereby the Daimler Airway will run one of their Napier-engined ten-seater expresses between London and Manchester daily in order to connect with the air services from London to the Continent.

The Daimler air expresses will leave the Manchester Aerodrome each week-day at 8 a.m. and, flying to the London Air Station in under two hours, will be in time to connect with the air services to Paris, Brussels, Cologne, Rotterdam, Amsterdam, and—before the end of the year—with Hamburg and Berlin.

From London to Manchester the air express will leave in the afternoon after the aeroplanes from the Continent have arrived at the London Air Station.

This new internal airway will bring Manchester within five hours of Paris and seven hours of Cologne, while in the Spring of 1923 it will be possible to fly from Manchester to Berlin and Copenhagen in the course of a day.

It is understood that the air fare will be only slightly above the first-class railway fare.

James tries the French Speed Course

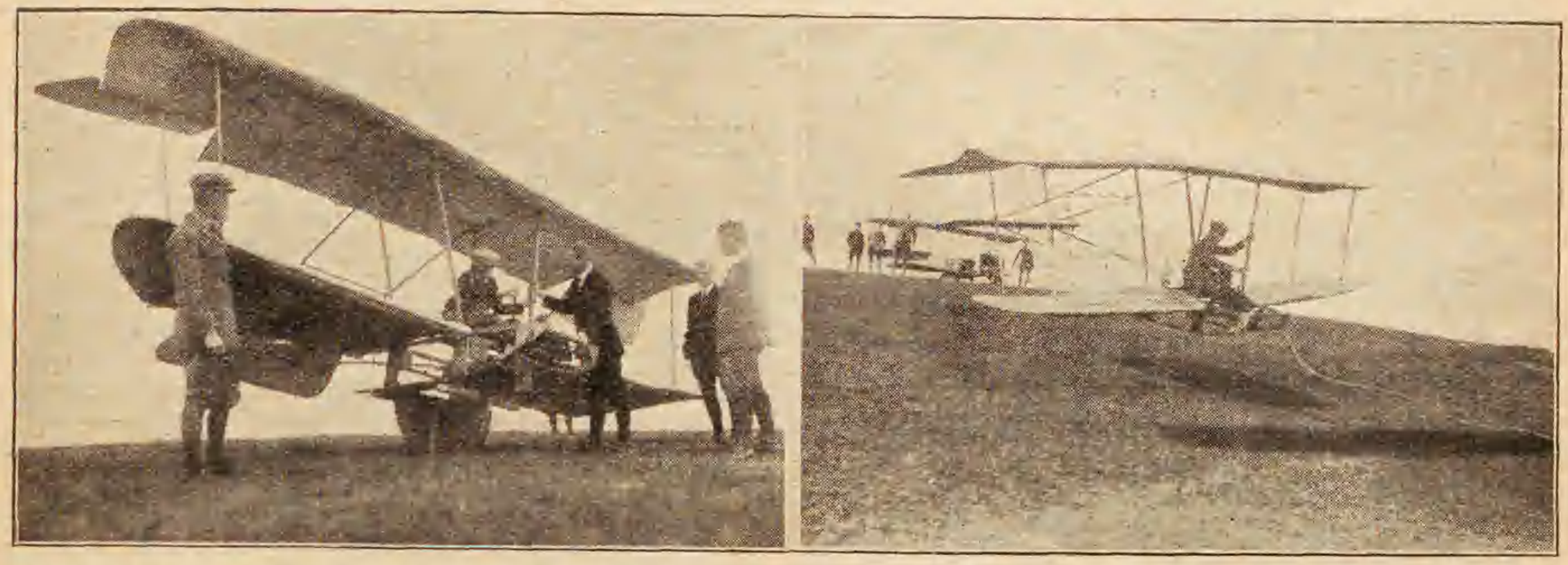
ON October 3 and 4 Mr. J. H. James attempted to wrest from Sadi Lecointe the honour of being the holder of the world's speed record. At Etampes on October 3 James made three attempts with his Napier-engined Gloucestershire Aircraft Co. Mars I, and on the next day a fourth attempt. During the first attempt the following times were obtained over the measured course of 1 km.: First flight in $11\frac{3}{5}$ secs., second in $10\frac{4}{5}$ secs., third in $11\frac{1}{5}$ secs., and fourth in $10\frac{4}{5}$ secs. This corresponds to an average speed of 324.349 km. (201.1 miles). In the second attempt the times were: $11\frac{2}{5}$, $10\frac{2}{5}$, $11\frac{2}{5}$ and $10\frac{2}{5}$ respectively. The regularity was remarkable. Average speed, 330.275 km. (204.8 miles) per hour.

In the third attempt the times were: 11, 10·7, $10\frac{3}{5}$ and 10·4, corresponding to an average speed of 341.3 km. (211.6 miles) per hour.

On October 4 a fourth attempt was made, the times obtained being: $10\frac{4}{5}$, $9\frac{4}{5}$, $11\frac{2}{5}$ and $10\frac{1}{5}$ secs. respectively. This gives an average speed of 341·432 km. (211·7 miles) per hour. Sadi's record stands at 212·6 m.p.h., so that to all intents and purposes the two machines are of the same speed. Both James and Lecointe will probably try again. To establish a new record it is necessary to beat the existing speed by at least 4 km. per hour.

GLIDING, SOARING AND AIR-SAILING

MONDAY of next week (October 16) will see the opening of the gliding competition for the *Daily Mail* Prize of £1,000, and for two subsidiary prizes of £50 each. One of these has been offered by Col. Alec Ogilvie, and will be awarded to the pilot who remains aloft for the longest period on Monday, the duration to be at least one minute. The other £50 prize has been offered by the Royal Aero Club, and will be awarded to the pilot who, on any day of the competition, remains up for the greatest duration (minimum five minutes). This prize will only be awarded to British pilots, and only to those who have not won the main prize of £1,000.



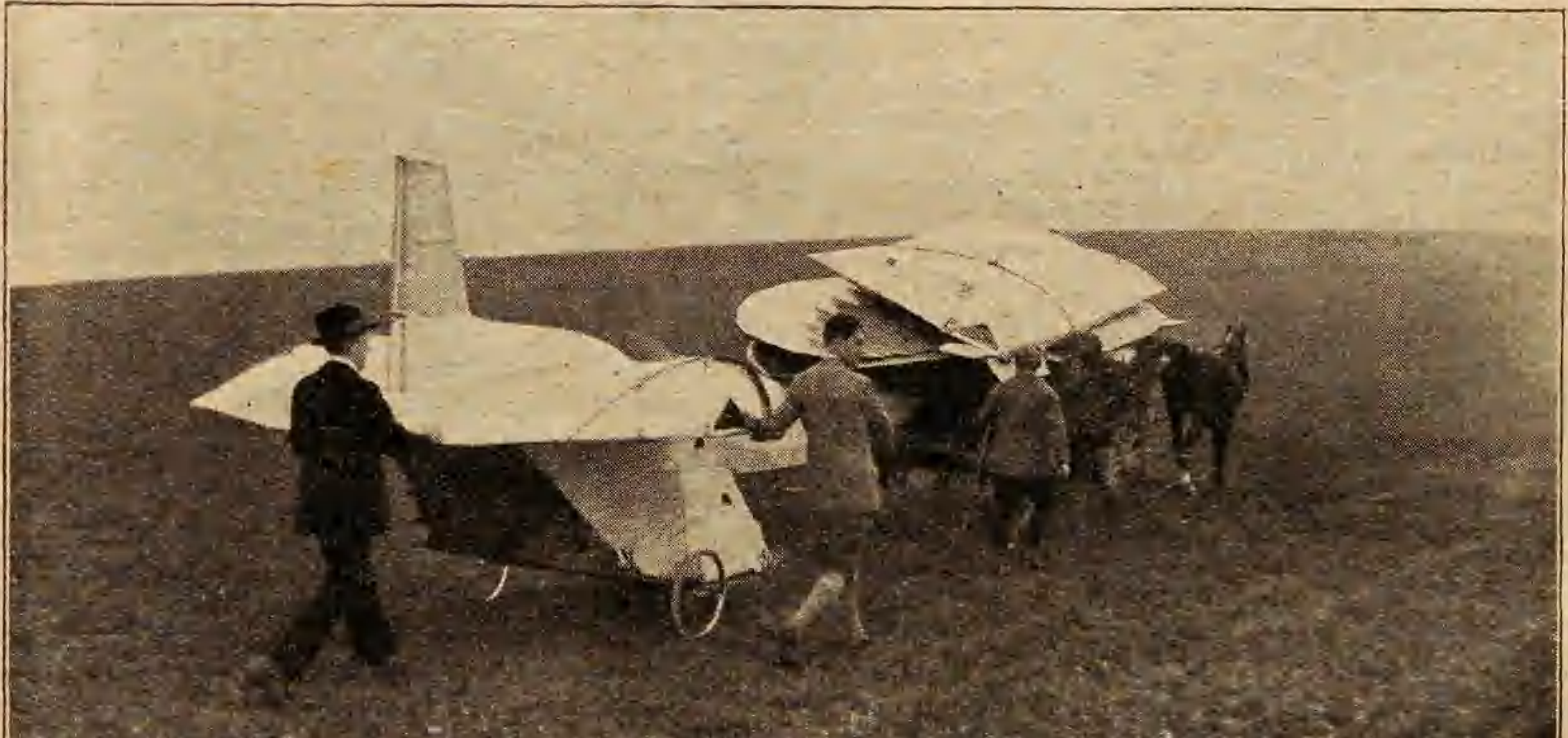
TEACHING GLIDER PILOTS TO FLY : At one of the glider flying schools in the Rhön hills pupils are taught to fly by being first mounted on an old glider placed on a pivot formed by two intersecting semicircles which allow the machine to tilt in any direction. The instructor catches hold of some part of the machine and wobbles it about. The pupil then has to make the correct movements with his controls. In the right-hand photograph a pupil is seen making his first free flight on the same glider. The tow rope is just dropping free. The machine has the appearance of having been designed by Mr. Heath Robinson.

* * *

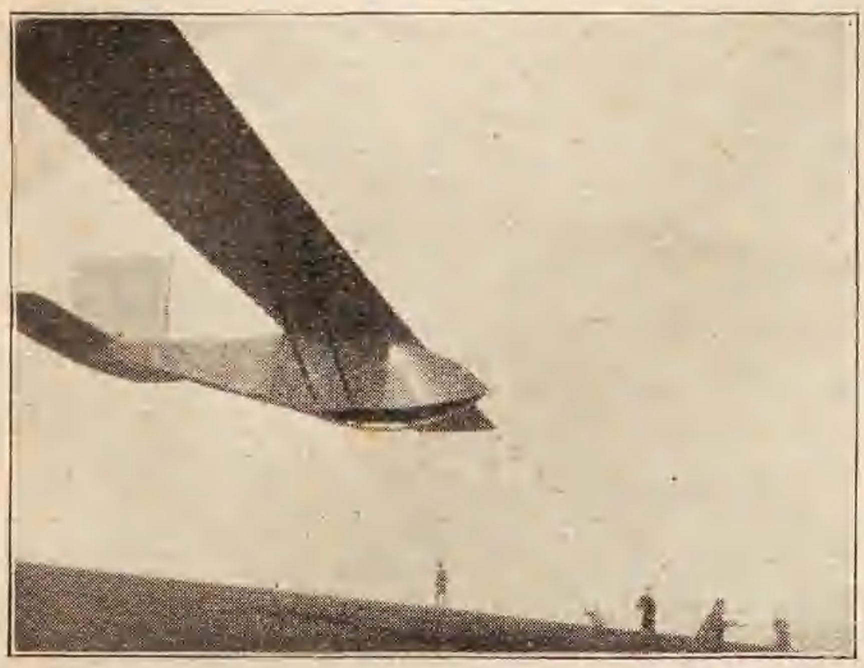
CONTRARY to expectations, the entries list for the gliding competition is a very large one, no less than 35 machines having been entered at the moment of going to press, with a possibility of two or three more coming along. This is highly gratifying, especially as the time left for constructing gliders has been very short, since the announcement was first made of the intention of the *Daily Mail* to offer its handsome prize of £1,000. What will make the competition even more interesting is the fact that at least three countries will be represented, *i.e.*, Britain, France, and Holland. It had been hoped that Germany would also participate, but the German pilots, notably Martens and Hentzen, have refused, partly by way of a protest against the restrictions placed by the Allies on German aviation, and partly because the expense, in German money, of bringing a glider to this country would be enormous. Also the date of the competition rather clashes with another competition in Germany for the Industrie Preis. However, it is to be hoped that if another competition is held here next year the Germans will be well represented.

* * *

UNDER the Royal Aero Club notes on page 588 will be found a complete list of the entries received up to Saturday last. As already mentioned, there is a possibility of a few more being entered, but at the moment the list of 35 machines may be regarded as complete. It will be seen that, among what may be termed the orthodox types, the monoplane is in considerable majority. The reason for this is, of course,



BRINGING HER BACK : Our photograph shows one way of bringing back a glider to the top of the hill after a flight. The wings are stacked on a German hay cart, the fuselage being trailed behind. The machine shown is the Aachen "Tail-first" monoplane on which Herr Klemperer crashed after getting into a spin when his glider was dropped from a kite balloon.



THE DARMSTADT MONOPLANE GLIDER "EDITH." In the illustration the machine is just getting away. Note the tow rope dropping from its quick-release in the nose of the fuselage.

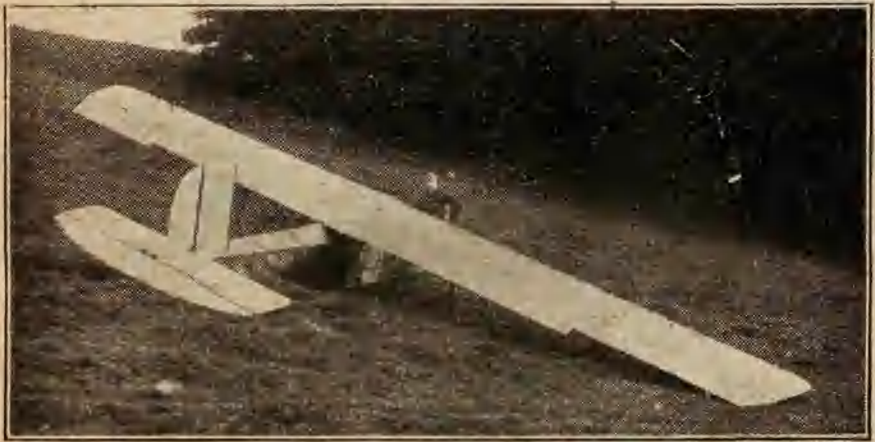
that this type is usually more efficient than the biplane, and as the rate of descent (for any given wing loading) varies as the square of the L/D, it is important to keep this ratio as high as possible. This appears to be most easily done with a monoplane of high aspect ratio and a minimum of bracing.

* * *

A VERY considerable number of unorthodox machines has been entered, including wing-flapping "ornithopters," direct-lift "helicopters," man-propelled aeroplanes, etc. One is, of course, prone to smile at these attempts, but at any rate their inclusion in the competition should assist materially in lending variety to the proceedings, and personally we are looking forward to a most enjoyable week at Itford Hill.

* * *

OF French machines entered one is the Dewoitine on which Barbot has been making excellent flights in France, both during and after the French gliding competition at Combegrasse. This machine is stated to be very efficient, and to have been designed according to the latest ideas in aerodynamics. Its performance will be watched with interest. It may be remembered that M. Dewoitine designed an interesting commercial monoplane for the French firm Aero-Transports Ernoul of Toulouse. The machine did not materialise, but this was, we believe, due to the abandoning of a project for a flying service and not to any defects in the design. The glider entered for the competition is a cantilever monoplane, with thick wing-section (in appearance like the Schoukovsky aerofoil, or Göttingen No. 441). The machine has a wing span of 37 ft., and a wing area of 124 sq. ft. The length over all is about 16 ft., and the weight empty is about 180 lbs. The wing loading in flying trim is, therefore, over 2 lbs. (2¾ approximately), which is somewhat heavy loading for a glider. However, the gliding angle is stated to be excellent, and the lift coefficient corresponding to the high values of L/D may be assumed to be fairly high, so that the rate of descent should not be excessively high. The machine will probably perform best in fairly high winds.



The Darmstadt monoplane, of which scale drawings were published in our issue of September 21, 1921. Herr Bottsch just managed to land the machine before striking the trees, but damaged the fuselage in doing so.

* * *

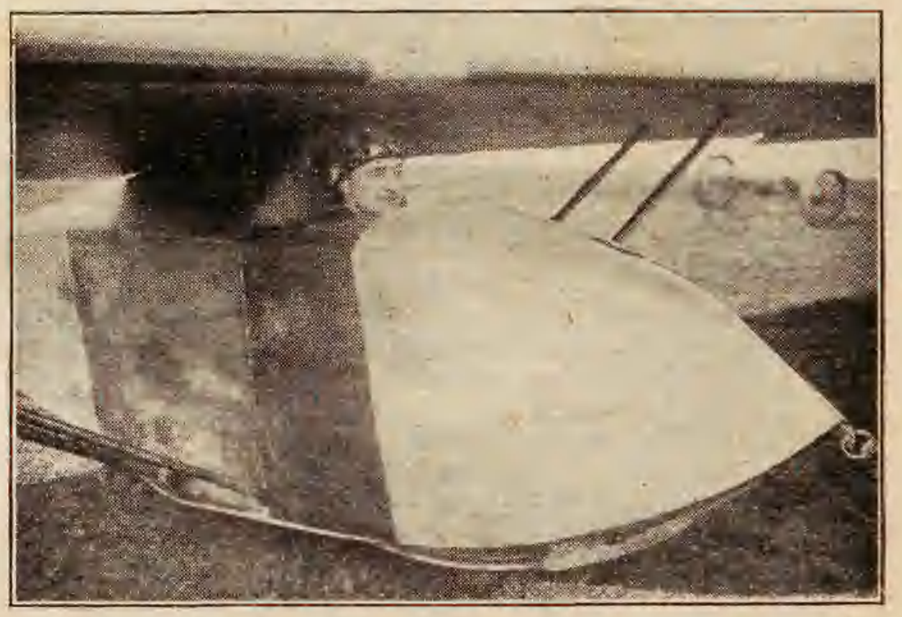
THE Peyret monoplane, to be flown by Maneyrol, also took part in the recent French competition at Puy de Combegrasse. Little information is available concerning this machine, except that it is a monoplane of but 22 ft. span, with a wing area of 156 sq. ft. and weighing only just over 100 lbs. empty.

* * *

HOLLAND will be represented by three machines, all entered by Mijnheer Fokker. Two of them will be biplanes, similar, probably, to the machine on which Fokker flew for 13 minutes with a passenger in the Rhön. What the monoplane will be like is not known at present, but as Fokker is an apostle of the cantilever monoplane it is fairly safe to assume that the third of his machines will be of this type.

* * *

OF the British machines it has only been possible to obtain particulars of a very few in time for this week's issue of FLIGHT. Next week, however, we hope to be able to place before our readers detailed descriptions of a number of the machines actually taking part in the competition (as distinct from those merely entered), and we hope to supplement this information by illustrations.



Herr Bottsch in the cockpit of the Darmstadt machine. Note the quick-release in the nose of the fuselage. This machine has made flights of long duration, one being of 1½ hours.

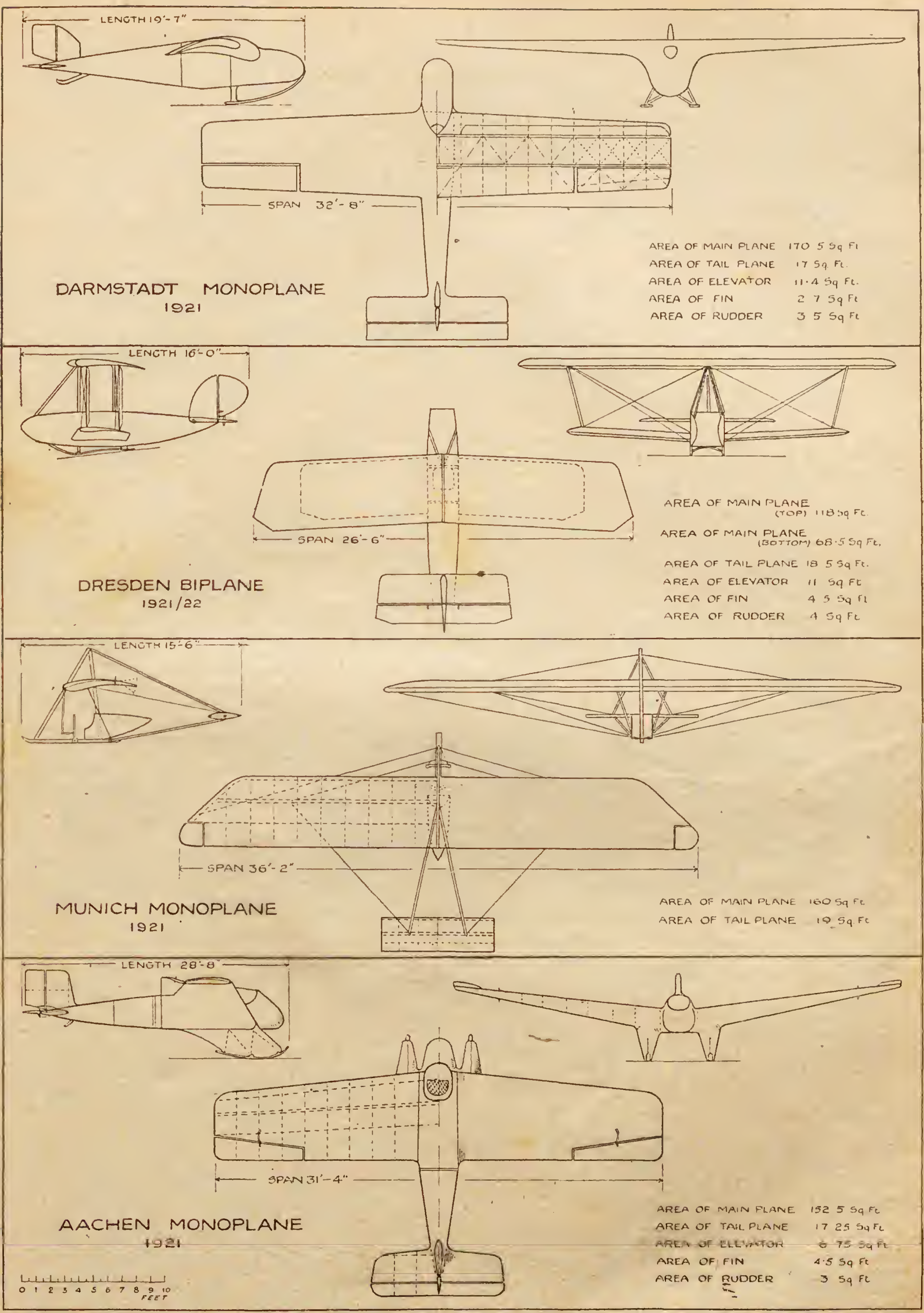
THE machine entered by Capt. Sayers, Mr. Courtney, and Maj. Wright has been constructed at the works of the Central Aircraft Co., Kilburn. We have had the privilege of seeing this machine, and were much impressed both by the design and the workmanship. In outward appearance the machine is very like the famous Hannover "Vampyr," but the construction is quite different, as is also the wing section used. The undercarriage consists of two simple skids, attached to the lower rails of the *fuselage*.

* * *

THE machine entered by Capt. F. Warren Merriam is also a monoplane, similar in a general way to the "Vampyr," but differing from that famous machine in many respects. It has been built at the Saunders sheds at Cowes, very kindly placed at the disposal of Merriam and Newman by by Mr. S. E. Saunders, who has repeatedly proved himself willing to assist in any way where the sport of flying is concerned. The monoplane is said to be a very pretty machine, and we are looking forward to its performance in the competition, piloted by our old friend Merriam.

* * *

As one of the earliest designers, and staunchest advocates of the monoplane, Mr. G. H. Handasyde holds a unique position in this country, and the construction and performance of the monoplane glider which he has designed for the competition, and which is to be flown by Mr. Raynham, should therefore be of more than ordinary interest. Mr.


LENGTH 19'-7"
SPAN 32'-8"
DARMSTADT MONOPLANE
1921
AREA OF MAIN PLANE 170 5 Sq Ft
AREA OF TAIL PLANE 17 Sq Ft.
AREA OF ELEVATOR 11·4 Sq Ft.
AREA OF FIN 2 7 Sq Ft
AREA OF RUDDER 3 5 Sq Ft
LENGTH 16'-0"
SPAN 26'-6"
DRESDEN BIPLANE
1921/22
AREA OF MAIN PLANE (TOP) 118 Sq Ft.
AREA OF MAIN PLANE (BOTTOM) 68·5 Sq Ft.
AREA OF TAIL PLANE 18 5 Sq Ft.
AREA OF ELEVATOR 11 Sq Ft
AREA OF FIN 4 5 Sq Ft
AREA OF RUDDER 4 Sq Ft
LENGTH 15'-6"
SPAN 36'-2"
MUNICH MONOPLANE
1921
AREA OF MAIN PLANE 160 Sq Ft
AREA OF TAIL PLANE 19 Sq Ft
LENGTH 28'-8"
SPAN 31'-4"
AACHEN MONOPLANE
1921
AREA OF MAIN PLANE 152 5 Sq Ft
AREA OF TAIL PLANE 17 25 Sq Ft
AREA OF ELEVATOR 6 75 Sq Ft
AREA OF FIN 4·5 Sq Ft
AREA OF RUDDER 3 Sq Ft
0 1 2 3 4 5 6 7 8 9 10
FEET

General Arrangement Drawings, to a uniform scale, of four German Gliders, the Darmstadt Monoplane, the Dresden Biplane, and the Munich and Aachen Monoplanes. These machines took part in last year's Rhön competition.

The Espenlaub monoplane, constructed by a carpenter out of all sorts of odds and ends. In spite of its very rough construction the machine flies very well.

Handasyde probably knows as much about the monoplane type of aeroplane as any man living, and he may therefore confidently be expected to have turned out a machine worthy of him. When the whole aeronautical world abandoned the monoplane for the biplane, Mr. Handasyde retained his faith in the former, and for several years continued to turn out some of the prettiest machines ever produced. We shall be disappointed if the glider does not come up to the pre-War Martinsyde monoplanes in graceful appearance and aerodynamic efficiency.

* * *

MR. REX STOCKEN will pilot a machine produced by the Aircraft Disposal Co., but at present no particulars of the machine are available, beyond the fact that the machine will be a monoplane of 45 ft. span.

* * *

CLARENCE WINCHESTER, the "Poet-Aviator," and Mr. Brynildson, both of whom were connected with the Ruffy-Baumann school of flying at Hendon in the early days of the War, have entered a biplane, to be piloted by Mr. Winchester.

* * *

Two de Havilland gliders will be entered, one to be piloted by Capt. Herne and the other by Capt. Broad. The de Havilland glider was described and illustrated in last week's issue of FLIGHT. On Friday and Saturday of last week several test flights were made with the first of these gliders, which was piloted variously by Capt. Broad, Mr. Cobham, and Capt. de Havilland. In spite of the very slight slope of the Stag Lane aerodrome the machine got well into the air and landed at a speed of about 18 m.p.h. At present the glider is fitted with an ordinary Vee undercarriage with wheels, but a different type may be fitted for the competition.

* * *

SCATTERED among the Gliding Notes of this week's issue will be found photographs of several German gliders.

One of our photographs shows the start of the Darmstadt monoplane, scale drawings of which were published in our issue of September 21, 1922. This machine, although being somewhat overshadowed by the Hannover at the Rhön Competition, nevertheless has some very excellent flights to its credit. One of these, for instance, was of 1½ hrs.' duration. The "Edith," as the machine is named, is now regarded as the only serious competitor for the Industrie Preis which the Hannover "Vampyr" has to reckon with. Piloted by Bottsch "Edith" has proved very nearly equal to the famous Hannover machine.

* * *

THE Espenlaub monoplane, built by a carpenter out of odds and ends of materials, proved itself quite a good glider, in spite of its very rough construction and somewhat irregular outline. As a matter of fact, the Espenlaub was of quite good workmanship, but of inferior finish. It is characterised by a very high aspect ratio (17 to 1), which may probably account for its efficiency.

* * *

WE now learn that the machine on which Herr Klemperer crashed, after coming down from a height of 2,000 ft. in a spin (having been dropped from a kite balloon), was of the "tail-first" or "Canard" type. This may explain why Herr Klemperer was unable to get out of the spin. One of the photographs shows the Aachen "Canard" being hauled up to the top of a hill after a flight. It will be noticed that the wings can be dismantled into quite small portions. This is a feature of great practical importance, and we rather fancy that some of the competitors at Itford Hill will have quite a lot of fun getting their gliders back to the top of the hill with the wings in place, especially in a strong wind.

* * *

BY way of contrast, we have thought that scale drawings of some of last year's German gliders may not be without interest. On page 591 will be found general arrangement drawings of four of the 1921 gliders used in the Rhön Competition. The Darmstadt monoplane was, generally speaking, similar to this year's model, but had a rather more carefully streamlined *fuselage* than "Edith."

* * *

THE Dresden biplane was used again this year, and gave fairly good results, although it did not come up to the performances of the Hannover and Darmstadt monoplanes.

* * *

THE Aachen glider flown by Klemperer won the Competition in 1921, but does not appear to have been entered this year, having presumably been supplanted by the "Canard" on which Klemperer crashed. It is mainly remarkable on account of the careful streamlining of the skid undercarriage and the large dihedral angle of its wings.

* * *

OF a much less elaborate, but very light, type is the Munich glider, which was flown by Koller in last year's Competition. Here the pilot is seated below the wing, and is "faired" by a tail piece behind the seat. The monoplane wing is divided in the centre, and is so mounted that its two halves can be tilted independently for lateral control, each wing-half acting as an *aileron*.

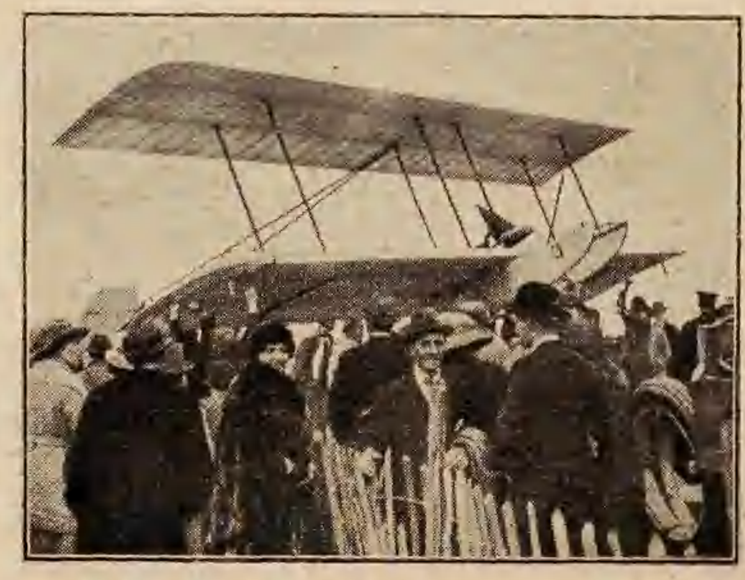
◆ ◆ ◆ ◆

FOKKER'S FIRST FLIGHT IN ENGLAND

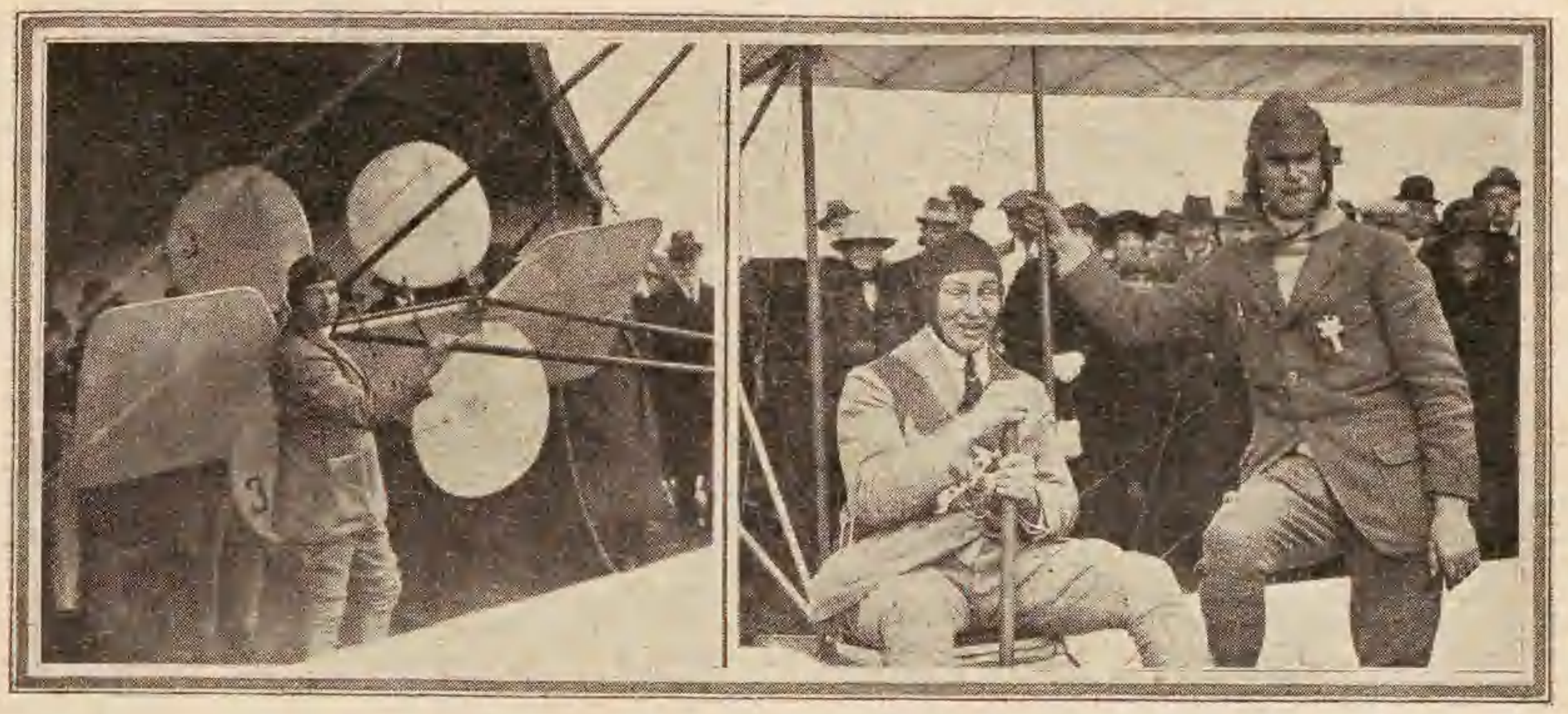
Gliding Demonstration over South Downs

IN connection with the opening of the Peacehaven Hotel, the South Coast Land and Resort Company had arranged, on October 10, for demonstration flights to be made from one of the hills in the South Downs on the Peacehaven Estate, near Newhaven, by Mijnheer Anthony Fokker, the famous Dutch pilot-designer. A number of visitors had availed themselves of the opportunity of witnessing a gliding flight, and many of them were privileged to see a series of kinematograph films which Fokker has taken in Germany and elsewhere of gliders and gliding flights. Wherever he goes Fokker always carries with him a very neat little kine-camera, and in this way he has collected a most interesting series of moving pictures, some of which were shown at the Peacehaven Hotel. Perhaps by way of showing that gliding is not always plain sailing, Fokker showed a glider crash which took place in Germany. The picture showing Hentzen, the famous German record-holder, flying the Hannover "Vampyr," was viewed with particular interest.

After the "pictures," visitors were entertained to luncheon at the Peacehaven Hotel, and later in the afternoon they proceeded out to the hill on which Mijnheer Fokker had erected his tent-hangar. The weather was not very favourable for gliding, what little wind there was coming from the



Lifting the Fokker Glider over the heads of the crowd before the start of the flight.



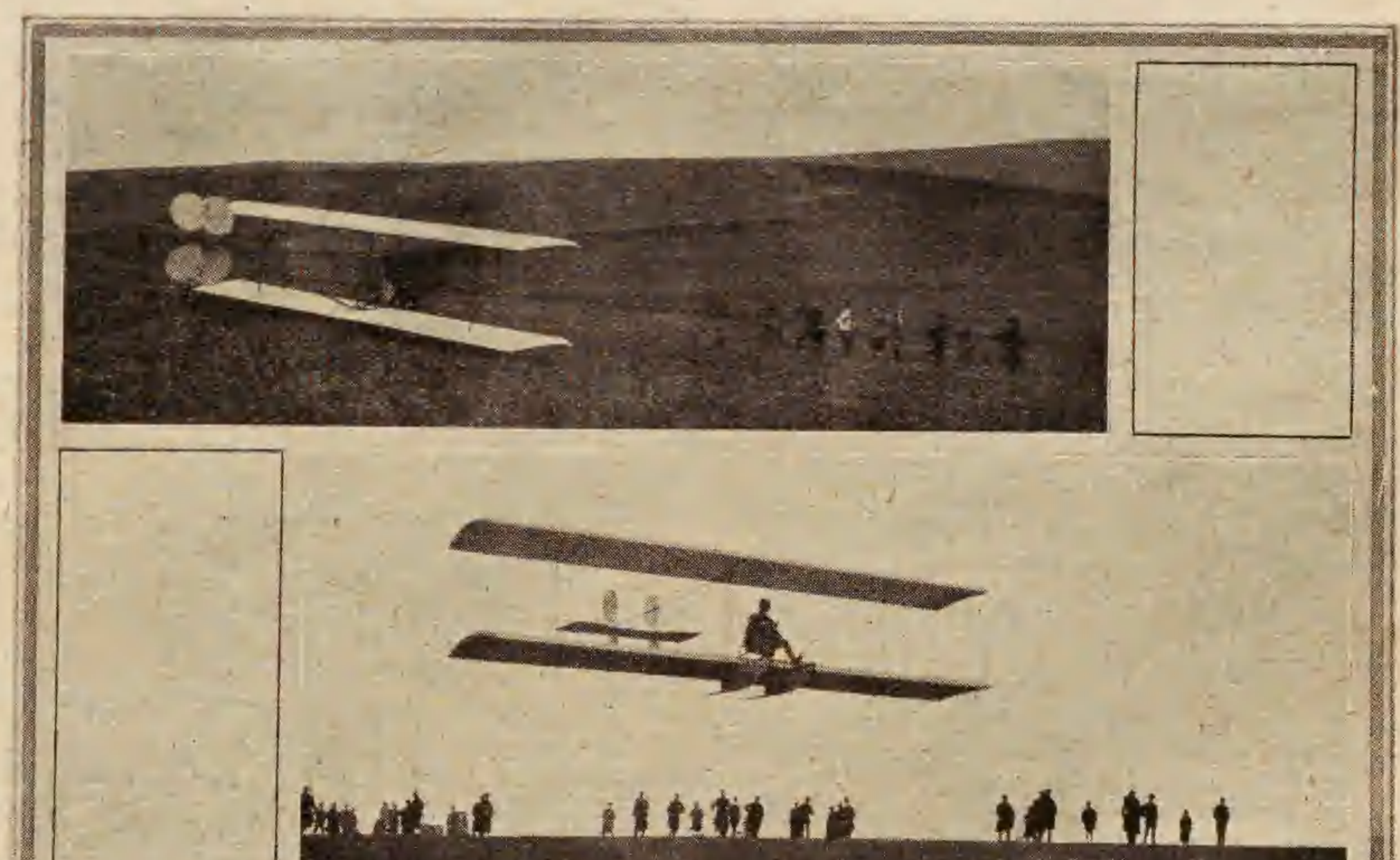
Fokker steadying the tail of his glider as it is being lifted out of the hangar. On the right the famous Dutch pilot-designer is seen in the seat of his glider.

opposite direction to what had been expected, *i.e.*, from north-east instead of from south-west. There was nothing for it but to haul the machine across to the hill opposite. This was accomplished by towing the machine behind a motor-car, the glider sliding along easily on its steel-shod skids, and Fokker sitting in his seat.

By the time the glider had been transported across to the top of the hill opposite the wind had dropped entirely, and Fokker expected some difficulty in getting the machine off without a head wind to help him. A start was made about four o'clock, twelve men hauling lustily on the towing rope. The speed, however, proved insufficent, and the glider refused to come "unstuck." It was then brought back to the top of the hill, and a motor-car was substituted for the man-power. After getting up to a speed of about 20 m.p.h. the machine rose, the towing rope was cast off, and the glide commenced.

The machine flew quite slowly, and did not appear to drop very rapidly, in spite of the fact that there was no wind to help it. A perfect landing was made some 500 yards from the starting point, the machine having remained aloft for approximately 45 seconds. The absence of noise made the flight seem quite remarkable, the only sound being a slight swishing as the machine passed overhead.

Among the spectators we noticed Maj.-Genl. Sir Sefton Brancker, Director of Civil Aviation, and Commander Perrin, Secretary of the Royal Aero Club. The Fokker glider is going to the competition at Itford Hill by the end of the week, and will probably be flying again on Monday.



FOKKER'S FIRST FLIGHT IN ENGLAND: The upper photograph shows the first start, which was unsuccessful. For the next start the machine was towed by a motor-car, and the machine got into the air as shown in the lower picture.

LONDON TERMINAL AERODROME

Monday evening, October 9, 1922.

THE first machine on the regular Daimler service to Holland left a few minutes after 9 a.m. today with three passengers and a load of newspapers for Rotterdam. For the present the Daimler Airway will run one machine to Holland in the morning, and this is scheduled to return to London in the afternoon.

The K.L.M. machine has been altered from 10 a.m. to 11.30 a.m., while their machine from Holland will start in the morning, instead of at 2 p.m. as hitherto.

Negotiations and arrangements with the German Government have now reached a point where the extension of the service to Hamburg, at the end of the month, becomes almost a certainty, and it is expected that the service to Berlin should be in running order before the end of the year. On Thursday last it was arranged that the Daimler Airway should run the first internal air service in Britain, and, by the end of the month, they hope to have a regular daily service between London and Manchester.

The object of this service is to connect Manchester direct with the services radiating from the London air station to the continent, and the present intention is to run an early-morning service from Manchester to Croydon in time to catch machines leaving for Holland, Cologne and Paris, while the return service to Manchester will leave London after the machines from the continent have arrived at Croydon. There will of course be some modification of this plan during the winter months, but it is expected that this scheme will work well during the flying season, and will bring Paris within five hours of Manchester.

A New Daimler "Air Express"

OWING to the extension of their services, the Daimler Airway have taken another D.H.34 over from the Air Ministry, which leaves the Ministry with one in hand, and increases the Daimler fleet to four, all D.H.34's with Napier "Lion" engines.

The Instone Air Line are having a rush of passengers between London and Cologne. So great is the demand for seats that on many occasions they have been compelled to put on an extra machine as far as Brussels to cope with the bookings. After a bad start, owing to the fog, at the beginning of the week, the service has settled down and is now running smoothly. In fact, several remarkably rapid journeys of just over 3 hrs., as against the scheduled 4½ hrs., have been made between London and Cologne.

Officials of the Air Ministry have been flying to and from Paris during the week in De Havilland "air-taxis." The other morning General Festing left Paris at 7 a.m., and was at Croydon soon after 9 a.m., while General Brancker and Colonel Blandy have been across during the week. Rumour has it that they are fixing up the details of the experimental night service which is to be run during the winter.

Sound-Ranging Experiments to Begin

THE additional story which has been built on the control tower is now being fitted with the sound-ranging device for which it was designed, and it is hoped to begin experiments with this during the week. The instrument has two square megaphone arrangements which can be revolved in all directions and elevated from the inside of the tower so that their mouths can point in any direction towards a machine in flight.

C.M.A. Air Lines are to have Breguet "Leviathans" on their services. Mr. Grosfils, their London manager, tells me that a number of these machines are already on order, but he does not think they will be in service before the spring of 1924. There has, it appears, been a considerable amount of trouble with the grouping of the four engines round a single propeller, and in the service type of machine two sets of two engines will be installed.

There was some excitement on the aerodrome in the early part of the week when, throughout the whole of one day, the aerodrome was shrouded in mist so that at times it was impossible to see across it. The cone-light was working, and bombs and rockets fired as incoming machines were expected; and, although their engines could be heard droning overhead, they could not be seen. All landed safely, however, and the pilots, when they had descended, being asked if they could see the cone light and "fireworks," caused great surprise by stating that they could see the aerodrome when 10 miles away, although on the ground the visibility was less than 1,000 yards. So that the firework display had been in vain!

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN OCTOBER 1 AND OCTOBER 7, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	32	102	12	27	30	2 30	D.H. 34 G-EBBU (2h. 6m.)	B. (4), D.H. 9 (1), D.H. 16 (1), D.H. 34 (3), G. (10), H.P.W.8B (3).
Paris–Croydon	34	128	10	29	33	3 12	D.H. 34 G-EBBU (2h. 20m.)	B. (5), D.H. 9 (1), D.H. 34 (3), G. (11), H.P.W.8B (3).
Croydon–Brussels–Cologne	9§	37	—	—	8	4 53	D.H. 34 G-EBBV (4h. 11m.)	D.H. 4 (1), D.H. 34 (3), Vi. (1)
Cologne–Brussels–Croydon	9‖	46	—	—	9	4 47	D.H. 34 G-EBBV (3h. 20m.)	D.H. 4 (1), D.H. 34 (3), Vi. (1).
Croydon–Rotterdam ...	6	5	6	6	6	2 44	Fokker H-NABS (2h. 4m.)	F. (4).
Rotterdam–Croydon ...	6	3	6	6	6	2 48	Fokker H-NABN (2h. 4m.)	F. (5).
Total for week ...	90	321	34	68	92			

* Not including "private" flights.

† Including certain journeys when stops were made *en route*

‡ Including certain diverted journeys.

§ Four Croydon–Brussels only.

‖ Four Brussels–Croydon only.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad. Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes.

Incidental Flying.—Messrs. Perry, Piercey, and Capt. Stocken made numerous test flights on D.H. 9's and Martinsyde F4's at Croydon for the Aircraft Disposal Co., and each took a D.H.9 to Brussels on the 7th.

NOTICES TO AIRMEN

France : Abbeville Aerial Lighthouse

THE aerial lighthouse at Abbeville now exhibits a white group flashing light, the characteristic of which is the letter F of the Morse code, repeated every 10 seconds, thus :—Flash 0.5 sec., eclipse 0.5 sec.—Flash 0.5 sec., eclipse 0.5 sec.—Flash 3.0 secs., eclipse 0.5 sec.—Flash 0.5 sec., eclipse 4.0 secs.

Previous Notice affected.—Para. 2 of Notice to Airmen No. 58 of 1922 is amended accordingly.

(No. 99 of 1922.)

Switzerland : Aerodromes

1. The following information relating to Swiss aerodromes has been received :—

(i) *Dubendorf* (Zurich).—Joint Civil Customs and Military aerodrome.

Position.—Lat. 47° 24′ N., long. 8° 38′ E. Situated approximately 1 km. E.N.E. of the village of Dubendorf and 8 kms. E.N.E. of Zurich.

Dimensions for landing.—1,300 metres N.W. to S.E. ; 600 metres N.E. to S.W. Certain portions of the rough ground shown on the plan published with Notice to Airmen No. 3 of 1921 have been levelled.

Landings in an N.E.-S.W. direction should be made in the N.W. portion of the aerodrome or in the extreme southern portion.

Altitude above sea level.—1,450 ft.

Obstructions.—Two W/T masts and aerial, 15 metres (50 ft.) in height in N. corner.

Signals and Markings

Ground Markings.—Concrete letters DUB, 8 metres high, are marked on the ground in the W. corner of the aerodrome, immediately S. of the Customs Office. The letters are read from the West.

A white rectangle, 200 by 100 metres, is marked on the ground in the N.W. portion of the aerodrome.

Signals.—A signal mast is situated in the centre of the row of hangars ranged along the S.W. side of the aerodrome. *The particular attention of pilots is drawn to the following signals which are flown from this mast :—A red and white streamer,* indicating that machines should land or take off towards the S.E. in the immediate vicinity of the white rectangle. *A black-and-white wind sleeve,* indicating that machines should land or take off up wing. *A red-and-white ball,* indicating that school flights are in progress. In order to avoid disturbance of school flights, machines must land or take off in a N.W.-S.E. direction, parallel, and as close as possible, to the row of hangars along the S.W. side of the aerodrome.

Night Markings.—The following night landing arrangements are put into operation only by special request :—

A revolving lighthouse is situated on the large hangar immediately N. of the Customs Office. The lighthouse exhibits a green or red light, revolving with a white horizontal beam. The *green* light indicates that landings *may* take place, and the *red* light that landings are *forbidden.*

All obstructions immediately surrounding the aerodrome, *i.e.,* hangars, W/T masts, etc., are marked by *red* obstruction lights.

A landing L of petrol flares is set out. Machines should land along the long arm towards the short arm ; the latter indicates the extremity of the landing area.

Accommodation, etc.—Hangars are available for aircraft of all sizes. Repairs may be executed in the workshops of the Military Air Service. Petrol and oil (all kinds) are available.

Telephone Nos.—Dubendorf 56 and Zurich-Selnau 47.

Customs Regulations.—Previous notification of projected arrival should be given by telephone in order that Customs examination may be arranged.

Landing Hours.—The aerodrome is closed at dusk. Aircraft requiring to land later must give previous intimation.

(*Note.*—The R.F. of 1/12,500 given at the foot of the plan published with N. to A. No. 3 of 1921 is incorrect, the plan actually being reproduced to the scale of 1/15,500.)

(ii) *Sternenfeld* (Basle).—Civil landing ground owned by "Société Aviatik, beider Basel."

Position.—Lat. 47° 33′ N., long. 7° 38′ E. Situated 3 kms. E. of centre of Basle, in the bend of the Rhine, on the south side.

Dimensions for landing.—425 metres E.-W., and 210 metres N.-S.

Altitude above sea level.—260 metres (853 ft.).

Surface.—Flat and grass covered. Care should be exercised. Work is not yet finished, and some parts of the surface are still dangerous. The ground is liable to be flooded during winter.

Obstructions.—Hangar in S.W. corner. Factory with chimneys, 20 metres (65 ft.) high, and high-tension electric cables, 200 metres S. of ground.

Accommodation.—One wooden hangar 22 metres long by 17 metres wide. Door height 4.5 metres, and width 16 metres.

Supplies, etc.—Petrol and oil may be obtained and repairs may be arranged in Basle.

Personnel, etc.—The aerodrome is not permanently occupied.

(iii) *Porrentruy.*—This aerodrome no longer exists.

2. *Previous Notices.*—The text of Notice to Airmen No. 3 of 1921 is cancelled and replaced by para. 1 (i). A revised plan is not being issued at present. Part of para. 2 (Porrentruy) of Notice to Airmen No. 17 of 1920 is cancelled by para. 1 (iii).

3. *Authority.*—"Office Aerien Federal" of Switzerland.

(No. 100 of 1922.)

Wireless Telegraphy Stations in Operation in connection with Civil Air Routes

IT is hereby notified :—

1. With effect from October 1, 1922, the British Meteorological synoptic message issued at 0200 G.M.T. will be transmitted on 4,100 metres C.W. instead of on 1,400 metres C.W.

2. The table in para. 1 of N. to A. No. 45 of 1922 and para. 1 of N. to A. No. 65 of 1922 are amended accordingly.

(No. 105 of 1922.)

Aerodromes for Civil Use : Consolidated List

IT is notified by the Air Ministry that :—

1. Aerodromes, Seaplane Stations and landing grounds, open to civil aviation in the United Kingdom, and Service and Civil stations, available to civil aircraft in case of emergency only, are shown in the lists (A to E) which have been corrected to October 1, 1922.

2. The lists are classified as follows, each aerodrome or landing-ground being given in alphabetical order :—

LIST A.—*Government-owned Aerodromes available for civil flying, at which accommodation exists.*

(*a*) *Civil Aerodromes.* (*b*) *Service Stations.*

LIST B.*—*Aerodromes available for civil machines in emergency only.*

(*a*) *Permanent Service Stations.* (*b*) *Stations temporarily retained for Service purposes.* (*c*) *Civil Stations.*

* N.B.—The Aerodromes in Section (*a*) *Permanent Service Stations* and Section (*b*) *Stations temporarily retained for Service purposes,* except aerodromes which are within a prohibited area (*e.g.,* Gosport), may be used, until further notice, in addition to cases of real emergency :—

(i) For refuelling in the course of journeys where no civil facilities exist.

(ii) For landing of passengers proceeding to a destination near the aerodrome concerned.

No guarantee can be given that any R.A.F. transport will be available, or that the machine can be housed in such cases. Where possible, notice of intention to use any such aerodrome should be given in advance to the Officer Commanding.

LIST C.—*Licensed Civil Aerodromes*

Civil Aerodromes licensed for all types.

LIST D.—*Unlicensed Private Aerodromes.*

Aerodromes available for civil machines only by special permission of the owners, or in emergency.

LIST E.—*Emergency Landing Grounds*

Unless otherwise indicated, no accommodation for aircraft exists at these stations.

3. *Customs Stations.*—The only aerodromes at which Customs facilities exist at present are *Croydon* and *Lympne.*

4. It should be clearly understood that these lists are purely provisional, and are subject to alteration from time to time. Such amendments are published periodically as "Notices to Airmen."

5. In those cases in which it is stated that accommodation does not exist, no facilities other than the actual landing grounds are available.

6. No guarantee can be given at the present time that personnel to handle aircraft is available either at the Service Stations or at the Civil licensed aerodromes.

7. Notices to Airmen Nos. 35, 45, 52, and 60 of the year 1922 are cancelled.

(No. 107 of 1922.)

AIRISMS FROM THE FOUR WINDS.

WHO asked for the kite-balloons ?

- - -

AND who discovered them ?

- - -

WHAT the re-transfer "scoop" meant to the aerodrome "all at"-purchaser ?

- - -

COMMANDER F. W. M. BOOTHBY is as usual practical and to the point in a communication regarding the helpful advantages of the airship in the passing—we hope—Near East complications. Commander Boothby's idea is that :—

"Constantinople could be reached by airship from England in twenty-four hours. One or two of our existing airships now decaying in the hands of the Air Ministry could carry fuel for a flight there and back with a moderate load. It would be feasible to construct airships to carry six aeroplanes in flying order to the Near East and have them on service there in thirty-six hours. If we are packing and dispatching aeroplanes by sea it is doubtful if they can be flying where required in less then three weeks from the order for their dispatch being given. Speed of concentration is everything in war, emphasised specially in air war. Only airships permit of the most rapid concentration where distances of over one thousand miles have to be covered. Sea transport will always be required for heavy guns, stores, etc., but men, aeroplanes, light guns are best transported by airship."

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To be hoped *these* aircraft were not also mixed up in the "all at" price !

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PERHAPS less expensive and equally effective for the purpose, irrespective of its accomplishment, was the natural incident on Sunday of the flight from Croydon to Constantinople of Maj.-Gen. Sir Warren Hastings Anderson, on a D.H. 37 aeroplane, under the unerring guidance of Mr. Alan J. Cobham. The "incident," where noticed at all, was received by way of an ordinary passing event, which is all to the good of the cause. Presently, by air will be "the only way" for most folk.

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M. FOKKER—as the decision stands at present—is to be barred from exhibiting at the Paris Aero Salon in December next. This is but an echo of the absurd action which resulted from Fokker's exhibiting at last year's Paris Salon. It is to be hoped, in the cause of aeronautical progress, there is sufficient independent thought with the Members of the *Chambre des Industries Aéronautiques* to see that their Executive Committee reconsider such a narrow-minded veto.

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BESIDES many ordinary matters of importance coming forward at the next International Commission for Air Navigation on October 20, at Old Palace Yard, Westminster, is one which should receive strong support, viz., the revision of one of the existing articles which at present handicaps the extension of cross-continental routes. At present, Article 5, as it stands, prevents any of the contracting States from allowing aircraft of non-contracting States—including ex-enemy States—flying over their territories. The French delegation will propose an amendment whereby any individual State will be empowered to make direct agreement with any non-contracting State with which it desires to establish flying. A clause of this character, as originally passed, is likely to have the contrary effect to that no doubt intended, to force in any State holding aloof. It is only prejudice that would support such isolation, and there is nothing like practical experience of the advantages occurring from co-operation to bring such obstinacy to heel.

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A PROPOS of that unfortunate contretemps of James's with his maps in the Coupe Deutsch, the French papers have, generally speaking, refused to accept James's explanation. Not a few of them have given other "explanations" of what happened, all of them wide of the mark and quite untrue. It is therefore all the more refreshing to find, among the French Press, one gentleman and one journal, at any rate, who have not lost the courtesy and chivalry with which we have always credited our French Allies. In the October 3 issue of *L'Aero-Sports*, M. Roger Labric, the distinguished *Redacteur en Chef* of that journal, publishes an article which he heads "La Mauvaise Parole." In this he takes exception to statements made in other French papers, notably *Le Journal*.

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WITH regard to the statement, attributed by M. Labric to "Comrade Raffalovitch," of *Le Journal*, that James's thermometer registered 110 degrees after he landed, M. Labric has interviewed M. Lamblin, who informed him that the thermometer never exceeded 70 degrees. He also quotes from *Le Journal* the following : "Besides, a slight fracture appeared on the top plane of his machine, and it is probable that not wishing it to come off in the air, James wisely preferred to land rather than risk a catastrophe." M. Labric's comments upon this statement are forcible and to the point. "How the devil," he says, "could James discover, from his seat, a fracture which did not exist and never did exist except in the imaginative mind of Raffalovitch ?"

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"THE foreigners," M. Labric concludes, "take the trouble to come and race here, at great expense, and it is thus that they are received and sympathised with in their misfortune. It is not only a lack of courtesy and of truth, but it is also unsportsmanlike in the highest degree."

- - -

WOULD that there were a few more sportsmen like M. Labric.

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OUR distinguished French confrère then suggests that James be persuaded not to leave France until he has had an opportunity of flying his machine over the measured kilometre course, his times to be taken by the same *chronometreurs* as those who timed Sadi Lecointe. This has now been done, and the average speed attained by James on the Mars I was one kilometre in 10.55 seconds, corresponding to a speed of 341·4 kilometres (211·7 miles) per hour. Sadi's record was of 212·6 m.p.h. Thus the machines are near enough of the same speed.

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CAN anyone give us the address of Liverpool ? We want to get at the valuable contributor to one of that city's "newspapers" of the following little perpetration :—

"LONDON–NEW YORK IN A DAY !
AMERICAN AIR COMPANY'S PROJECT.
Possible in Two Years.

The establishment of a Trans-Atlantic air service within the next two years is a possibility.

"According to information which has reached London it is learned that a scheme is already being prepared by an American corporation called "General Air Service" which has powerful financial interests behind it.

"The co-operation that will be required on this side of the Atlantic is sure to be forthcoming, it is stated, so that travellers may look forward to journeying from London to New York and back in about two days.

"Plans are in hand for the organisation of a company to build the airships, the General Air Service being an operating company only. The air lines will be huge ships with a passenger capacity of 100, and will be capable of a maximum speed of 100 miles an hour.

"The airships will be fitted with luxurious quarters attached to the frame of the ship and so arranged that noise, fumes and discomforts of any kind are well nigh impossible. Lounges and smoking-rooms will ensure comfort during the day, and luxurious sleeping quarters will make night travel of the pleasantest nature. The sanitary arrangements will leave nothing to be desired, and an adequate dining service will be provided."

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As motive power is not mentioned probably the forthcoming glider experiments are to form the basis of the whole scheme. Isn't it wonderful ? as poor Charlie Bertram, the conjurer, used to say.

THE WORK OF S. P. LANGLEY

PROFESSOR L. BAIRSTOW, Chairman of the Royal Aeronautical Society, chose the above subject for his first lecture of the season (given on October 5 at the Royal United Service Institute), in order to draw attention to a first-rate example of systematic enquiry, the type of enquiry properly called scientific. "Progress was made," Professor Bairstow said, "step by step in the face of formidable difficulties, and no attempts were made to solve the problems of mechanical flight by bursts of brilliance of the type known as the invention of genius. To my mind this, the scientific method, is most suitable for the great bulk of human endeavour, and we should accept the phenomenal leaps of some individuals as the exception rather than the rule. The influence of Langley lies in the force of example and the spirit of his work rather than in the permanence of his data. It is probably not wide of the mark to say that the experimental results of Langley are now rarely appealed to, since they have been succeeded by others of greater accuracy and more immediate applicability, and yet who can doubt that the whole course of aviation was largely determined by the efforts of this one man. Without him I think it almost certain that flying would not have been ready for the Great War, with consequences which we can imagine."

The lecturer then referred to the "Langley Memoir on Mechanical Flight," published in 1911, in which the first part was written by Langley himself (and covered the period 1887–1896), the second part by Charles M. Manley, Langley's chief assistant (covering the period 1897–1903). "The end of this period," Professor Bairstow said, "is significant, coinciding almost precisely with the earliest successes of the Wright brothers. The record after that date has been marred by the Hammondsport trials on the modified Langley aeroplane. I want you to leave those trials out of your account, for they have nothing to do with Langley and his methods."

Regarding a quotation from Langley ('I have brought to a close the portion of the work which seemed to be specially mine—the demonstration of the practicability of mechanical flight—and for the next stage, which is the commercial and practical development of the idea, it is probable that the world may look to others. The world, indeed, will be supine if it do not realise that a new possibility has come to it, and that the great universal highway overhead is now soon to be opened'), the lecturer said:—

"In that short passage is much of interest; it points out the unknown amount of work involved in a particular piece of research, and that the reward is often in internal satisfaction and not commercial return. To the scientist the financial returns are, I think, rightly, less appreciated than the successful campaign against difficulties, though he must, since he belongs to the animal kingdom, pay such attention to the former as will keep body and mind fit for the task.

"I think Langley might well be satisfied with the help that he has given to others, though he might wish to reiterate his concluding paragraph to a world which has allowed 20 years to lapse without realising the value of the opening of the great universal highway. Possibly, however, he might exhibit some of the patience shown in his experimental work and see sufficiently steady, if slow, progress towards the goal he foresaw."

"It appears," the lecturer said, "that the pursuit of knowledge requires some courage, and Langley impresses one as having been able to recognise home truths with detachment and humour. In one passage he says: 'It has taken me, indeed, but a few years to pass through the period when the observer hears that his alleged observation was a mistake; and the period when he is told that if it were true it would be useless; and the period when he is told that it is undoubtedly true, but that it has always been known.' It sounds like modern history instead of 25 years ago, and I wonder how many cold shivers are passing down our backs at the thought that we may be saying such things ourselves. Of course it is not likely, but then——."

"Throughout his writings," the lecturer continued, "Langley made a clear distinction between two subjects which he called 'aerodynamics' and 'aerodromics,' a distinction which still exists, but is differently described. His divisions correspond very closely with the modern expressions 'performance' and 'control and stability,' both of which are now regarded as branches of aerodynamics. The scientific advisers of the Air Ministry are more and more turning to the study of 'aerodromics,' on which progress towards safety is seen to depend very largely. Its problems are very difficult at the present time, and in the absence of scientific executive direction progress will continue to be slow.

"There is little present evidence of the spirit of Langley, which takes up a task so great that 'to cover it no lifetime would have sufficed.' Team work may be continuous, but the work of an individual is necessarily limited by the length of his active years of life. If, however, the team is to be steady it must be well guided, and we have yet much to learn in the methods of doing this. Would Langley, who saw so clearly the broad future of aviation, or a non-scientific man have been the better director of research?"

The lecturer described the experiments conducted by Langley from the year 1886, his disappointments and successes. He aimed at demonstrating the possibility of mechanical flight, and to him there was no noteworthy distinction between demonstration on a model and on a man-carrying aeroplane. In May and November, 1896, flights were made with model aeroplanes fitted with a steam engine that produced 1 h.p. to 1½ h.p. and weighed a little over 5 lbs. No pilot was carried. The machines were launched from a track over water. In the first flight the distance traversed was a little over 3,000 ft., at a rate of from 20 to 25 m.p.h.

The lecturer then showed slides illustrating the Langley man-carrying machine, and gave some particulars of weights, areas, etc., as well as making reference to the unsuccessful attempts at free flight with the full-size machine.

"The end of Langley's work," said the lecturer, "did not come from lack of spirit, for he considered it desirable to continue the experiments, but the adverse opinions expressed in Congress and elsewhere led to the suspension of operations. Later on, in 1904, 'it was found that while a number of men of means were willing to assist in the development of the aeroplane, provided arrangements were made for later commercialisation, none were ready to render the assistance from a desire to assist in the prosecution of scientific work.'"

In conclusion Professor Bairstow said:—

"Is not this sketch rather an indication that Boards—including Air Ministeries—cannot utilise the enthusiasm of scientists under their control? What is wrong? Is it the Air Ministry or the scientist, or both? Can an administrator who has no scientific knowledge direct the work of scientists? Has Britain ever allowed a fair trial to the executive control of scientific work by a man of science? How often have men of science been placed on advisory bodies and their advice ignored? I am not going to answer my own questions; in one aspect the ground is political, and concerns our system of government, but in another it is a proper subject for the concern of a scientific and technical body like the Royal Aeronautical Society.

"I have made my lecture rather long without covering the many interesting points in Langley's work in more than a sketchy manner. His speculations on soaring are worth the attention of any serious investigator who is trying to account for the phenomenal success of gliders. I may not stay to deal with the subject now, for the digression, to be worth while, would be long."

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ROYAL AERONAUTICAL SOCIETY NOTICES

Forthcoming Arrangements.—October 19, 5.30 p.m., Royal United Service Institution, Mr. J. D. North, "The Metal Construction of Aeroplanes."

Owing to the continuance of rebuilding operations of the Royal Society of Arts, Major A. R. Low's lecture, "A Review of Airscrew and Helicopter Theory, with Aeroplane Analogies," will take place at the Royal United Service Institution, Whitehall, S.W. 1, at 5.30 p.m., on Thursday, November 2.

Members are reminded that they do not require tickets for lectures, and that the only announcement of them is contained in the official notices to the press, and in the preliminary notices in the *Aeronautical Journal.*

The October number of the *Aeronautical Journal* contains the following: Wilbur Wright Lecture; "Some Aspects of Aeronautical Research," by Lieut.-Col. A. Ogilvie; "Helicopters," by John Case; "Stability Calculations in the Process of Design," by J. D. North; "Gas Armour," by F. L. M. Boothby.

W. LOCKWOOD MARSH,
Secretary

THE ROYAL AIR FORCE

[*War Office.*]

London Gazette, October 3, 1922.

General List

Sir J. M. Salmond, K.C.B., C.M.G., C.V.O., D.S.O. (Air Vice-Marshal, R.A.F.), to be temp. Maj.-Gen. whilst comdg. the Forces in Iraq ; Oct. 1.

[*Air Ministry*]

London Gazette, October 3, 1922.

General Duties Branch

The following are granted short service commissions as Flying Officers, with effect from, and seniority of, dates indicated :—C. R. Carr ; Sept. 19. I. Glyn-Roberts ; Sept. 22. W. H. Stiles ; Sept. 25. D. C. Balfour is granted a short service commission as Flight Lieut. for three years on active list, with effect from, and seniority of, Oct. 1. G. A. Kysh is granted short service commission as Flying Officer for three years on active list, with seniority of April 1, 1918 ; Oct. 1.

The following are restored to full pay from half-pay :—Air Commodore E. A. D. Masterman, C.M.G., C.B.E., A.F.C. ; Oct. 2. Wing Comdr. G. P. Grenfell, D.S.O. ; Sept. 14.

Flt. Lt. F. J. Hooper is placed on the Retired List ; Oct. 3. Flg. Off. W. B. Higgins resigns his short service commission ; Sept. 13. Flg. Off. R. S. Maitland-Edwards relinquishes his short service commission on account of ill-health, and is permitted to retain rank of Lieut. ; Oct. 4. Pilot Off. E. F. Kohler relinquishes his short service commission on account of ill-health contracted in the Service ; Sept. 7.

Stores Branch

Flg. Off. L. G. Stevenson is placed on Retired List on account of ill-health contracted on active service ; Oct. 4.

Medical Branch

Capt. J. J. Boyle, Army Dental Corps, is granted temporary commission as Flight Lieut. on atachment for four years' duty with R.A.F. ; Oct. 1. He will continue to receive emoluments from Army funds.

Nursing Service

Miss M. McGlynn is confirmed in her appointment as Staff Nurse ; March 1.

Memoranda

Lieut. H. Balls relinquishes his temporary commission on ceasing to be employed, and is permitted to retain his rank ; Sept. 19.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified : —

Group Captains : Hon. J. D. Boyle, C.B.E., D.S.O., from No. 7 Group Headquarters (Inland Area) to Headquarters, R.A.F., Iraq (Supernumerary). 14.9.22.

Wing Commanders : W. H. Primrose, D.F.C., from School of Technical Training (Men) (Armoured Car Details) (Inland Area) to Headquarters, R.A.F., Iraq (Supernumerary.) 14.9.22. G. P. Grenfell, D.S.O., from Half-pay List to Air Ministry (C. of C.). 14.9.22. D. L. Allen, A.F.C., from Half-pay List to R.A.F. Depôt (Inland Area). (Supernumerary.) 20.9.22. W. Tyrrell, D.S.O., M.C., M.B., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to Basrah Hospital, Iraq, for duty as O.C. 14.9.22. B. A. Playne, D.S.O., M.B., B.A., from Headquarters Inland Area to command Baghdad Combined Hospital (Iraq). 14.9.22. C. T. Maclean, D.S.O., M.C., from Headquarters, Inland Area, to Headquarters, R.A.F., India. 19.9.22.

Squadron Leaders : A. Levick, O.B.E., to Headquarters, Inland Area, to Headquarters, R.A.F., Iraq. 14.9.22. W. V. Strugnell, M.C., from R.A.F. Depôt (Inland Area) to Aircraft Depôt (Iraq). 14.9.22. W. G. Sitwell, D.S.C., from Electrical and Wireless School (Inland Area) to Headquarters, R.A.F., Iraq. 14.9.22. F. G. D. Hards, D.S.C., D.F.C., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Iraq (Supernumerary). 14.9.22. F. H. W. Guard, C.M.G., D.S.O., from School of Technical Training (Men) (Armoured Car Details) (Inland Area) to Headquarters, R.A.F., Iraq (Supernumerary). 14.9.22. A. J. Butler, M.C., A.F.C., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Iraq. 14.9.22. J. A. Stone, from Headquarters, Inland Area, to Headquarters, R.A.F., Iraq (Supernumerary) 14.9.22. R. P. Willock, from School of Technical Training (Men) (Armoured Car Details) (Inland Area) to Headquarters Iraq (Supernumerary). 14.9.22. R. L. G. Marix, D.S.O., from R.A.F. Depôt (Inland Area) to Electrical and Wireless School (Inland Area) (Supernumerary). 25.9.22. W. W. Shorten, F.R.C.S. (E.), from Headquarters, Inland Area, to Baghdad Combined Hospital (Iraq). 14.9.22. H. A. Hewat, M.B., from R.A.F. Hospital, Cranwell, to R.A.F. Depot (Inland Area) (Supernumerary). 23.9.22. R. A. G. Elliott, M.B., B.A., from Headquarters (Coastal Area) to Headquarters, R.A.F., Middle East (Supernumerary). 16.9.22. J. Kemper, M.B.E., from Aircraft Depot, Egypt (Middle East) to No. 4 Flying Training School (Middle East). 18.7.22. A. G. Higgins, from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to School of Technical Training (Men) (Inland Area). 27.9.22. R. Leckie, D.S.O., D.S.C., D.F.C., from No. 1 School of Technical Training (Boys) (Halton) to R.A.F. Depot (Inland Area) (Supernumerary). 25.9.22.

Flight Lieutenants : J. M. Robb, D.F.C., from No. 24 Squadron (Inland Area) to No. 6 Squadron (Iraq). 14.9.22. R. S. Aitken, M.C., A.F.C., from Electrical and Wireless School (Inland Area) to Headquarters, R.A.F., Iraq. 14.9.22. H. M. K. Brown, from School of Technical Training (Men) (Armoured Car Details) (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary). 14.9.22. E. P. Roberts, M.C., D.C.M., from Headquarters (Coastal Area) to No. 6 Squadron (Iraq). 14.9.22. F. L. C. Butcher, from Electrical and Wireless School (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. N. H. Jenkins, D.F.C., D.S.M., from No. 24 Squadron (Inland Area) to No. 84 Squadron (Iraq). 14.9.22. C. E. Wardle, from School of Technical Training (Men) (Armoured Car Details) (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. G. F. P. Warren, from School of Technical Training (Men) (Armoured Car Details) (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. H. O. Fellowes, from Headquarters, Inland Area, to Headquarters, R.A.F., Iraq. 14.9.22. H. V. Drew, A.F.C., from No. 10 Group, Headquarters (Coastal Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. W. H. Ellison, from No. 1 School of Technical Training (Boys) (Halton) to Aircraft Depôt (Iraq). (Supernumerary.) 14.9.22. A. E. Sutton-Jones, from R.A.F. Base, Gosport (Coastal Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. A. H. Comfort, from R.A.F. Depôt, (Inland Area) to Stores Depôt (Iraq). 14.9.22. (Act. Sq. Ldr.) F. Binns, M.B.E., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. W. J. de Salis, D.S.C., from Marine and Armament Experimental Establishment (Coastal Area) to Half-pay List. 28.9.22. W. K. Mercer, from R.A.F. Depôt (Inland Area) to R.A.F. Base, Leuchars (Coastal Area). 1.10 22. A. R. Thomas, from Instrument Design Establishment (Inland Area) to No. 5 Flying Training School (Inland Area). 2.10.22. P. J. Flood, from School of Technical Training (Men) (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. H. B. Troup, from No. 1 School of Technical Training (Boys) (Halton Hospital) (Halton) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. D. Le Bas, from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22.

HONOURS

Awards to the R.A.F. in Iraq

THE King has given orders for the following promotions in and appointments to the Most Excellent Order of the British Empire, in recognition of distinguished services in Iraq during 1921. To be dated February 1, 1922 :—

C.B.E. (*Military Division*).—Wing Commander W. F. MacNeece, D.S.O., D.F.C., R.A.F.

O.B.E. (*Military Division*).—Flight Lieut. F. Petch, M.B.E., R.A.F. ; Flight Lieut. C. H. Tancred, M.B.E., R.A.F

M.B.E. (*Military Division*).—Flying Officer J. M. Wyer, D.S.M., R.A.F. ; Flight Lieut. A. P. Ledger, R.A.F. ; Flight Lieut. E. C. W. Fitzherbert, D.S.C., R.A.F. ; Flying Officer J. W. Hustwaite, R.A.F.

The King has approved of the following rewards for distinguished services rendered during active service operations in Iraq during 1920-21 :—

Bar to D.F.C.—Flight Lieut. C. B. S. Spackman, D.F.C. ; Flight Officer E. Brewerton, D.F.C.

D.F.C.—Sqdn. Ldr. W. Sowrey, A.F.C. ; Flight Lieut. M. Thomas, A.F.C. ; Flight Lieut. H. S. P. Walmsley, M.C. ; Flying Officer F. K. Damant.

Distinguished Flying Medal.—244308 A.C. 1 T. G. Banks, 47558 Flight Sgt. J. Birch, 39018 A.C. 1 R. Hayne, 89300 A.C. 1 P. A. Hughes, 336589 L.A.C. S. L. Palmer.

Meritorious Service Medal.—401649 Sgt. S. W. Blight, 17396 Sgt. A. V. Brooker, 19797 Sgt. A. Figg, 329321 L.A.C. (actg. Cpl.) F. Garrod, 313813 Flight Sgt. W. P. Luscombe, 148401 Sgt.-Maj. C. F. Mountifield, 314819 Flight Sgt. H. A. C. Oland, 8293 Cpl. G. E. Taverner.

The following officers and airmen of the Royal Air Force have been mentioned in dispatches for distinguished service rendered during active operations in Iraq during 1920-21 :—

Flying Officer C. W. Booth, M.B.E. ; Sqdn. Ldr. R. Collishaw, D.S.O., O.B.E., D.S.C., D.F.C. ; Flying Officer F. J. Fogarty ; Sqdn. Ldr. V. Gaskell-Blackburn, D.S.C., A.F.C. ; Flying Officer G. A. Gowler ; Flight Lieut. O. G. Gregson ; Flight Lieut. C. W. Mackey ; Sqdn. Ldr. R. S. Maxwell, M.C., D.F.C. ; Wing Commander V. O. Rees, O.B.E. ; Sqdn. Ldr. E. A. B. Rice, M.C.

149455 Cpl. C. E. Andrews, 308977 L.A.C. (actg. Cpl.) J. R. Briggs, 864 Flight Sgt. C. F. R. Bunting, 331411 L.A.C. F. Carter, 340506 Cpl. W. T. Eberwein, 6071 Cpl. (actg. Sgt.) A. C. Elmy, 157606 A.C. 1 W. H. Harrison, 204601 Cpl. W. R. Henderson, 780 Sgt. G. W. Hepple, 252623 L.A.C. N. Hetherington, 156440 A.C. 1 B. J. Jennings, 157884 Cpl. I. Mackintosh, 89812 A.C. 1 R. J. Meads, 1349 Cpl. (actg. Sgt.) S. C. Murton, 332458 A.C. 1 G. O. Pitcher, 301859 Sgt. H. Thompson.

The King has been graciously pleased to approve of the following rewards for distinguished services during active service operations in Somaliland in March, 1922 :—

D.F.C.—Sqdn. Ldr. A. S. C. Maclaren, O.B.E., M.C., A.F.C.

Distinguished Flying Medal.—81,000 Leading Aircraftsman J. A. Bridgman.

Mentions in Dispatches.—Flying Officer G. S. Smith.

The following officer of the Royal Air Force has been mentioned in dispatches for distinguished services during active service operations in the Hinterland of Aden in February, 1922 :—

Flying Officer W. N. Plenderleith.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

(London Aero-Models Association)

AT an Extraordinary Meeting of the Society, held at Headquarters on Friday last, Dr. Thurston in the Chair, the Hon. Secretary, Mr. A. E. Jones, gave a synopsis of the work accomplished during the first year of the Society's existence. He said he thought that after hearing the auditors' report it would be agreed that it is very creditable from a financial point of view that this infant Society is so strong and vigorous, and also very creditable that the Society should emerge with a balance in hand of over £15. It must not be overlooked that the assets are greatly increased by the following :—

1, The "Sir John Shelley" Cup; 2, the "Lady Shelley" Cup; 3, the Kite and Model Aeroplane Association Cup; 4, the "Model Engineer" Cup; 5, the "Weston" Cup; 6, the "Flight" Cup; 7, the "Felix Kelly" Cup; 8, the "W. E. Evans" Cup; 9, the "D. H. Pilcher" Cup; 10, the "Farrow" Shield; the minimum value amounting to over £120—in addition to apparatus, value over £20.

There was, he continued, a likelihood of further cups being presented, but he thought they were most fortunate in having these valuable assets, and thanks are due to the gentlemen who have been instrumental in procuring same for them, and also to the donors for their great kindness and generosity.

He said he would also like to make special mention of the fact that since October, 1921, cups and cash prizes to the total value of £14 11s. have been won outright, thanks to the generosity of the following gentlemen: Mr. Best, Messrs. W. G. Evans and Sons, Mr. L. A. Gray, Mr. C. J. Lane, Mr. J. Louch, Mr. F. de P. Green, Mr. D. A. Pavely, Mr. A. Wilson and others. There is also a prize of £3 3s. offered for an ornithopter competition, thanks again to Mr. D. A. Pavely.

The Society has also received valuable support from the *Model Engineer* and FLIGHT, not only in the way of cups, but in valuable space kindly given in their columns week after week, which if the Society had to pay for would amount to a very considerable item of expenditure. He hoped their kindness would be rewarded with a larger clientèle anxious to benefit by the good work of the members and especially the Research Committee of the Society.

He added they must not forget what the *Model Engineer* did for them in another direction; they allotted space for Society exhibits at their exhibition at a very nominal fee, and further encouraged the members by presenting one silver and five bronze medals in addition to numerous certificates.

There is another very important and valuable privilege which the Society enjoys—that of having Headquarters provided free of charge; and thanks are due to Mr. Rees for this great benefit, which if put at a nominal charge of 10s. 6*d*. per meeting would mean an expenditure of over £26 per annum.

They were also greatly indebted to Mr. and Mrs. Graves for the splendid way they have looked after the requirements of the Society. He thought they would agree with him that this alone was wonderful value for their money, but greater benefits had accrued in another direction. They had obtained official permission to fly on the L.C.C. open spaces. They have had lectures from Dr. Hankin, Mr. Reynolds (of Messrs. Handley Page), Mr. W. E. Evans, and Mr. F. J. Camm. They have also had the opportunity of taking part in or listening to debates as follows :—"The Construction of Model Aeroplane Wings," Mr. Burchell; "Fusilage Models," Mr. W. E. Evans; "Model Propeller Making," Mr. W. E. Evans; "The Burk Propeller," Mr. F. de P. Green; "Geared Motors," Mr. F. J. Camm; "Compressed Air Motors," Mr. Rippon; "Construction of Containers," Mr. J. E. Louch; "Ornithopters," Mr. D. A. Pavely.

The following competitions have been arranged :—

1st, Parliament Hill Fields; 2nd, Wormwood Scrubbs; 3rd, Wormwood Scrubbs; 4th, Wimbledon Common; 5th, Hackney Marshes; 6th, Wimbledon Common; 7th, Handley Page Grounds; 8th, Wimbledon Common.

The Competition Secretary will be pleased to give particulars of these Competitions if required.

Special flying demonstrations have been given at Hampstead, Blackheath, Wanstead Flats, and Wimbledon Common. Special meetings were held for record breaking at Wanstead Flats, Wimbledon Common, and Hampstead Heath.

They have had the following records put up, or, in other words, British records broken :—(1) Mr. D. A. Pavely, compressed air driven model at Wimbledon Common, 63⅖ secs., timed by Mr. F. de P. Green and Mr. C. A. Rippon. (2) Mr. L. A. Gray, enclosed rubber driven model, hand launched, at Wanstead Flats, 37 secs. (3) Mr. L. A. Gray, enclosed rubber driven model R.O.G., 26 secs. (4) Mr. C. Hersom, twin pusher R.O.G., at Wanstead Flats, 247 secs. (5) Mr. C. Hersom, single tractor waterplane, at Wanstead Flats, 43 secs. (6) Mr. H. J. Davis, gliding record, 41⅗ secs.

These records were timed by Mr. Houlberg and Mr. Rippon, and accepted by the Committee.

On behalf of the Society the Technical Secretary has written interesting articles in the Press, for which they (the Society) are greatly indebted to him.

A film was taken of the Competition held at Wormwood Scrubbs, a copy of which the Secretary said was in his possession. They were most fortunate in having Messrs. Pathé Frères as official cinematographers to the Society.

Three most excellent concerts were given, for which the thanks of the Society are due to Mr. J. Louch.

Mr. Houlberg has designed an excellent certificate, a copy of which will be given to any member putting up a meritorious performance.

The prize winners are as follows :—Messrs. L. A. Gray, W. E. Evans, L. Lansdown, C. A. Rippon, A. Whelpton, D. A. Pavely, M. Levy, C. J. Burchell, F. de P. Green, G. A. Brown, L. G. H. Hatfull, H. H. Bedford and C. Hersom.

The membership of the Society has increased from 10 to 80 during the past twelve months. Amongst the members enrolled are two Doctors of Science; this, he thought, augurs well for the future of the Society. Many members have been enrolled who will be particularly useful in research work, and he had no doubt that it will be seen that they are elected to the Research Committee, who will be only too pleased to welcome them in the strenuous work that lies before that body.

Suggestions from several quarters have been made that there should be two official observers on each ground instead of one, as at present. Another suggestion is that a Correspondence Circle be formed for the benefit of country members.

The Committee are desirous of making up a programme for the winter session, and this, it is hoped, will be ready in the course of a week or so.

A. E. Jones, Hon. Sec., 48, Narcissus Road, West Hampstead, N.W. 6.

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PERSONALS

Married

Major **HERBERT GEORGE BRACKLEY**, D.S.O., D.F.C., was married on September 27, at All Saints' Church, Margaret Street, W., to Miss **FRIDA MOND**, elder daughter of Mr. Robert Mond, J.P., of Combe Bank, Sevenoaks, and 50, Wimpole Street, and niece of Sir Alfred Mond. Miss Mond was given away by her father, and Major Eric Ince was best man.

PHILIP VICTOR CHABOT LOW, late Lieut., Black Watch and R.A.F., third son of Mr. and Mrs. Alexander G. Low, of 9, Holland Park, W. 11, was married on September 30, at Durban, South Africa, to **ALISON**, fourth daughter of the late **CHARLES LOGAN** and Mrs. Logan, of 21, Lothian Street, Hawick.

To be Married

The engagement is announced between **JOHN ARCHIBALD REDVERS BULLER**, late K.R.R.C. and R.A.F., son of the late Rev. E. H. Buller and of Mrs. Seymour, of Roche de Lion, Gorey, Jersey, and **MARJORIE**, daughter of the late **HENRY WARD-PRICE** and of Mrs. Ward-Price, of 14, Hanover Square, W.

The engagement is announced between **ROYDON DASH**, D.F.C., only son of R. Ashford Dash, of 6, Berrylands, Surbiton Hill, and **CHRISTINE** (**CHRISSA**), third daughter of F. G. **TYRRELL**, of Westholme, Laton Road, Hastings, Sussex.

The engagement is announced between Flight-Lieut. **THOMAS HENDERSON**, R.A.F., eldest son of Mrs. H. Henderson, of Tynemouth, Northumberland, and **EDITH LESLIE**, daughter of Mrs. **ALEXANDER DEUCHAR**, lately of The Minories, Newcastle.

The marriage of Wing-Commander W. G. **WELSH**, R.A.F., and **RUTH EDRIDGE DALZELL** will take place next Monday at St. George's, Hanover Square.

RUBBER AS APPLIED TO AIRCRAFT

MR. J. W. DYER, M.Sc., A.I.C., delivered an interesting lecture, under the above title, on October 2 before the Engineers' Club, and we give below a *résumé* of his remarks on this important subject.

The author summarised the uses of rubber under the following headings:—

(1) To form the gas-holding layer and the outer protective layer for the envelopes of kite balloons, non-rigid and semi-rigid airships; (2) in the gas-bags of rigid airships to form the adhesive by which gold-beaters' skin is stuck to the cotton fabric, which is the base; (3) in shock-absorber cord for heavier-than-air craft; (4) in petrol hose; (5) for tyres on the wheels of aeroplanes; (6) in many electrical insulating materials generally.

"In a general way," said Mr. Dyer, "it can, I suppose, be said that any material used for any constructional purpose whatsoever is open to supersession by a better and cheaper. The aeroplane designer, so I am given to understand, scorns delights and lives laborious days to come by some other methods of absorbing the shock of landing than the use of rubber cord and some other material for his fuel-supply pipes than rubbered hose.

"Although there are complaints of failure and attempts to replace it by alternative gear, it is difficult to get satisfactory explanations of the causes of failure.

"It is the exception rather than the rule to have failed materials returned from service for examination accompanied by a full account of the circumstances that led to failure."

Dealing with the lighter-than-air side, the author stated that the main use of rubber is as a constituent of the proofed fabrics of which the envelopes are made, and in this field, if and when any of these craft are required, rubber is without a present rival.

Every improvement in the endurance of the proofing calls for renewed attention to the textile component. For this, as for the rubber, light is the dangerous agent. A good deal of work arising out of the problems of aircraft fabrics has been published on this point. The precise mode of action may not be clear, but it can be accepted that light, air and the cellulose of the textile form an unstable trio, and the practical result is the tendering of the textile.

It seems possible that through tests the following points might be investigated:—

(1) The minimum weight of gas-holding layer for good robustness.

(2) The effect with the thinner gas-holding layers of a little and a good deal, say 10 per cent., of mineral addition such as litharge, as compared with pure rubber sulphur.

(3) Whether degree of cure is of any importance.

If rigid airship construction is actively resumed, there is no doubt that attempts to find an actual substitute for gold-beater's skin will be made. Whether a rubber-proofed fabric could be made to meet both weight and permeability requirements is at present somewhat doubtful.

It may be asked whether rubber can be used as proofing material for the fabric outer cover of rigid airships. Present practice rules out entirely the possibility of using rubber, because the proofing material, a cellulose nitrate or acetate dope with various additions, is applied *in situ*, and is relied upon to produce nearly all the tautness, which it does by its contraction on drying.

In the early days we tried rubber-proofed outer covers, not in actual service, but only experimentally; the work was abandoned when the prime importance of tautness was recognised, and the apparent impossibility of getting it in any other way than by a contracting dope.

* * * *

Air Parcel Post Fees

THE Postmaster-General announces that it has become necessary to increase the fees payable on parcels weighing over 5 lbs. posted for transmission by the semi-official parcel service to Paris which is carried on in conjunction with Messrs. Handley Page's aeroplane service. The new scale of fees took effect on Thursday, October 5, and is as follows:— For parcels weighing up to 2 lbs. 1s. 9*d.*; 2 to 5 lbs., 3s.; 5 to 8 lbs., 4s. 6*d.*; 8 to 11 lbs., 6s.

A Fire at Martlesham

A FIRE broke out at Martlesham experimental aerodrome early on Thursday morning of last week, and one of the smaller buildings, which contained two German aeroplanes and one amphibian, was destroyed. The Woodbridge Fire Brigade and men of the camp made a splendid effort to save the adjoining buildings, but of the actual building which caught fire nothing but tangled girders remained. The cause of the fire is at present unknown.

PUBLICATIONS RECEIVED

The Buff Book Trade and Professional Directory for London, October, 1922. The Business Telephone Directories, Ltd., 25, Lawrence Lane, Cheapside, E.C. Price 2*s.* 6*d.*; by post, 3*s.* 6*d.*

The Royal Air Force Cadet College Magazine, Vol. II, *No.* 2. *Autumn*, 1922. Gale and Polden, Ltd., Wellington Works, Aldershot. Price 3*s.* 6*d.*

Aluminium Repairing. By William H. H. Platt. *Lockwood's Technical Manuals.* London: Crosby Lockwood and Sons. Price 3*s.* net.

Aeronautical Research Committee. Reports and Memoranda.—No. 786 (*Ae.* 43), *An Aerodynamic Theory of the Airscrew.* By H. Glauert. January, 1922. Price 9*d.* net, post free 10*d.* *No.* 788 (*Ae.* 45), *Theoretical Streamlines round a Joukowsky Aerofoil.* By M. Barker, B.Sc. December, 1921. Price 3*d.* net, post free 3½*d.* London: H.M. Stationery Office, Kingsway, W.C. 2.

Report for the Year 1921–22 *by the Director of the Royal Scottish Museum, Edinburgh.* London: H.M. Stationery Office, Kingsway, W.C. 2. Price 6*d.* net.

Reports of the Light Alloys Sub-Committee, 1921. *Advisory Committee for Aeronautics.* H.M. Stationery Office, Kingsway, London, W.C. 2. Price 18*s.* 6*d.* net, post free.

Catalogue

Technical and Scientific Books, Second-hand and New. W. and G. Foyle, Ltd., 121-125, Charing Cross Road, London, W.C. 2.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motor.

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published October 5, 1922

9,847. LUFTSCHIFFBAU ZEPPELIN GES. and P. JARAY. Fins and keels for airships. (161,179.)
9,944. E. A. PERRIN. Aeronautical machines of helicopter type. (162,275.)
9,961. N. TESLA. Aerial transportation apparatus. (185,446.)
15.301 E. B. VAUGHAN. Wind motors, propellers, etc. (185, .)
15,622. Y. P. G. LE PRIEUR. Apparatus for correcting the course on board of aircraft. (164,343.)
25,951. Landing indicators for helicopters. (169,720.)
27,425. M. L. V. LAME. Aircraft of helicopter type. (185,661.)

Published October 12, 1922

15,847. FAIREY AVIATION CO., LTD., and C. R. FAIREY. Ships for use with aeronautical machines. (185,821.)
16,356. P. SALMON. Operating means for aircraft controls. (185,849.)
16,357. J. M. NORMAN. Means for operating aircraft controls. (185,850.)
16,506. Y. P. G. LE PRIEUR. Apparatus for correcting course on board of aeroplanes. (166,119.)
29,982. H. O. SHORT. Aeroplane flying-machines. (185,992.)
31,104. RAUL, MARQUIS OF PATERAS PESCARA. Flying-machines of the helicopter type. (171,712.)

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xvi.)

INSTRUMENTS (Speed), Watches, &c.—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Goldsmiths & Silversmiths Co., 112, Regent Street, W. 1. Gerrard 9091 (3 lines).

Smith, S., & Sons (M.A.), Ltd., Cricklewood Works, N.W. 2. Willesden 2335 (7 lines).

INSULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C. 1. City 3115; "Vanduara," Cent, London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2. Central 1156 (3 lines); "Cherry," Cent, London.

MACHINING—

Monk Engineering Co., Ltd., Coventry. Coventry 807; "Assistance," Coventry.

MAGNETOS—

British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry. Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

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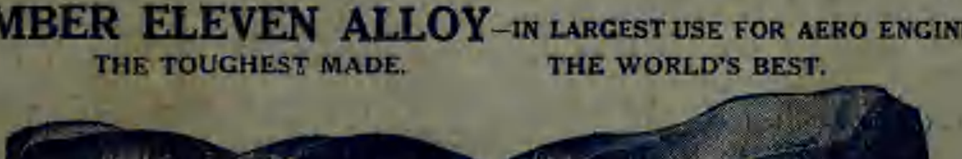

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Oct. 16–21	**Daily Mail £1,000 Gliding Competition**
Oct. 26	**Royal Aero Club Dinner at Savoy Hotel, celebrating the Schneider Cup victory and first King's Cup Race**
Nov. 30	**Closing date for FLIGHT Glider Designing Competition**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

A Splendid Example

THE Detroit Aviation Meeting, just concluded, provides a splendid example of how Government departments can assist the cause of aviation, not only by placing orders—that is done as a matter of course by any Government realising that an aircraft industry must be kept alive—but by placing orders for machines which are not strictly service machines, although incorporating features which are as desirable in service craft as in sporting machines. In the race for the Pulitzer Trophy no less than 21 machines were entered by the American Government, 16 of which were entered by the U.S. Army Air Service and five by the Navy Air Service. Evidently the American authorities realise that the machine which makes a really fast racer has most of the characteristics required in a single-seater fighter, or "Pursuit" machine, as our cousins call them. The one important performance item which, probably, these racing machines do not possess is that of climb. There does not, however, appear to be any reason why, with wings of larger area, and, of course, equipped with the required armament, such machines should not make very excellent "Chasers," and by sanctioning orders for machines of the racing type the American Treasury gives a stimulus to the sporting side which must be of the very greatest value in arousing enthusiasm for and interest in flying all over the States. The result is that, the next time the taxpayer is asked to loosen his purse-strings for the provision of aircraft, he is likely to do so much more willingly than if the same money had been spent on pure service types about which he would probably have heard little, and consequently cared rather less.

There is in the American Army and Navy Air Service entries an example which it is devoutly to be hoped our own Air Ministry and Treasury may follow. Take a machine like the Gloucestershire Aircraft Company's Mars I with Napier "Lion" engine, which we mention by reason of its being the only really fast racing machine which this country possesses today. We are quite certain that, if this machine were fitted with slightly larger wings and equipped with machine guns and ammunition, it would make a single-seater fighter of the greatest value. Other firms would undoubtedly be very willing to turn their attention to the production of racing machines if the Air Ministry were to give financial assistance.

Apart from the value as aerial propaganda, the mere flying of such machines by service pilots would provide a form of training which could not fail to be of the greatest benefit to the service. From the structural and aerodynamic point of view, practice in producing such machines would mean progress in our designing offices and aircraft works. Nothing tries out a design so thoroughly as having to attain speeds of over 200 m.p.h. Refinements which have never been considered worthy of attention before prove sheer necessities. Wide speed range is essential if a reasonably safe landing speed is to be retained, and altogether the strong and weak points in a design are nowhere brought out more clearly than in a racer.

History has shown that the racer of today is the service craft of tomorrow. The Sopwith Schneider machine was, in its day, considered somewhat of a racing freak. Yet what happened? When war broke out this very type did a tremendous amount of extremely useful work in the R.N.A.S. The Bristol "Scout," designed by Capt. Barnwell, was the fastest machine of its day. During the early part of the war it was used as a single-seater fighter. And so one could continue giving examples of racing machines having proved their worth in the services. We strongly urge the Air Ministry and the Treasury to consider the matter, and at once. There is no time to lose. If orders are placed with firms for racing machines, bearing in mind the possibility of conversion into service craft, and such machines be entered in all important air races, not only will the sport receive a much needed stimulus, but the industry will benefit, and so will, ultimately most of all, the Royal Air Force. Our thanks to America for her excellent and practical example. It now rests with us to profit by it.

◆ ◆ ◆

Bravo, Raynham! There can be no doubt whatever that the British gliding competition for the *Daily Mail* £1,000 prize and several smaller subsidiary prizes has already, after but two days, proved a great success. Probably not even the greatest believers in the possibilities of gliding as a sport had ventured to hope for such splendid performances as have been attained during the first two days of the competition. Even among enthusiasts it is doubtful whether many seriously believed that the stipulated minimum time of 30 minutes would be attained, while we have spoken to very many who were firmly convinced that the competition would be a "wash-out." We had become so accustomed to remembering that the Germans had had several years of practice in the sport, and the relatively meagre results obtained by the French at Clermont-Ferrand seemed to bear out the general belief that a very great deal of practice both in the design and construction and flying of gliders was necessary before results of any importance could be attained.

Monday and Tuesday of this week proved such pessimism wrong. With the exception of the Dewoitine and Aachen monoplanes and Fokker biplanes, all the entries were first attempts in designing gliders, and were flown by pilots who had had no previous experience on this type of aircraft. Yet look at the results already obtained. In his fourth or fifth flight Raynham remained aloft for 11½ minutes, and in his sixth or seventh he increased his time to close on two hours. Gordon England, who has not flown any sort of aeroplane for four years, has also put up very creditable performances, whilst several other promising machines are "in sight" to carry on during the remaining four days of the competition and to raise the duration "record" for Britain. It is not now unduly optimistic to express the hope that the German record of three hours 10 minutes, established by Herr Hentzen on the Hannover "Vampyr," may be equalled or even excelled before the close of the meeting. Raynham himself could probably, had it not been for his somewhat awkward controls, have remained up considerably longer on Tuesday, and when he has had certain minor adjustments made he will probably succeed in raising his previous time, provided always that present weather conditions continue.

Gordon England's little monoplane, the smallest of the bunch, is designed for flying in high winds, and we firmly expect him to challenge Raynham's wonderful performance before the end. He may even have done so by the time these lines appear in print. Other machines are being tuned up, some of which are designed for relatively faint winds, others for high winds, so that whatever the elements may produce during the next few days, the glorious sport should continue. The Sayers machine is very similar in general lines to the "Vampyr," and when Courtney has had a bit of experience it should prove a serious competitor to the Handasyde. The two de Havillands have not yet had an opportunity, owing to minor damages, of showing what they can do, except in a straightforward glide. Even so, they both exhibited great capacity for remaining aloft while the least bit of up-current remained to support them, and when they have been put right again they should also provide really good sport.

As to the lessons already learned, it is too early to speak as yet; so many different types have not had an opportunity of being thoroughly tested out. Next week it should be possible to form certain definite conclusions. Already it appears that no one machine can be the "best" for all conditions. One type is at its best in strong winds. Another does better in medium winds, but it does not appear that there is a very great deal to choose between them. We rather think that improvements will be along structural lines, and more connected with the practical side of handling the machines on the ground. For instance, the type of undercarriage to fit, facility in dismantling the wings for transport, and features of this kind. Otherwise it appears, as far as it is possible to see at present, that any reasonably clean design of not too great weight should be capable of good performance. As we have constantly maintained, most of the success depends upon the pilot.

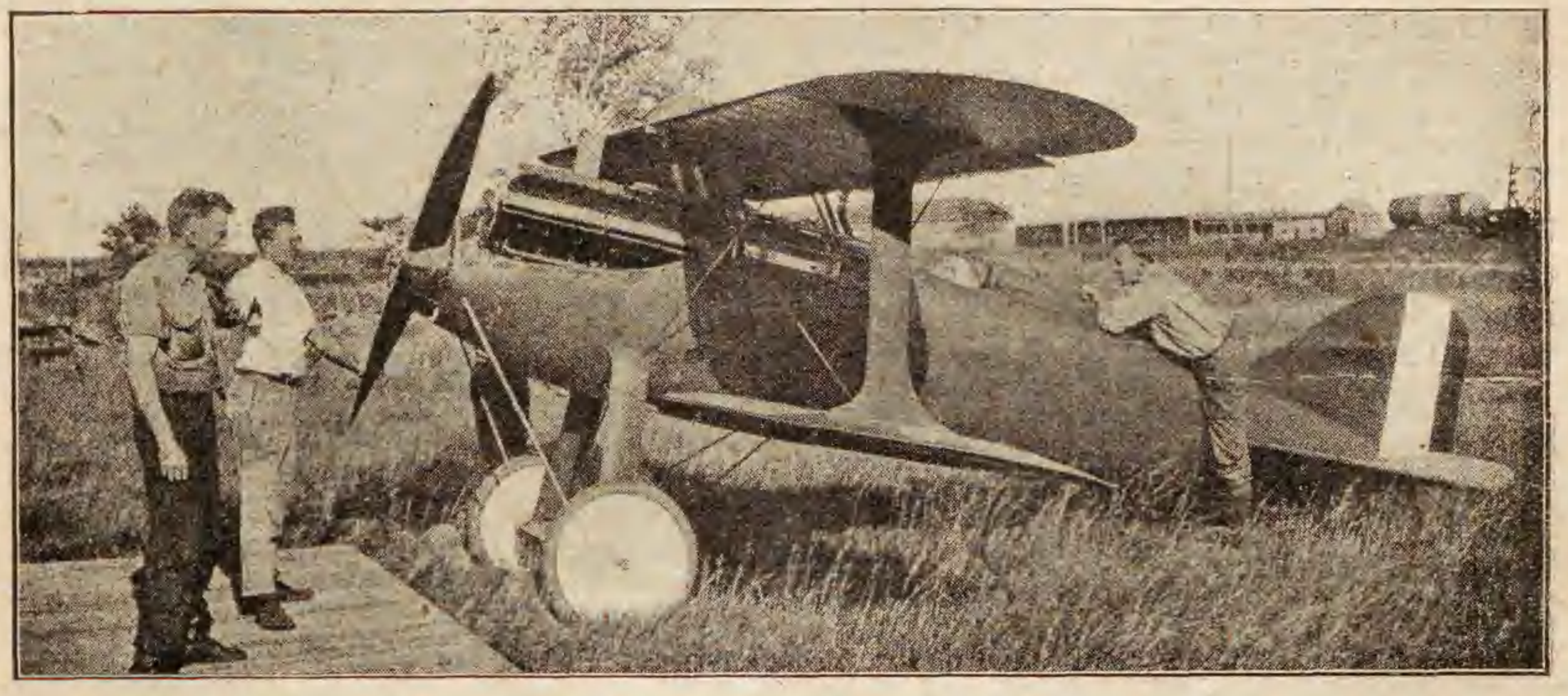
The public interest in the competition is tremendous, and we sincerely trust it will be found possible to retain the range of hills from Itford to Firle permanently, so as to establish there a gliding club where, during week-ends, pilots may enjoy this exhilarating sport. The place is within easy reach of London, both by road and rail, and those who are not in a position to take up the sport actively will at any rate be able to afford a week-end ticket to Lewes, and thus combine the enjoyment of pure air on top of the hills with watching what is undoubtedly one of the prettiest sports in the world.

THE 1922 PULITZER TROPHY RACE

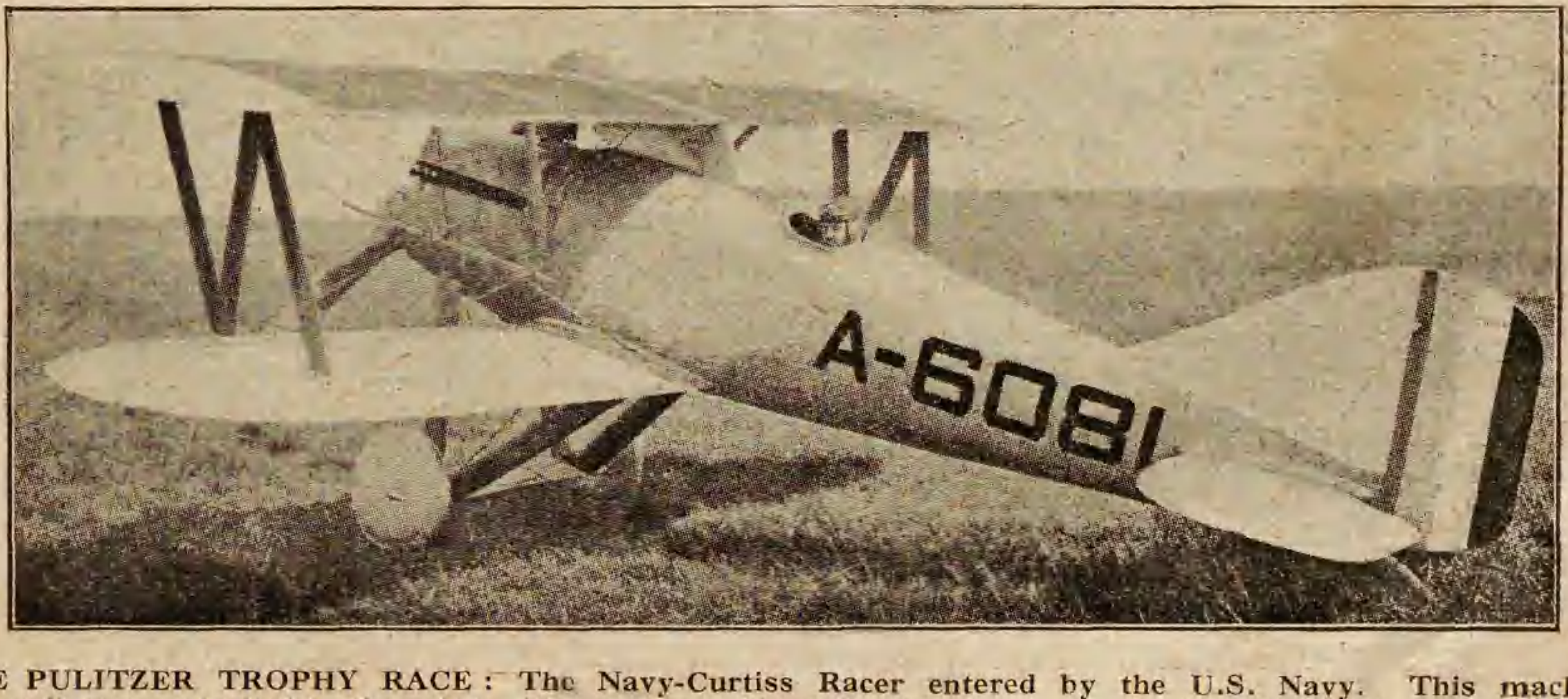
THIS year's Pulitzer Race, which was flown on October 14, was won by Lieut. R. L. Maugham, flying one of the Army-Curtiss Racers, who covered the 160 miles triangular course at a speed of 206 m.p.h. Lieut. Maitland, in a similar machine, was second.

We give below some brief particulars and illustrations—for which we are indebted to our American contemporary, *Aviation*—of some of the competing machines. The outstanding feature of this year's race is the comparatively large number of new machines, specially built for this race, and entered by the U.S. Army and Navy Services. It is reported that there were 21 entries, made up as follows :—U.S. Army : Two Curtiss biplanes, two Loening monoplanes, two Thomas-Morse TM 22 monoplanes, three Verville-Sperry monoplanes, one Verville-Packard biplane (type of 1920 Pulitzer winner), and six Thomas-Morse MB 3 pursuit biplanes. U.S. Navy : An improved Curtiss biplane, a Curtiss "Wild-cat" triplane, a Thomas-Morse MB 7 monoplane, one "Bee-Line" (Booth-Thurston) monoplane, and the Navy "Mystery" plane.

The Curtiss Machines.—The Curtiss fleet consisted of a Navy racer, biplane, and a racing triplane, entered by the U.S. Navy, and two Army racers, entered by the U.S. Army. An outstanding feature with three of these machines may be said to consist of the employment of wing-radiators—radiators built into and following the contour of the wing itself—instead of the usual type of water-cooling radiators. We refer to this again later. The Navy racer is similar to the type which won last year's Pulitzer race, but with certain modifications, and improvements. These two machines differ only in that one year's model is fitted with Lamblin radiators, mounted on the landing chassis, whilst the other is equipped with the wing type radiator. The fuselage, of Curtiss-ply construction, is carefully streamlined and of the minimum cross-sectional area. The wings are of multi-spar construction, with Curtiss-ply covering. The petrol tank is mounted between the top plane and the fuselage, and is streamlined. A Curtiss C.D. 12, 12-cylinder engine is fitted, which develops 400 h.p. at 2,000 r.p.m. A simplified oiling system, reducing the number of tanks and parts to a minimum, is employed, in addition to an improved type of oil cooler, which maintains a constant oil temperature, low enough to permit the engine to deliver its maximum horse-power at full throttle. Aluminium and duralumin have been made use of to the fullest possible extent, including in many instances piping, tanks, fittings, etc. The principal characteristics of the Navy Racer are as follows :—Span (overall), 22 ft. 8 ins. ; length, 21 ft. ; height, 8 ft. 11 ins. ; chord, 4 ft. ; gap, 4 ft. ; stagger, 1 ft. 3 ins. ; wing section, Sloan ; angle of incidence, 0° ; dihedral (lower), 2° ; total wing area, 168 sq. ft. ; area of ailerons, 18 sq. ft. ; elevators, 9·2 sq. ft. ; tail plane, 12·6 sq. ft. ; fin, 4.8 sq. ft. ; rudder, 4·8 sq. ft. ; weight empty, 1,735 lbs. ; weight laden, 2,165 lbs. ; loading/sq. ft., 12·5 lbs. ; loading/h.p., 5·24 ; speed range, 70-190 m.p.h. It is estimated that with the wing-radiators an increase in speed of 10 m.p.h. is obtained.



THE PULITZER TROPHY RACE :—One of the two Army-Curtiss Racers entered by the U.S. Army Air Service. These machines have wing radiators, and are fitted with 375 h.p. Curtiss D 12 engines. One of these machines, piloted by Lieut. R. L. Maugham, won the trophy at a speed of 206 m.p.h.



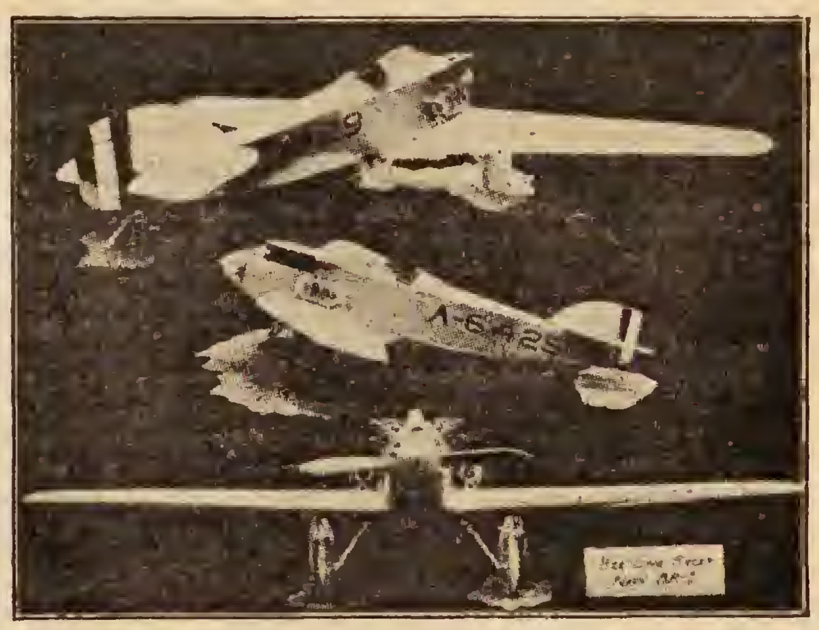
THE PULITZER TROPHY RACE : The Navy-Curtiss Racer entered by the U.S. Navy. This machine has radiators embodied in the wings (the previous Navy-Curtiss Racer hav.ng Lamblin radiators), 400 h.p. Curtiss CD 12 engine.

The Army Racers are the latest development of Curtiss practice. The fuselage is of Curtiss-ply, a strong light 2-ply veneer of laminated spruce, $\frac{3}{32}$-in. thick, and like the Navy Racer, well streamlined. The weight of the fuselage complete is only 127 lbs. The projected area of the fuselage is 25 per cent. less than that of the Navy Racer, which won last year's race. The wings are multi-spar, Curtiss-ply covered, with wing-radiators. These latter consist of corrugated sheet brass radiator surfaces which replace the wing covering, top and bottom, maintaining the true shape of the wing section. The flow of air around the wings thus cools the engine water without any extra head resistance. It may be of interest to note this type of radiator was developed by the Curtiss Co. during the last two years, and has been given a thorough "try-out," on one occasion a cross-country flight of about 1,500 miles at an average speed of 100 m.p.h. being made by a Curtiss "Oriole" fitted with this radiator.

The Army Racer has single I-inter-plane struts, and the fixed tail surfaces are of the Curtiss-ply cantilever construction, without any external bracing. The control surfaces—ailerons, elevators and rudder—are of steel and duralumin, with fabric covering, and are all operated by means of internal cables and tubes. The wing section employed is the Curtiss No. 27. A Curtiss D. 12, 375 h.p. 12-cylinder V engine is fitted. By the employment of the single-strut type of landing chassis the resistance of this unit has been reduced two-thirds, whilst retaining the strength and rigidity of the conventional V-chassis. The wheels are provided with cupped discs of aluminium which cover the spokes and hub, and a fabric covering is applied over the wheel and tyre in such a manner that a smooth oval section is presented to the air stream. The axle is enclosed in a lifting section fairing, 7 sq. ft. area. Characteristics; Span, 19 ft.; length, 18 ft. 11 ins.; height, 7 ft. 10 ins.; chord, 3 ft. 10 ins.; gap, 3 ft. 10½ ins.; stagger, 7½ ins.; angle of incidence, 0°; no dihedral; total wing area, 131 sq. ft.; area of ailerons, 9·25 sq. ft.; tail plane, 11·2 sq. ft.; elevators, 9·2 sq. ft.; fin, 4·9 sq. ft.; rudder, 4·9 sq. ft.; weight empty, 1,454 lbs.; weight laden, 1,950 lbs.; loading/sq. ft., 14·1; loading/h.p., 5·2 lbs.; speed range, 70-200 m.p.h.

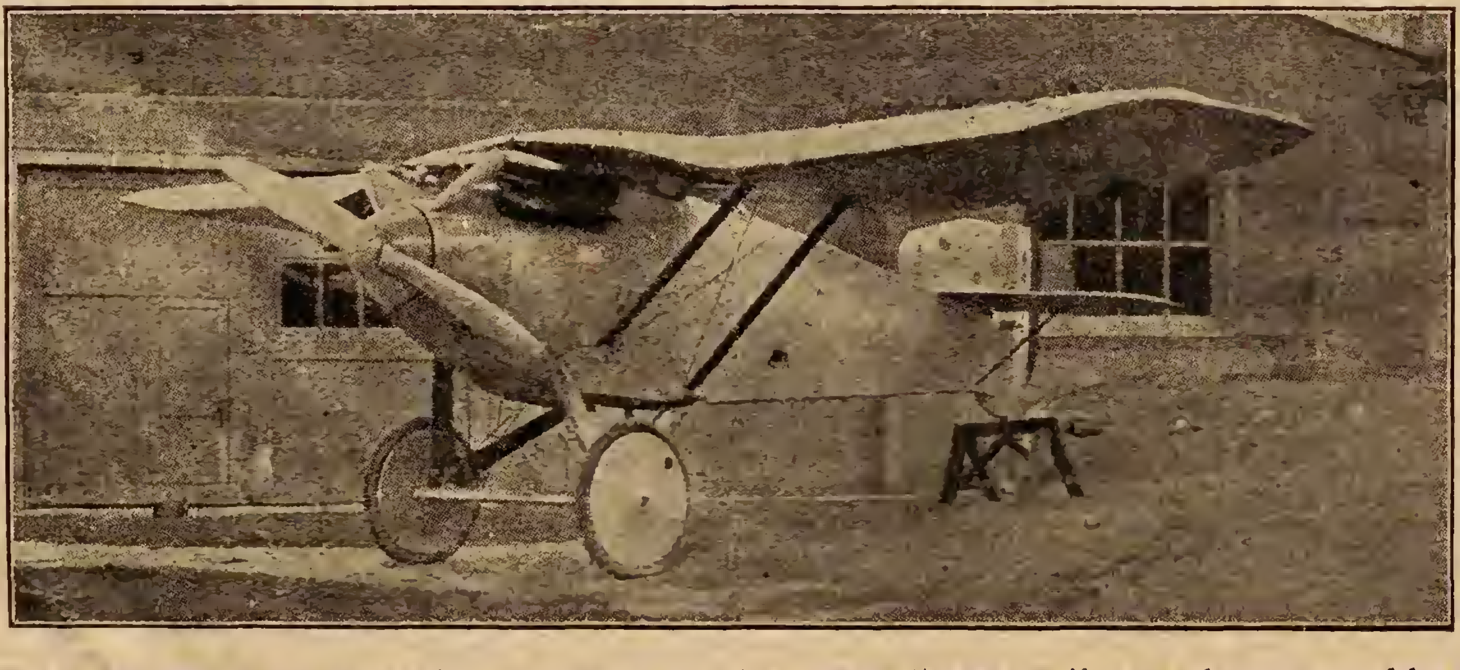
The Navy Triplane is a development of the 1920 "Wild-cat" monoplane, which "grew" its extra wings, first a pair at the 1920 Gordon-Bennett race in France, and then another pair at Omaha race in 1921, as a result of the difficulty experienced in landing at speed on the aerodromes at the places mentioned above. This year's machine, however, has been practically rebuilt, but unfortunately an illustration and full particulars of this machine are not available at the moment. It is fitted with a Curtiss 430 h.p. C. 12 geared type engine, and has the multi-spar wing construction and Curtiss-ply monocoque fuselage, as in the other models. A Curtiss flat plate radiator, mounted on the fuselage, is fitted. Characteristics: Span (all planes), 20 ft.; length, 19 ft. 3 ins.; height, 8 ft. 6 ins.; chord (top), 3 ft. 6 ins., (others) 3 ft.; gap, 2 ft. 8 ins. (top) and 2 ft. 7 ins.; stagger, 1 ft.; angle of incidence, 0°; dihedral, 2¾° (lower); total area, 179·5 sq. ft.; weight empty, 1,936 lbs.; weight laden, 2,406 lbs.; loading/sq. ft., 13·4 lbs.; loading/h.p., 5·5 lbs.; speed range, 70–196 m.p.h.

The "Bee-Line" Racer.—The Navy also entered a monoplane, known as the "Bee-Line" Racer, or Navy B.R. 2, designed and built by Messrs. Booth and Thurston, of the Aerial Engineering Corp., Hammondsport, N.Y., who were formerly with the Curtiss Co. in 1921 and worked on the Curtiss Racer of that year. The B.R. 2 is a cantilever monoplane possessing many original features, and having the wings mounted low on the fuselage, as in the Junkers. A retractable landing gear is fitted, the entire chassis being withdrawn into the fuselage once the machine is in the air. This machine, we believe, also utilises the wings as a radiator for cooling the engine water, the wings being covered by a thin sheet of copper, under which the water circulates. The wings have a pronounced taper from root to tip both in plan form and in thickness. The fuselage is of deep rectangular section. The engine is a 400 h.p. high compression Wright model H. 3. Characteristics: Span 28 ft. 1 in.; length, 21 ft. 1¼ ins.; height, 6 ft. 4½ ins.; chord, 6 ft. to 2 ft.; dihedral angle, 3½°; wing section, Göttingen, 387; total wing area, 104 sq. ft.; weight (fully laden), 2,020 lbs.; loading/sq. ft., 19·4 lbs.; loading/h.p., 5 lbs.; speed range, 70-190 m.p.h.



THE PULITZER TROPHY RACE: The Navy BR-2 ("Bee-Line") monoplane, 380 h.p. Wright.

The Loening Racers.—The two Loening Racers, entered by the Army, are of a similar type, possessing several outstanding features. They are cantilever monoplanes, with the wings low down on the fuselage. The heavy continuous wing spars of the main wing structure carry the landing chassis, whilst the engine is also mounted directly on them. This engine, the new 600-630 h.p. 12-cylinder Packard, specially developed for the Army Air Service, is relatively so large in comparison with the machine that the engine itself extends over a third the distance of the fuselage back to the rear spar of the wings. The petrol tank, with a capacity for 1½ hrs., is mounted immediately behind the engine, and behind the tank, at the rear of the wings, is the pilot's cockpit, from which an excellent range of vision is obtained. The wings, fuselage, landing chassis and tail weigh only 500 lbs., or one-third the weight of the power plant, including engine, radiator, water, etc. As the



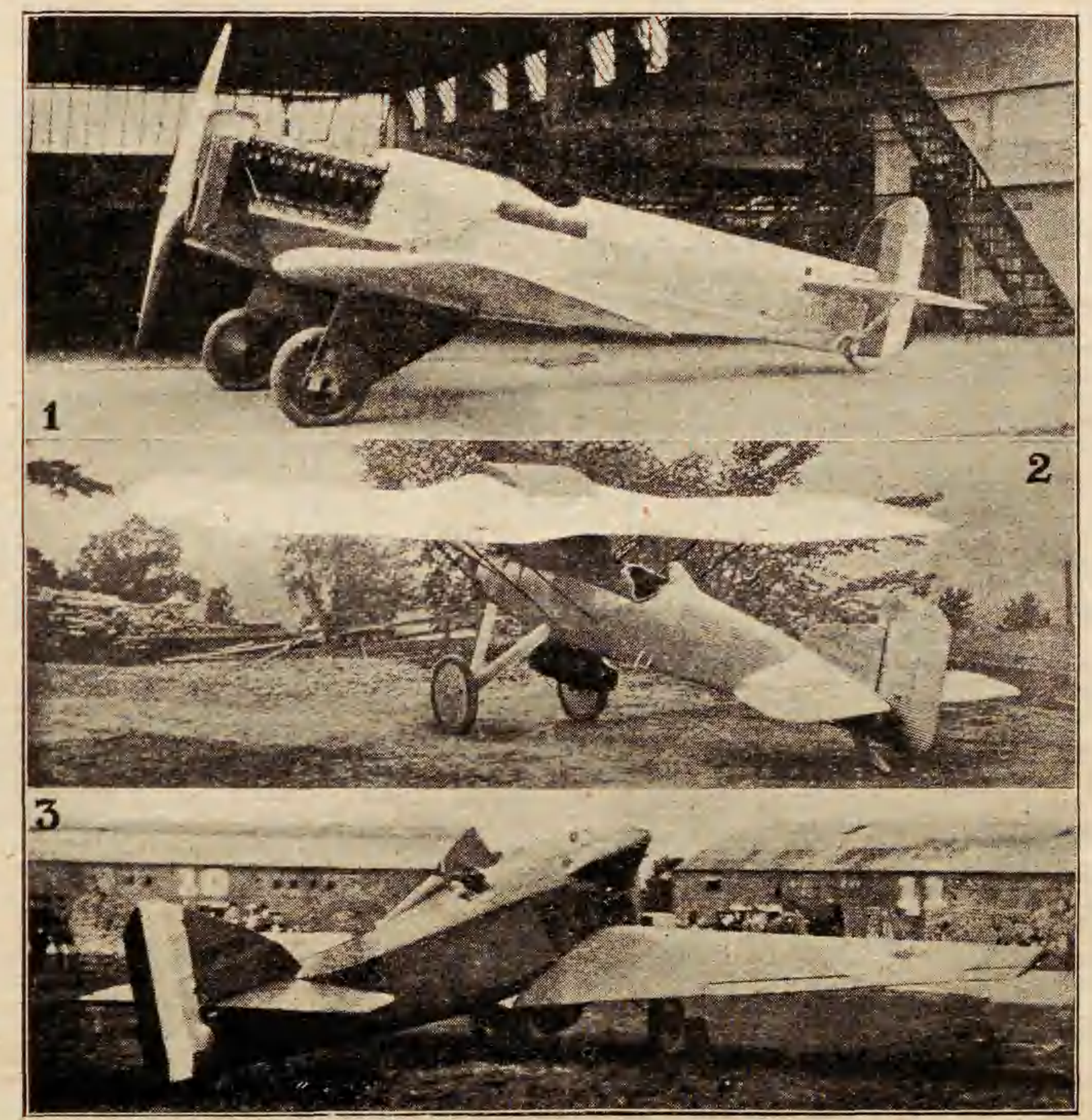
THE PULITZER TROPHY RACE: The Thomas-Morse MB7 "parasol" monoplane, entered by the U.S. Army Air Service, 400 h.p. H3 Wright.

gross weight of the machine is 2,700 lbs., the loading per horse-power is as low as 4·3 lbs., whilst the loading per square foot is 15·5, so that the claim for high speed together with extreme manœuvrability is not unreasonable. Further particulars, as regards construction, etc., are not yet available, but the principal characteristics are as follows :—Span, 27 ft. ; length, 21 ft. ; height, 7 ft. ; total wing area, 174 sq. ft. ; weight (laden), 2,700 lbs. ; loading/h.p., 4·3 lbs. ; loading/sq. ft., 15·5 lbs. ; speed range, 72-190 m.p.h.

The Thomas–Morse Machines.—In addition to six M.B. 3 biplanes, which are more or less conventional pursuit-type machines, and one M.B. 7, a parasol monoplane similar to that entered in last year's race, the Army had two new Thomas-Morse racers in this year's race of a very interesting type. Unfortunately, detailed particulars of these two machines, which were of the same type, are lacking, but it will be seen from one of the accompanying illustrations that the general lines resemble those of the M.B. 7 in that it is a parasol monoplane of the "semi-cantilever" type, with an arch or hump in the centre of the wings. The T.M. 22, as this new type is styled, differs considerably otherwise, however, for it is constructed entirely of metal. The wings, tail surfaces and fuselage are covered with corrugated sheet duralumin, except for the fore part of the fuselage, where the metal is quite smooth. This metal is also employed in the construction of the fuselage, wing and tail plane structures, but steel tubing is used for the engine mounting. The engine is the new 600 h.p. "2025" Packard previously referred to. The wings are mounted above the fuselage by four struts each side of the fuselage, the first two front ones of each set forming an inverted V. The distance from the attachment of these struts on the wings to the wing tip equals about one-third the total span. Characteristics : Span, 29 ft. ; length 19 ft. 9 ins. ; chord, 6 ft. ; total wing area, 172 sq. ft. ; weight (laden), 2,750 lbs. ; loading/h.p., 4·5 lbs. ; loading/sq. ft., 16 lbs.

Apart from the general design, the M.B. 7 is of orthodox wood construction, with fabric-covered wings and fuselage. The principal characteristics are : Span, 24 ft. ; length, 18 ft. 6 ins. ; height, 7 ft. 3 ins. ; chord (mean), 5 ft. ; angle of incidence, 1° ; dihedral, 5° ; wing section, mod. U.S.A., 27 ; total wing area, 112 sq. ft. ; engine, Wright H. 3, 400 h.p. ; weight (laden), 2,000 lbs. ; loading/h.p., 5 lbs. ; loading/sq. ft., 17·8 lbs. ; speed range, 60·5-180 m.p.h.

The Verville-Sperry Racers.—The Verville-Sperry machine, two of which were entered by the Army, is also an "underslung" cantilever monoplane, designed by Alfred V. Verville, of McCook Field, the builders being the Sperry Aircraft Co., of Farmingdale, L.I. Amongst the most interesting features are a retractable wide-track landing gear, with the wheels so arranged that they extend out under the wings, and fold up under the latter when the machine is in flight. What i claimed to be an absolutely unique feature is a shock-absorbing wheel, the axle or hub of which is embedded in rubber. The fuselage and tail surfaces are constructed completely of steel tubing, and the tail plane is adjustable. Another feature is the shock-absorbing engine mounting, the engine bolts being embedded in rubber spools, so that much of the vibration when the engine is running on full throttle is eliminated. The wings are double cambered, and of wood construction, with box spars, and fabric covered ; the leading edge is reinforced with veneer. The forward half of the fuselage is covered with aluminium, and the rest with fabric. A Wright racing model H. 3, 380 h.p. engine is fitted. Characteristics : Span, 32 ft. 4 ins. ; length, 22 ft. ; chord, 5 ft. ; total wing area, 150 sq. ft. ; weight (laden), 2,225 lbs. ; loading/h.p., 5·9 lbs. ; loading/sq. ft., 15 lbs. ; speed range, 67-190 m.p.h.



THE PULITZER TROPHY RACE : Three of the monoplanes entered by the U.S. Army Air Service. 1. The Loening cantilever, 600 h.p. Packard. 2. The Thomas-Morse TM 22 all-metal "parasol," 600 h.p. Packard. 3. The Verville-Sperry cantilever, 380 h.p. H3 Wright (racing model).

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

HENRY FARMAN is practising gliding outside Boulogne on one of his "Moustiques." Already he has made a considerable number of flights, lasting on an average 4 mins. each. In the meantime, the glider should soon arrive at Itford Hill if it is to take part in the British competition.

* * * *

SEVERAL well-known aircraft constructors are following with interest the happenings on the South Downs. Mr. C. R. Fairey is staying there *en famille*. Capt. Geoffrey de Havilland arrived on Sunday last by air, and landed in a field below the hill. Mr. F. Handley Page, in spite of a damaged undercarriage, was also an interested spectator. On enquiry, we learned that "H. P." had been playing golf, and that in making a drive he kept his foot flat on the ground, with the result that there was a crack as if he had broken his club, and his knee joint was found to be wrenched. He had to go to bed for a fortnight, and Sunday last was his first day out. With the aid of crutches Mr. Handley Page was able to get about, but not without difficulty, and climbing up and down the slopes around Itford is not exactly suitable exercise for a man with a broken leg. Still, wild horses could not have kept "H. P." away from the gliders. All will wish him a speedy recovery.

* * *

WHILE everyone sympathised most sincerely with M. Barbot, whose machine crashed on Sunday while taking off, it was impossible that the happening should not be made the subject of a joke, as would, of course, a mishap to anyone else. Some wag suggested that in the future the Dewoitine should be known as the "Do-it-in."

RAYNHAM'S controls have come in for a good deal of criticism, owing to the fact that he operates his *ailerons* by the simple procedure of pulling on the *aileron* cable with his left hand, while operating the elevator with his right and the rudder with his feet. It is suggested that if this tendency towards simplicity is allowed to grow we shall see pilots flying barefoot, with the rudder cables wound around their big toes, the elevator strings in their mouth and the *aileron* cables attached to their ears.

* * *

RAYNHAM has done well, hasn't he? Most people would say so. But still he has failed to do what he promised our representative on Sunday last. His scheme, and a perfectly good and unanswerable one it was, was to get off at sunrise and remain up until sunset. Other competitors would then be unable to beat him because "every day in every way is getting shorter and shorter."

* * *

ALTHOUGH the gliding competition has provided great sport and fine performances, it has sadly disappointed many. From the entries list one was justified in finding on, or at the foot of, Itford Hill a number of strenuous gentlemen pedalling away for dear life and lifting themselves into the air. Up till Tuesday night the only pedals we noticed were those on our "push-bikes," and they showed no inclination whatever to leave mother earth. But we still have hopes. It has been suggested that these direct-lift machines should be made to start from the foot of the hill and alight on the top. And quite right, too.

* * *

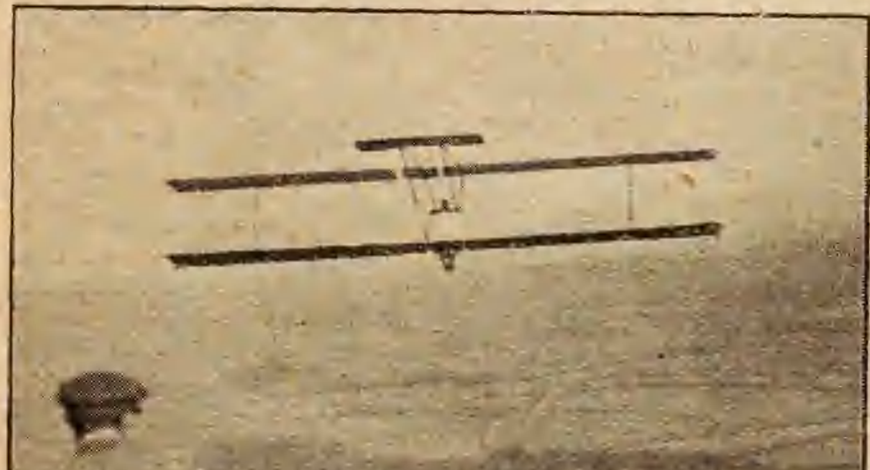
JUST as we are going to press we learn that Mr. Jeyes has crashed on his Aachen glider. Starting on Oct. 18, from Beddingham Hill in a strong gusty wind he fought gamely for 1½ minutes but, on attempting to land, a gust caught the machine and it crashed on a wing tip, turning over and pinning Mr. Jeyes underneath. Fortunately he escaped serious injury, but the machine is a complete "write-off."

THE BRITISH GLIDING COMPETITION

The Minimum Duration Exceeded on First Day of Meeting

LEWES, *Saturday, October* 14.

IN the tent hangars erected on the northern slope of Itford Hill competitors are busy putting finishing touches to their machines. The first of them to arrive on the scene of the gliding competition for the *Daily Mail* prize of £1,000 and several subsidiary prizes was Mr. Gordon England, who made one or two short "hops" yesterday to test the trim of his small monoplane. This machine is housed in the upper tent, as is also Raynham's monoplane and Jeyes' Aachen (Klemperer) machine, the monoplane which won the gliding competition in Germany last year. In the next tent M. Barbot's Dewoitine monoplane is standing all ready for the fray. During the early morning hours the other tents remained empty, but several competitors were expected to arrive during the day, notably Merriam's and Sayers' monoplanes.

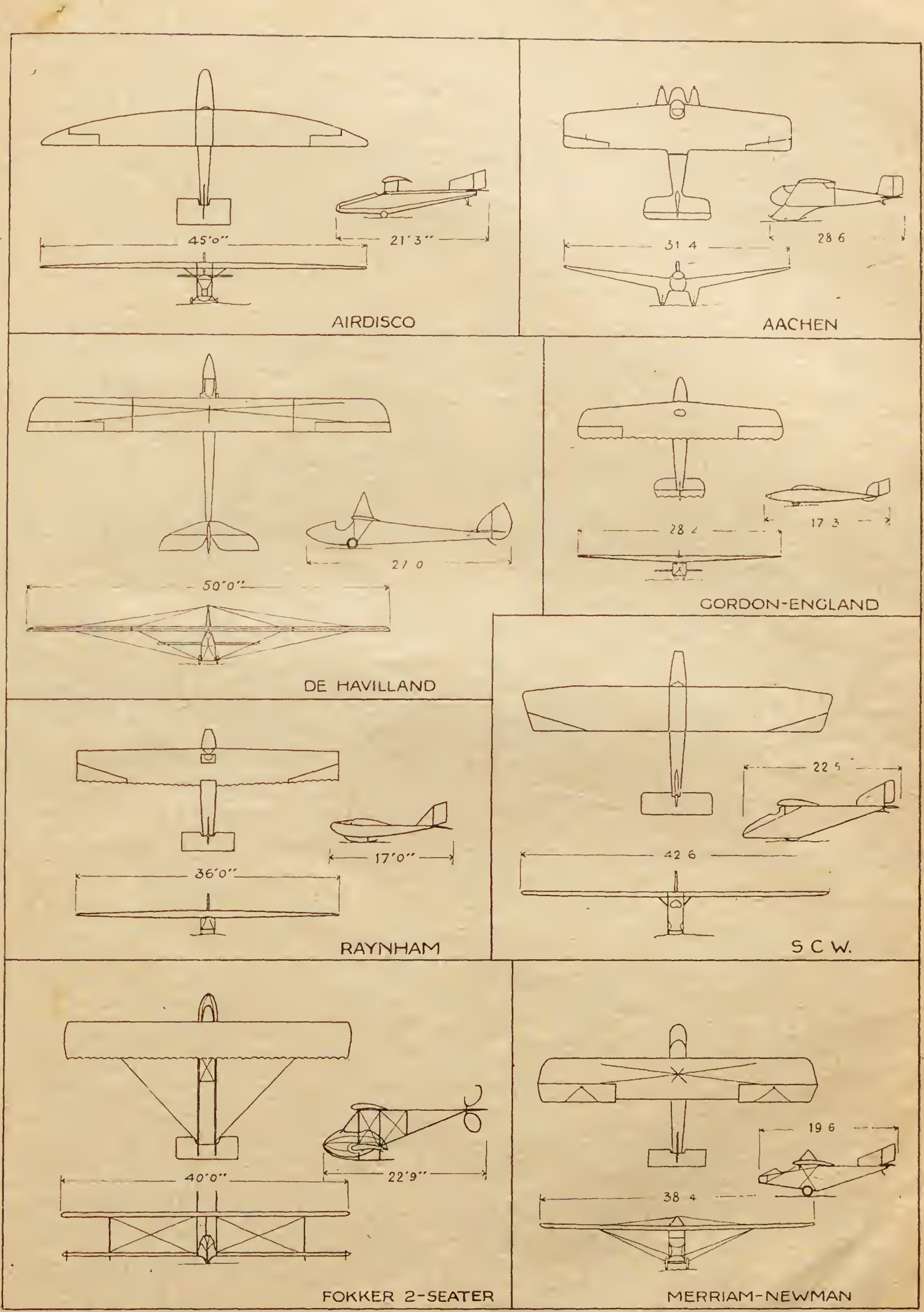


Fokker starts off on his 37 minutes' flight.

Gordon England had found in his preliminary flights that his rudder was on the small side, and he and his brother, George England, were busy during the day making a slightly larger rudder. About half-past three in the afternoon Mr. Jeyes had his Aachen lifted outside the hangar to try a short hop across the ridge which runs north from Itford Hill. A detachment of the R.A.F. (from Uxbridge) under the command of Flying Officer Gowler, have been "lent" by the Royal Air Force to assist in starting and generally handling the machines, and in Jeyes' attempt were hauling lustily on the ropes. When the word "Go" was given, the mechanics hanging on to the wing tip ropes did not let go in time, one of them getting tangled up in the long rubber cords used for starting. As the Aachen monoplane was not designed to carry passengers on its wing tips, it came down somewhat abruptly, and the landing shock broke one of the seat supports, and also caused an elevator pulley to come adrift. However, no great damage was done, and Mr. Jeyes and his assistants were soon at work patching up the broken parts.

Shortly afterwards, Raynham, Camm, and half a dozen of willing helpers carried the Handasyde monoplane to the top of Itford Hill, where Raynham tried three starts along the straight, not attempting to go "over the top." His machine got off remarkably well, leaving the ground at a speed of certainly not more than 10 m.p.h., and floated along a few feet above the ground, coming down gently and stopping in a couple of yards. While he was gliding along, Raynham worked his elevator vigorously to test the control, and even at that low speed the machine appeared to answer extremely well. The rudder control, however, was not quite so good, and Raynham decided to follow England's example and fit a slightly larger rudder.

Towards evening the Sayers' glider arrived on a lorry placed



AIRDISCO

AACHEN

DE HAVILLAND

GORDON-ENGLAND

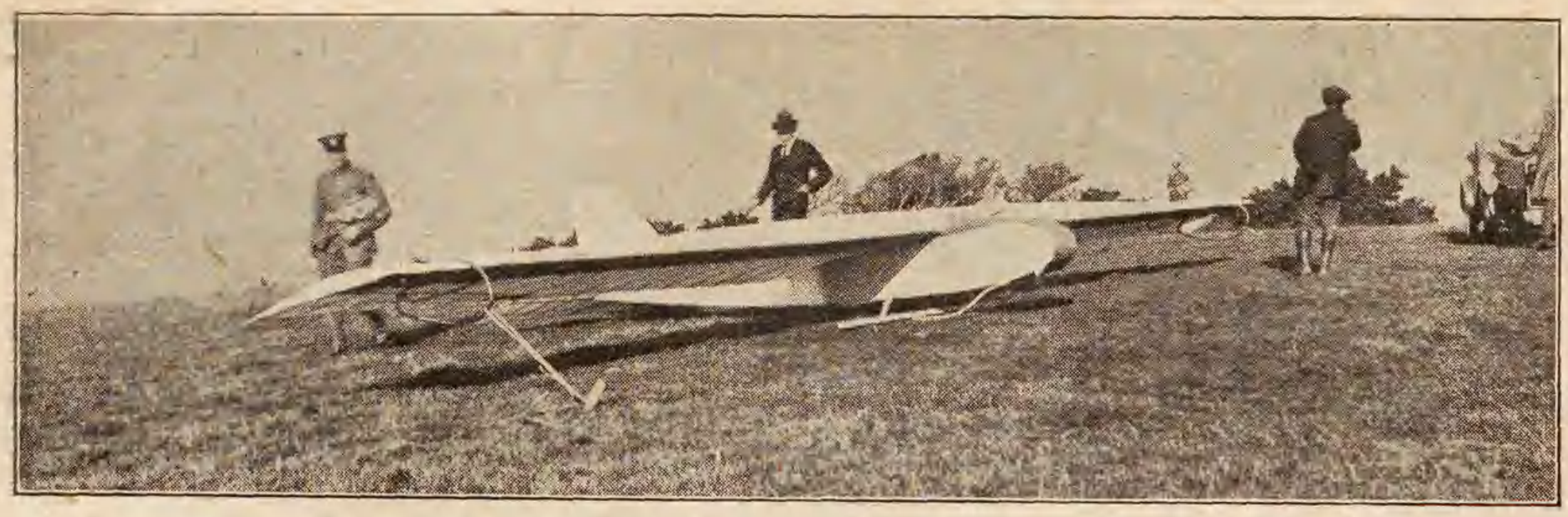
RAYNHAM

S C W.

FOKKER 2-SEATER

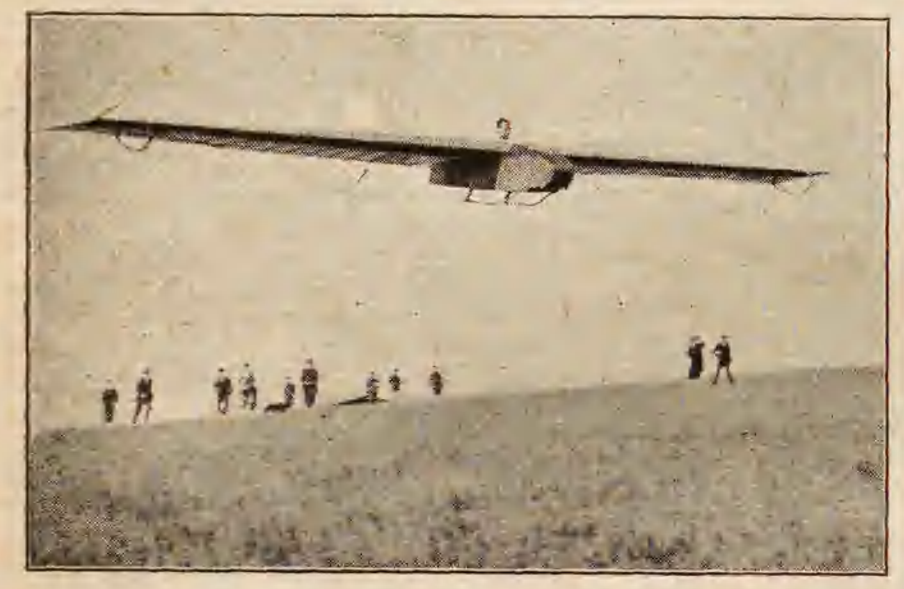
MERRIAM-NEWMAN

General arrangement drawings, to a uniform scale, of some of the competing gliders.



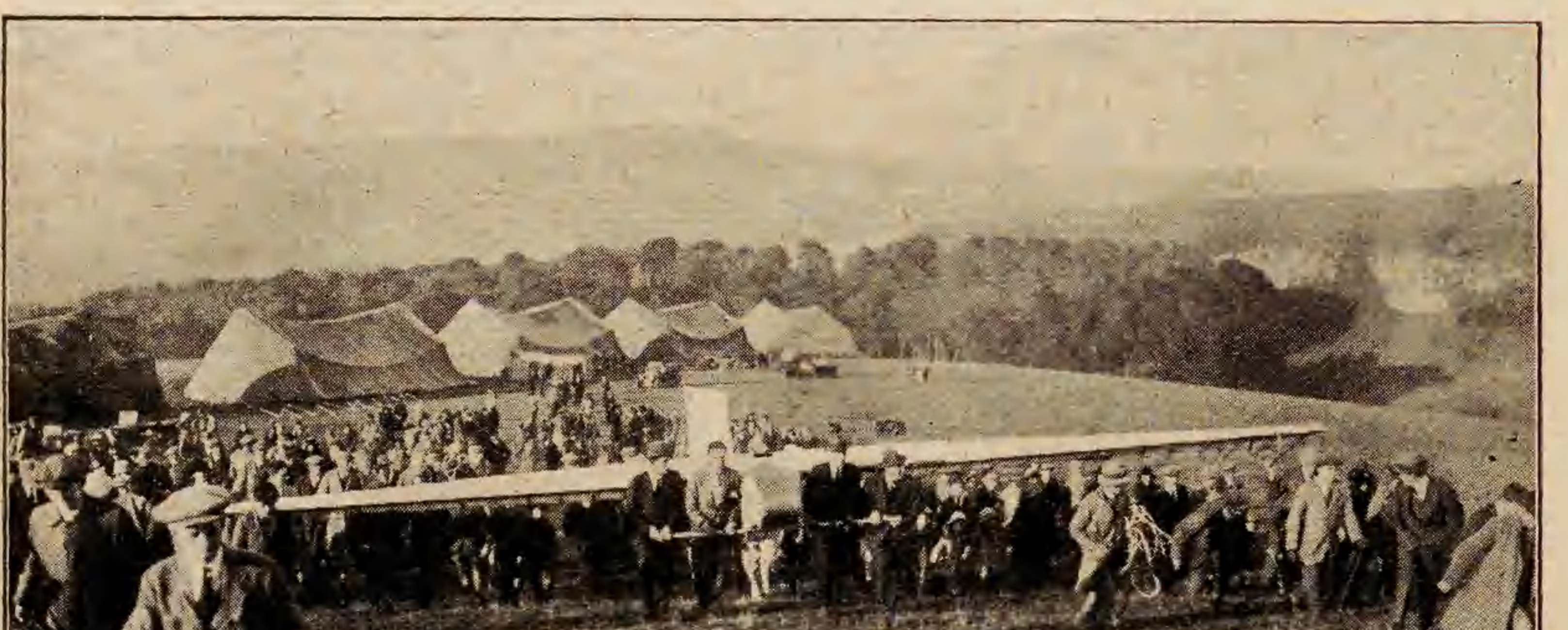
Raynham's Glider pegged down on the summit of Itford Hill.

at his disposal by Mr. Fairey, and the work of unloading it was commenced without delay. A few minutes afterwards Merriam and Newman came puffing up the slope of the hill in a little 10 h.p. car on which their monoplane glider had been carried, without other assistance, all the way from Southampton. It was gathered that Merriam and Newman had had quite an interesting time, what with the wind trying



Raynham making a short flight, October 15, to test his machine.

Raynham starting off on his 11½ minutes' flight.



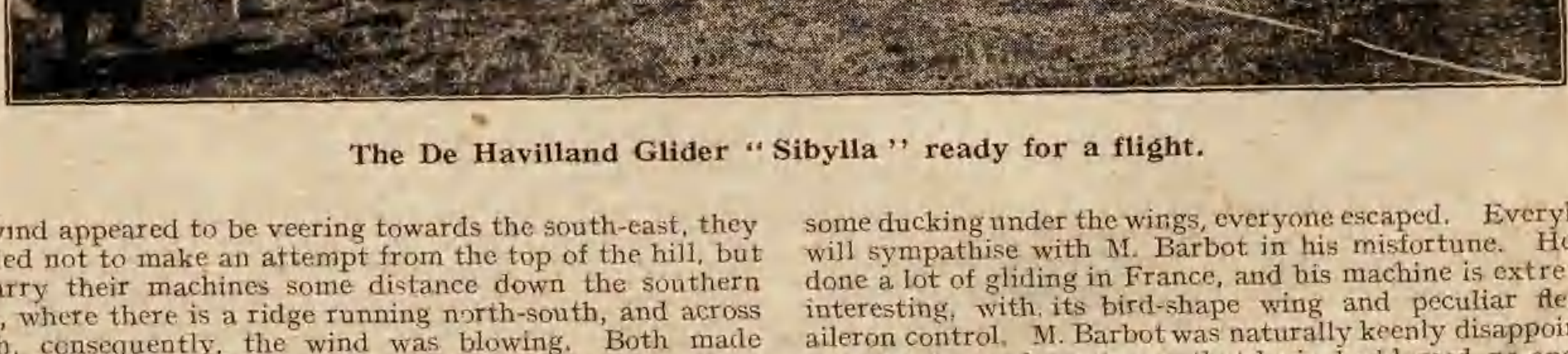
Carrying Raynham's Glider up to the top of Itford Hill. In the background may be seen the five tent hangars used for housing the machines.

to blow car, glider, and all into the ditch. Considerable time had also been wasted at toll gates, the keeper having to consult numerous books, forms, etc., before he could find out how much to charge for a glider. Even then he did not succeed, but had to make a guess according to the good old rule of three: If an aeroplane is charged so much, how much should one charge for an aeroplane which is not an aeroplane but a glider. The de Havilland machines had also been expected, but by the time the tents were shrouded in darkness they had not arrived.

Capt. Broad on the De Havilland Glider No. 4 making a flight from Beddingham Hill.

Sunday, October 15.—Today several more competitors arrived. The two Fokker machines (biplanes) were brought over from Peacehaven, and the crew got busy erecting them, which operation appeared to be rapidly performed. One of the machines is the two-seater on which Fokker remained aloft for 13 minutes with a passenger. The other is a single-seater without nacelle.

The two de Havilland gliders, Sibylla (No. 4) and Margon (No. 33) also arrived, and are being erected in the lower hangar. During the morning Raynham and Gordon England had their machines carried to the top of Itford Hill, but as the wind appeared to be veering towards the south-east, they decided not to make an attempt from the top of the hill, but to carry their machines some distance down the southern slope, where there is a ridge running north-south, and across which, consequently, the wind was blowing. Both made short flights into the valley, but found that as soon as they were clear of the slope they got into the down-current from the next slope, and had to dive into the valley. Both machines, however, were found to handle well, and Raynham began to get used to his somewhat unusual aileron controls.

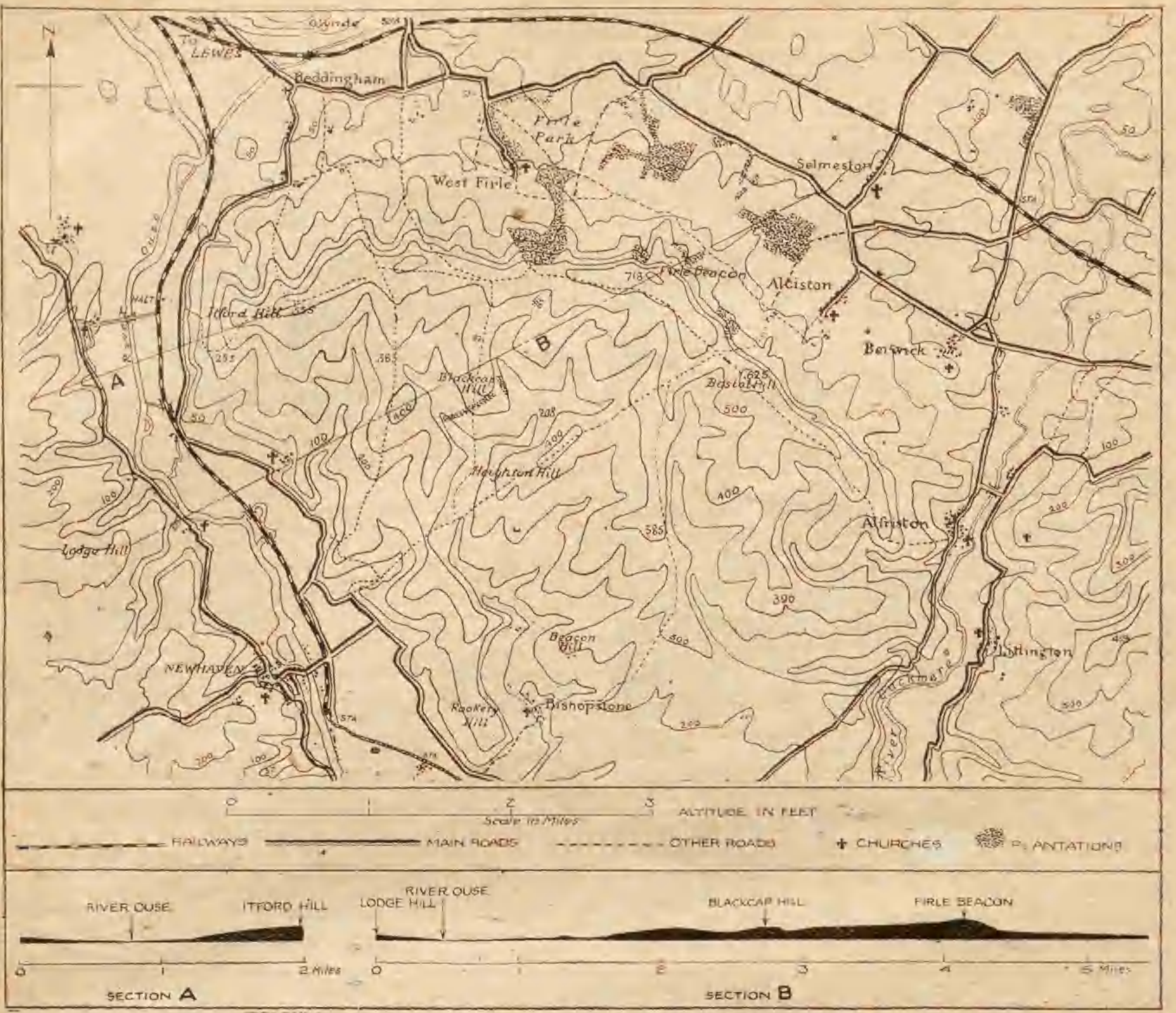


The De Havilland Glider "Sibylla" ready for a flight.

In the afternoon M. Barbot had his Dewoitine monoplane brought up to the top of Itford Hill, and as the wind was by then east-north-east, he intended to make start from the northern slope. The machine was placed in position, but partly owing to the crowd gathering around, and partly to the wind, the take-off was made in a cross-wind. The machine caught a gust under its starboard wing tip, which rose high into the air. The machine swerved to the left, touched with the left wing-tip, did a "cartwheel," and went over on its back, M. Barbot being underneath with his head in the gorse bushes. When the machine was righted, it was found that M. Barbot had escaped with a scratched face and wrist, but the machine was badly damaged. The nose had caved in, and one wing was found to be broken beyond hope of repair with the facilities at hand. How it happened that no spectator was hit and injured is a mystery. The machine swung right into a dense crowd, but by scattering in all directions, some ducking under the wings, everyone escaped. Everybody will sympathise with M. Barbot in his misfortune. He has done a lot of gliding in France, and his machine is extremely interesting, with its bird-shape wing and peculiar flexible aileron control. M. Barbot was naturally keenly disappointed, but, like the good sportsman that he is, he blamed no one but himself for the accident. He knew his machine, and thought that even in the cross-wind it would answer the controls readily enough.

In spite of its "unlucky" number, Gordon England's monoplane gets up well, and is remarkable for its extremely steady flight.

Later in the afternoon Gordon England had his machine taken to the top of Beddingham Hill, and made a pretty flight of 1 min. 34 secs. duration, which is the longest made so far in this district. Tomorrow, the first day of the competition,



Contour Sketch-Map of Scene for Gliding Competition.

this figure will probably be exceeded by several competitors. In landing he slightly damaged the nose of his machine, but this is being repaired.

Monday, October 16.—The first flight this morning was made by Raynham, who got away from Beddingham Hill about 10.30. The wind was east-north-east, and Raynham flew due north at first, having gained considerable altitude, and then turned into the wind to land. He remained in the air for just under two minutes (1 min. 58 secs.), which was sufficient to win for him the £50 prize offered by Col. Alec Ogilvie should no other competitor increase the time.

By about midday the two de Havilland machines had been brought to the top of Beddingham Hill, and were got ready to start. The manner of doing this is to tether the tail skid of the machine to a peg by means of a steel cable provided with a quick-release device. A number of men walk forward with long rubber cords or ropes, stretching them as taut as they will stand. On the word "Go" a man pulls the quick-release, the towing party at the same time running forward as fast as possible. The machines are thus catapulted into the air after a very short run. Capt. Broad, on No. 4 (Sibylla) was the first to get away. He rapidly gained altitude, but the machine appeared to be buffeted about a good deal, and the ailerons could be seen flicking as the swirls struck the machine. However, Broad stuck to his task, and managed to keep up fairly well until he got some distance away from

WILLING HELPERS: A detachment of the R.A.F. carrying Gordon England's and Raynham's gliders to the top of the hill.

On the summit of Firle Beacon Hill: From left to right: Col. Darby, Col. Ogilvie, Capt. Nicholl, and Mr. Fairey.

the hill. He then ran into calmer air, and began to drop. When at a very low altitude over the bottom of the valley the machine was struck by a gust which lifted the right wing. Swinging round to the left, Capt. Broad righted the machine again, but there was no time to get her round into the wind, and he had to make a landing in a cross-wind. From the top of the hill he appeared to make quite a good landing, but afterwards it was learned that he had damaged a wheel of the undercarriage. The duration of his flight was 2 mins. 18 secs., so that Raynham's time was beaten.

Capt. Herne got away next, some 20 minutes late, on No. 33 (Margon). Shooting into the air he rose rapidly, and his machine appeared a good deal steadier than Broad's. Herne held his height admirably for quite a long distance, but finally got out of the ascending current, and had to commence a glide into the valley. He seemed to be going well when, close to the ground, his left wing was seen to rise. He then disappeared from view, and it was impossible to tell what sort of landing he had made. Later it was learned that he had come into contact with a hedge, and when his machine was next seen on the hill its wings were torn considerably, and one of the top bracing wires broken. However, the damage appeared to be to the fabric covering only, and should be easily repaired. Herne's time was 2 mins. 38 secs. As this was his first flight on the machine, his performance was a highly creditable one.

In the meantime Jeyes, who had repaired the damage sustained on Saturday, had the Aachen brought up to the top of Beddingham Hill, and about 1 p.m. he was "shot" over the edge. The towing rope appeared to catch in something, and the machine rocked somewhat violently for a few seconds. Then, however, the ropes came adrift, and the machine got away well, Jeyes keeping his altitude for a considerable time. The fact of the ropes sticking had somewhat spoilt the flight, as he lost the few seconds when he should have been getting his height. However, in spite of this he did very well, remaining up for about three minutes. He made a perfect landing in a valley.

The Fokker biplane had by now been brought up to the top of the ridge, and as Fokker passed on his way towards Firle Beacon it was concluded that he would make an attempt from there. His method of transporting the glider is to place it across his Cadillac, and lash it fore and aft, letting it rest and pivot on its central skid. Raynham and Gordon England had by then also decided to bring their machines to Firle Beacon, where the wind appeared strong and seemed to offer possibilities of extended flights. Shortly after 2 p.m. Fokker took his seat in the machine, with Mr. Bewsher as passenger. Then followed a long wait, during which there was much photographing and whirring of cine-cameras. Fokker said he was waiting for the wind to get up. Ultimately he got off well about 2.30, and rose rapidly. Instead of flying out from the hill, as all previous pilots with the exception of Jeyes had done, Fokker hugged the edge of the range, letting his machine proceed crab-fashion towards Bostal Hill to the south-east. The machine rose and fell as it got into and out of the ascending air currents. For quite a long period the biplane appeared to be standing still in the neighbourhood of Bostal. It was then seen to turn and commence its return journey, still at a greater altitude than the starting point. It was hoped that Fokker would be able to alight on the hill from which he had started, but he appeared to drift too far to the north away from the ridge, and to get out of the rising currents. Coming back towards Firle, losing height gradually, he made a right-hand turn into the valley and got ready to land. Just before touching, the machine was seen to approach a small gap in a hedge. The gap being too narrow to let the machine pass, Fokker "jumped" it, and alighted smoothly on the other side, having been in the air seven minutes, which was an extremely fine performance, considering that he carried a passenger.

Raynham and Gordon England had not failed to learn their lesson from Fokker's method, and as soon as his flight was concluded, they ran to the top of Firle Beacon to get their machines ready. Raynham got away just before three and rapidly gained altitude, "hugging the coast" as Fokker had done, and drifting crabwise towards Bostal. His altitude increased from time to time, while now and then the machine would drop as it got out of the air currents. As in the case of Fokker, Raynham seemed to remain for a long time near Bostal, but finally he was seen to let his machine drift to the right, close to the hill, make a left-hand turn, and commence to return. He was still well above his starting-point, and we began to hope that he might gain Firle without losing height, and thus be able to make a second trip. This was not to be, however, and the machine seemed to get out of the rising air and began to drop. When Raynham saw that he could not regain his starting-point, he glided down wind, passing Firle Beacon at a great pace, some 200 ft. below the top, and finally he disappeared from view. He had by then been up 10 minutes, and it was stated later that his actual time in the air was 11 mins. 23 secs., an extremely fine performance. Raynham told us later that he had a great deal of fun in landing. Apparently, as he turned north and was drifting sideways across the fields, he felt the up-currents from the ridges and hedges, and in this manner he hopped sideways over several hedges, finally turning into the wind and landing smoothly. Everyone was delighted with his performance, and he was considered a certain winner of the Ogilvie Prize.

When Raynham had landed, Gordon England made a start, about 3.20 p.m., getting into the air very well indeed, and gaining height as Fokker and Raynham had done. The steadiness of England's machine was remarkable, by far the steadiest flight of the day. "Crabbing" towards Bostal, England appeared to rise and drop more than the others had done, but always on a very even keel. He had gone a long way towards Bostal when it was noticed that, in spite of his keeping even closer to the ridge than had Fokker and Raynham, he lost altitude rapidly. The explanation soon became obvious. In the excitement we had not noticed that the wind had dropped; but England's machine, not being of an excitable nature, did notice it, and acted accordingly. Soon he was seen to turn north, and make a landing some distance east of Firle Beacon. His time in the air was 4 mins. 32 secs. This was the first flight of the day to represent a decrease in duration, but it was obviously caused by the failing wind.

In the meantime Merriam had had his machine brought up to the top of Itford Hill, from which he had intended to make a flight. All the time-keepers and officials were, however, at the eastern end of the ridge, at Firle Beacon, and Merriam commenced to wheel his monoplane Firlewards. The dropping wind, however, caused him to alter his decision, especially as it was getting rather late.

Curiously enough, the wind increased in force again towards sunset, and Fokker, who had brought his biplane to the top of Firle, decided to have another attempt. Although the sun was getting very close to the edge of the western hills, he took off about 4.45, this time alone in the machine. Without going so far afield as on the previous flight, he cruised around, circled and turned, constantly rising and falling, but maintaining a fair average level above his starting-point. The sun disappeared behind the hills, although it would probably still be visible over flat country, and still Fokker kept on

Shouting down to the few remaining spectators, he enquired how long he had been up, and was told to "stick it" another few minutes, as he would then have exceeded the minimum of 30 minutes. When he finally did land, he had been up for 37 mins. 6 secs. The performance was an extremely fine one, and as Fokker landed within the prescribed radius of 800 yards from his starting-point, he has a claim on the *Daily Mail* prize of £1,000. However, there is nearly a week in which others may improve upon the duration, and several machines have not turned up yet. Given good weather, there does not appear to be any reason why the German record should not be beaten in Sussex.

Tuesday, October 17.—The early part of the morning gave promise of another fine day, and there was a strong north-easterly wind blowing. Up to about 10 a.m. there was nothing doing on Itford Hill, and by this time the force of the wind had increased considerably. Then Merriam's machine was brought out and carried up the hill. On reaching the top we started on the long, long trail for Firle's Beacon, where it was proposed to make a flight. When about halfway there we observed a machine shoot up over the beacon and sail gracefully sideways before turning back again. This proved to be Raynham on No. 2, and we watched him sailing backwards and forwards during the rest of our weary way. On arriving at the Beacon, we learned that Raynham had been up for 1 hr. 35 mins. already; and he was certainly still going strong. He would soar sideways alongside the hill towards the right, gaining height in the meantime. Then he would turn out away from the hill and return, with the wind just slightly assisting him, then turn out again and repeat the process *ad lib.*, with variations, keeping fairly close to the hill all the time. At about 12.20 Raynham sailed a little further than usual to the right, and just lost the up-current and dropped considerably. He made a splendid effort to get up again, and nearly succeeded at the western end of the Beacon, but eventually had to glide down below, making a neat landing on a small hill just underneath. His time was given as 1 hr. 53 mins. Prior to this flight Raynham had made one or two short trial flights.

Preparations were then made for getting Merriam's machine ready, which was eventually brought up to the jumping-off point. At 12.45 the starting ropes (elastic) were pulled forward by several willing hands, the machine being held back in the meantime, and then Merriam gave the signal to "Let her go." The machine almost immediately rose upwards at what seemed an alarming angle. Then the left wing rose, and the machine was literally blown over on its back, and then "cart-wheeled" on to its nose, crashing into the ground at the same time. At first we thought matters were most serious—that Merriam and some of the onlookers had received serious injury. Strange to say, however, Merriam got out of the badly smashed machine with nothing more than a bruised leg, whilst, somehow or other, the crowd got clear of the falling machine with remarkable rapidity, and no one was hurt. It was, of course, most fortunate that things turned out as they did; but still we, and all present, were extremely sorry that Merriam should be put out of the running—for the present, at any rate—so early. However, it might easily have been very much worse, so here's better luck next time!

Shortly afterwards, Raynham's machine was "brought to the surface" again, and a little later it was carried back to Itford, as it was decided not to make further flights this day, as Raynham wished to make certain alterations to the controls. In the meantime another machine—or so we thought—was observed high up over Beddingham Hill, almost stationary, and sundry guesses were made as to what 'bus it was. We learnt later it was a kite! Imposter!

After a wait of an hour or so (during which a much-needed lunch, wisely brought with us), we observed a machine take off from Beddingham Hill, but we were too far off to distinguish the breed. It appeared to glide straight down, and soon disappeared from view. There was nothing for it but to tramp back again (as many of the spectators had already done), and on arriving on the above-mentioned hill, we found that the machine observed had been Gordon England's monoplane. He had made a glide, we were told, of about two minutes. After this, *his* machine was carried back to Itford, parts of Merriam's 'bus following. By this time it was past four o'clock, and as it was doubtful if anything more would happen, we went down to the hangars to see if there were any new arrivals, but only one—G. W. Cain's monoplane—arrived just as it was getting dark. Adjustments were still being made to various other entries, some of which—well, 'nuff said!

In the following notes we give a brief description of the gliders which had arrived at Itford Hill by Monday evening. The accompanying scale diagrams on page 607, drawn to a uniform scale, should help to form an idea of the lines and relative size of the various machines.

The Machines

Gordon England's Machine is a very small cantilever monoplane, with the type of wing section recommended by Mr. Weiss. The span is 28 ft., and the wing area 130 sq. ft. The weight of the machine empty is but 100 lbs., and assuming that the pilot weighs 160 lbs., the total weight is 260 lbs., and the wing loading exactly 2 lbs./sq. ft.

Raynham's Monoplane is also of the cantilever type, the wing section used being the Göttingen No. 441. The aileron controls are unusual, inasmuch as the cable is not connected up to the control stick, but is operated direct by the pilot's left hand. The machine has a span of 36 ft. and a wing area of 155 sq. ft. The weight empty is 160 lbs., and fully loaded 320 lbs., giving a wing loading of 206 lbs./sq. ft. The machine gets off at a remarkably low speed, and flies with the tail well up.

The Aachen Monoplane was illustrated in Flight last week, and it suffices to state that it is similar to the type on which Herr Klemperer did so well in the German competitions last year.

The S.C.W. (Sayers) Monoplane is described in detail on another page of this issue, to which we would refer readers.

The Merriam-Newman Monoplane has a thin wing section (R.A.F. 15), and consequently bracing has been necessary. The machine has an ordinary girder type fuselage with wire bracing, and altogether the construction follows conventional lines.

The De Havilland Gliders have already been fully described and illustrated (see Flight of October 5, 1922). The only alteration is to the undercarriage (as foreshadowed in our article), which is now merely an axle mounted on the lower longerons and carrying the wheels. The angle of incidence has been increased to allow of landing slowly.

The Fokker Machines.—At the moment of writing, only two of the three Fokker machines entered have put in an appearance. These are both biplanes, but one is a two-seater with an enclosed nacelle, while the other is an open single-seater.

The Airdisco Glider has a crescent-shaped monoplane wing of very original section. Speaking from memory, we should say the section is very similar to the bird's wing section tested several years ago at the Eiffel laboratory. The wings are extremely light, and appeared to sag with their own weight. We should say a few bracing wires would be advisable.

At the moment of writing these notes no other machines had arrived at Itford Hill, but next week we hope to deal with some of the newcomers. In the meantime, a detailed description of the S.C.W. monoplane, designed by Capt. Sayers and built by the Central Aircraft Co., of Kilburn, may be of interest.

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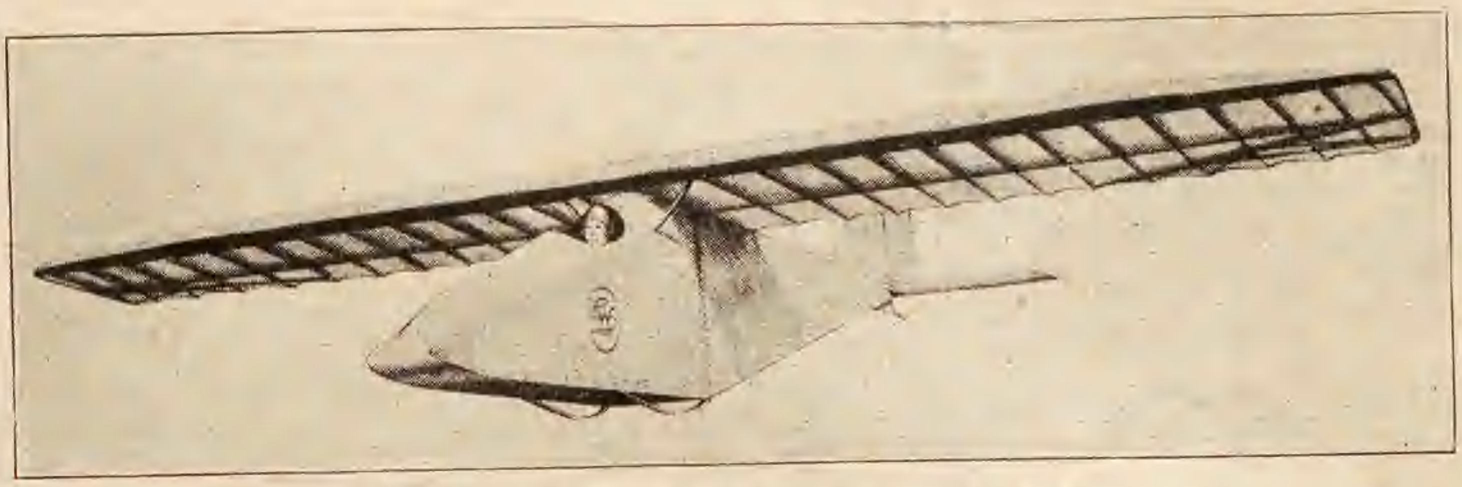
THE SAYERS, COURTNEY AND WRIGHT MONOPLANE

Constructed by the Central Aircraft Company

Although resembling in outward appearance the famous Hannover "Vampyr," the monoplane designed by Capt. W. H. Sayers, in collaboration with Mr. F. Courtney and Maj. Wright, and built by the Central Aircraft Company, of Kilburn, differs from the German machine in many respects, notably in the matter of detail construction. Aerodynamically also the "S.C.W." shows characteristics which are at variance with those of the "Vampyr." For one thing, the wing section employed is quite different from the Göttingen No. 441, which the Hannover machine is said to possess. In the "S.C.W." monoplane glider, the section is one of the airscrew sections, T. 62, we believe; that is to say, in so far as one can speak of any particular section in a wing which tapers in thickness and chord from root to tip. What Capt. Sayers has actually done is, we believe, to step up the ordinates of the original section over the central portion of the wing, gradually thinning it down until the actual section is attained some distance out along the span, and thence the ordinates are progressively reduced towards the tip.

Another respect in which the "S.C.W." monoplane differs from the "Vampyr" is in the aspect ratio, the chord being considerably greater in the former machine, and consequently



Sketch of the S.C.W. (Sayers) Glider in flight.

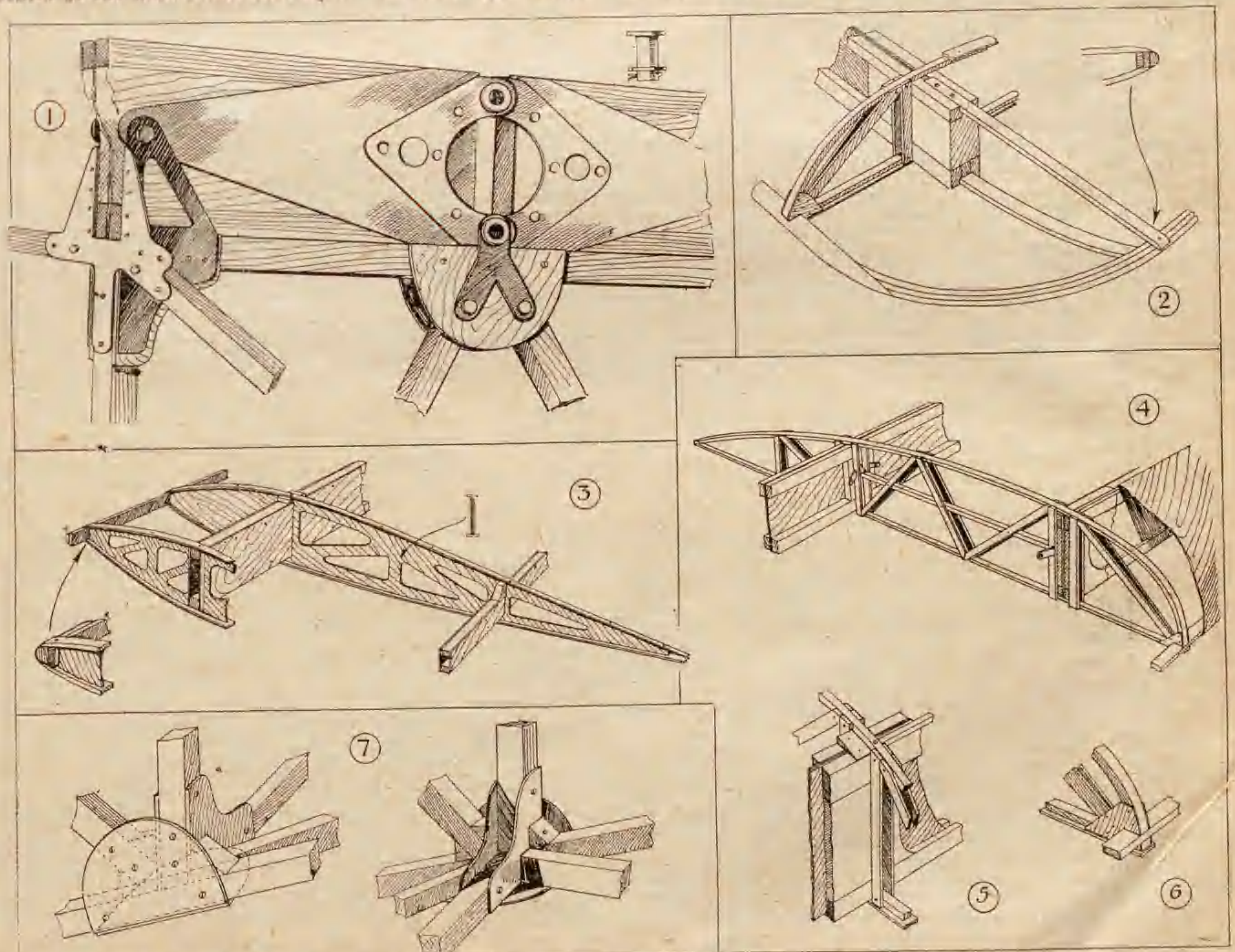
the aspect ratio smaller. How this change will affect the characteristics of the machine remains to be seen.

As already mentioned, the construction of the "S.C.W." monoplane is quite different from that of the "Vampyr." The fuselage, which in external shape greatly resembles the Hannover monoplane, is built up entirely without wire bracing, and, except for the wing spar fittings, without metal fittings of any kind. The four spruce longerons are ¾ in. square in the forward portion, tapering to about ⅝-in. square at the stern. The struts are of similar dimensions, and of the same material, and rigidity is obtained by diagonal spruce struts secured to the longerons and vertical struts by three-ply wood "fish-plates," screwed to longerons and struts.

Where local considerations demand it, the transverse panels in the fuselage are built up in the form of a "diamond" enclosed in a rectangle and having its corners attached to the centre of the sides of the rectangle. The covering is fabric, except where local stresses are likely to occur, such as near the tail and over the bottom of the front portion, where three-ply covering is used.

The wing is built up in two halves, joined on the centre line by forked fittings (steel) of the form shown in one of the sketches. The spars are of built-up construction, with ⅜-in. three-ply webs and double flanges of spruce, screwed, through the three-ply, to one another. Over the inner portion the spars are reinforced by packing pieces of spruce, which bring the I section up to a rectangular one.

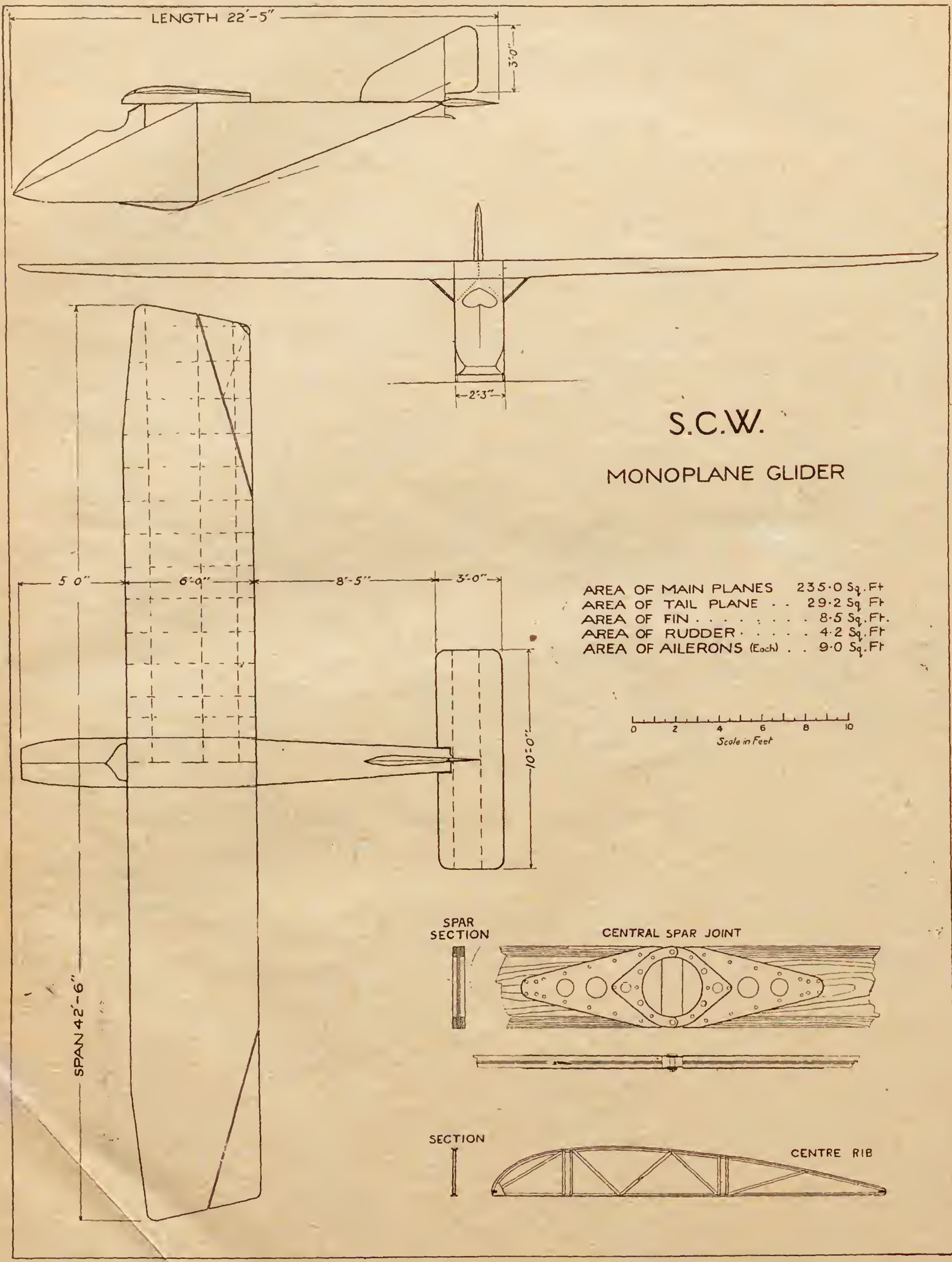
The ribs are of very light and neat construction, which is well illustrated in one of our sketches. The light flanges are of ¼-in. square spruce, and the webs are formed by a Warren truss consisting of double strips. Finally, over the outside of flanges and the ends of the web strips are tacked narrow capping strips of thin three-ply wood. The leading edge of the wing is covered with a sheet of thin three-ply,



THE "S.C.W." MONOPLANE GLIDER. Some constructional details. 1. Metal fittings securing spar to top longeron, and also spar root fitting. 2. Construction of wing tip. 3. Details of elevator. 4. Sketch showing spar and rib construction. 5 and 6. Details of rib. 7. A typical fuselage joint, showing three-ply "fish-plates."

extending from the leading edge strip up to the top of the front spar. The three-ply capping strips, to which reference has been made, stop at the edge of the nose covering sheet, thus forming a smooth surface. It should be pointed out that the rear edge of the three-ply sheet is screwed and tacked to a strip secured to the top face of the spar, so that it is supported right along and not at the ribs only.

The attachment of the wings to the fuselage is by very substantial fittings, forked over the upper longerons and having lateral grooves in them for the spars. By undoing a



THE "S.C.W." (SAYERS) MONOPLANE GLIDER: Plan, side and front elevations, to scale.

few bolts, the wing can be dismantled, either in one piece, or, by undoing the tubular bolts of the spar root fittings, in two halves. These bolts are in the form of short tubes of fairly large diameter, so as to give large bearing area, and are simply secured by a washer and split-pin.

The undercarriage is in the form of two skids, hinged at their front ends to the lower longerons, and so housed in the rear fitting as to be free to slide in a fore and aft direction as the load on the skids causes these to deflect.

Lateral control is roughly by ailerons, of triangular shape, and the controls are of the usual type, with the exception that elbow cranks and pull-and-push rods take the place of cables running over pulleys.

The general design appears to be very good, and the workmanship, as was to be expected from the Central Aircraft Company, is excellent. It seems probable that, if the machine performs well in the competition, the C.A.C. may standardise it and place it on the market at a reasonable figure.

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LONDON TERMINAL AERODROME

Monday evening, October 16.

The fine weather of the last week has given a fillip to the traffic on the airways, and the number of passengers travelling by air has been almost up to summer figures. Today, for example, there were 22 passengers on Handley Page machines from Paris. On the London-Cologne route the Instone Air Line continue to carry good loads of passengers, and, owing to the prevailing easterly wind, some rapid flights have been made from Cologne to London. On one occasion Mr. Holmes, piloting one of the Napier 34's, made the journey from Cologne to London in a flying time of only 2 hrs. 55 mins. This, by the way, he has just eclipsed today, doing the Cologne-London flight in 2 hrs. 39 mins.

Rapid journeys from the Continent have been the rule during the week, while to the Continent the times have been unusually long. One of the Grands Express Goliaths created a new record for such machines by flying from Paris to London in 1 hr. 55 mins. on Saturday, while a Daimler 34 made the same journey in 1 hr. 44 mins.

Startling accounts have appeared in the daily press of a mishap to one of the Messageries Aériennes' Goliaths near Poix early last week. According to a passenger, the machine crashed so badly that it "bounced" into the air again. Incidentally, this passenger stated that he had climbed out on to the top of the Goliath when this occurred—no mean feat, by the way, considering that it is impossible to get out of the Goliath in flight without first of all throwing the pilot overboard! What actually happened was that the machine was forced to descend owing to bad weather, and, after making a rather bumpy landing on bad ground, the wheels sank into the soft earth of a filled-in shell hole, causing the Goliath to tip up on to its nose—an experience alarming enough to start the imagination of an excited passenger.

Increase of Traffic on Rotterdam Route

The Rotterdam service run by the Daimler Airway and the K.L.M. is beginning to attract good loads. This is probably due to the cut in both passenger and goods rates. At any rate, there has been a sudden rush of goods, which is taking the K.L.M. all their time to deal with, while there is a steady increase in passengers—several full loads leaving during the week. At present the passenger machine leaves at 9 a.m., and the goods machine at 11.30 a.m., which is, of course, the wrong way round. I understand that this is to be altered when the Daimler Airway open their service to Manchester on Monday next. Then the machine from Manchester will go right through to Amsterdam, leaving Croydon somewhere between 11 and 11.30 a.m., while the K.L.M. machine with goods and early passengers will leave about 9 a.m. The Daimler service is also to be extended from Rotterdam to Amsterdam on Monday next.

Handley Page Transport have been carrying full loads again practically every trip this week, and I understand that the forward bookings are exceptionally good for this period of the year. This week the Daimler Airway are continuing to carry the early-morning newspaper traffic to Paris, by arrangement with Handley Page, but after this week their machines will be required on the Manchester-London-Amsterdam route, and, as the price paid for this form of traffic is too small to allow of the running of a twin-engined "Handley" specially to take it to Paris, one of the French companies will probably take over this newspaper load.

M. Jacques de Lesseps, who was the second man to fly across the Channel, made his second aerial journey from France to England during the week. This time he travelled as a passenger in one of the C.M.A. "Goliaths." It is interesting to note that there was a lapse of 13 years between his pioneer flight and his air journey of last week, and the difference in the type of the machines and in the "every-dayness" of the flight in 1922 forms a striking comment on the rapid progress made by aviation during that period.

A Night-Lighting Comedy

An amusing incident occurred one night during the week, when a French "Spad" which had been equipped for sky-writing, was *en route* for Croydon from Paris to be delivered to Maj. Savage at Hendon. The machine was known to have passed Lympne, but had not reached Croydon by dusk, and the aerodrome night-flying lights were switched on. These were kept going for a considerable time, until it was discovered that the pilot of the machine was walking round the aerodrome, an interested spectator of the lighting "exhibition." It appeared that he had landed his machine at Kenley, and come on to Croydon by car, and, having no idea that the lights were for his benefit, was examining the cone-light with obvious interest.

Further night-flying tests were carried out on Friday night by a Bristol Fighter, which flew over the aerodrome after dark and made several landings.

An unusual enquiry, which is significant of the place in transport that aviation is winning, was received at the aerodrome during the week. A big firm of meat merchants wished to know if it would be possible to send several tons of meat a day to France, and asked for a quotation for regular daily consignments of from 3 to 5 tons.

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"R. 38" Memorial

The design for a memorial to be erected at Hull to the victims of "R. 38" airship disaster has been approved by the Air Ministry, by whom the cost is to be defrayed.

Fine American Duration Flight

Lieutenants Macready and Kelly started off from San Diego on October 5 in a large monoplane to attempt a non-stop flight from California to New York. Owing to fog and unsuitable weather conditions generally this project was abandoned, and the airmen decided to make an attempt to beat the duration record instead. This they have apparently succeeded in doing, although the record of 35 hrs. 18 mins. has not yet been homologated. Later, we hope to be able to record some details.

Bossoutrot Remains Up for 34 Hrs. 17 Mins.

On October 14 Bossoutrot, the famous Farman pilot, accompanied by Drouhin in a Farman "Goliath," left le Bourget aerodrome in an attempt to establish a new world's record for duration. After remaining in the air for 34 hrs. 17 mins. 7 secs., they had to alight owing to running short of fuel. The flight is claimed by France as a world's record on the grounds that the American flight has not been homologated. Neither, for that matter, has the French. It is of interest to note that the Renault engines with which the "Goliath" was equipped were driving Leitner-Watts all-metal airscrews, so that these well-known propellers may now be assumed to have amply proved their worth under the most severe conditions.

America Sets Up a New World's Speed Record

On October 16 Lieut. Maugham, winner of the Pulitzer Trophy, set up a new world's speed record—flying over a measured kilometre course. On his Curtiss machine he is stated to have flown at an average speed of 248.5 m.p.h.

Soviet Air-Service Conscripts

A new Soviet decree has been published that all able-bodied men shall on attaining 20 years of age serve in the army as follows:—Infantry and Artillery, 1½ years; Cavalry, 2½ years; or Air Service, 4½ years.

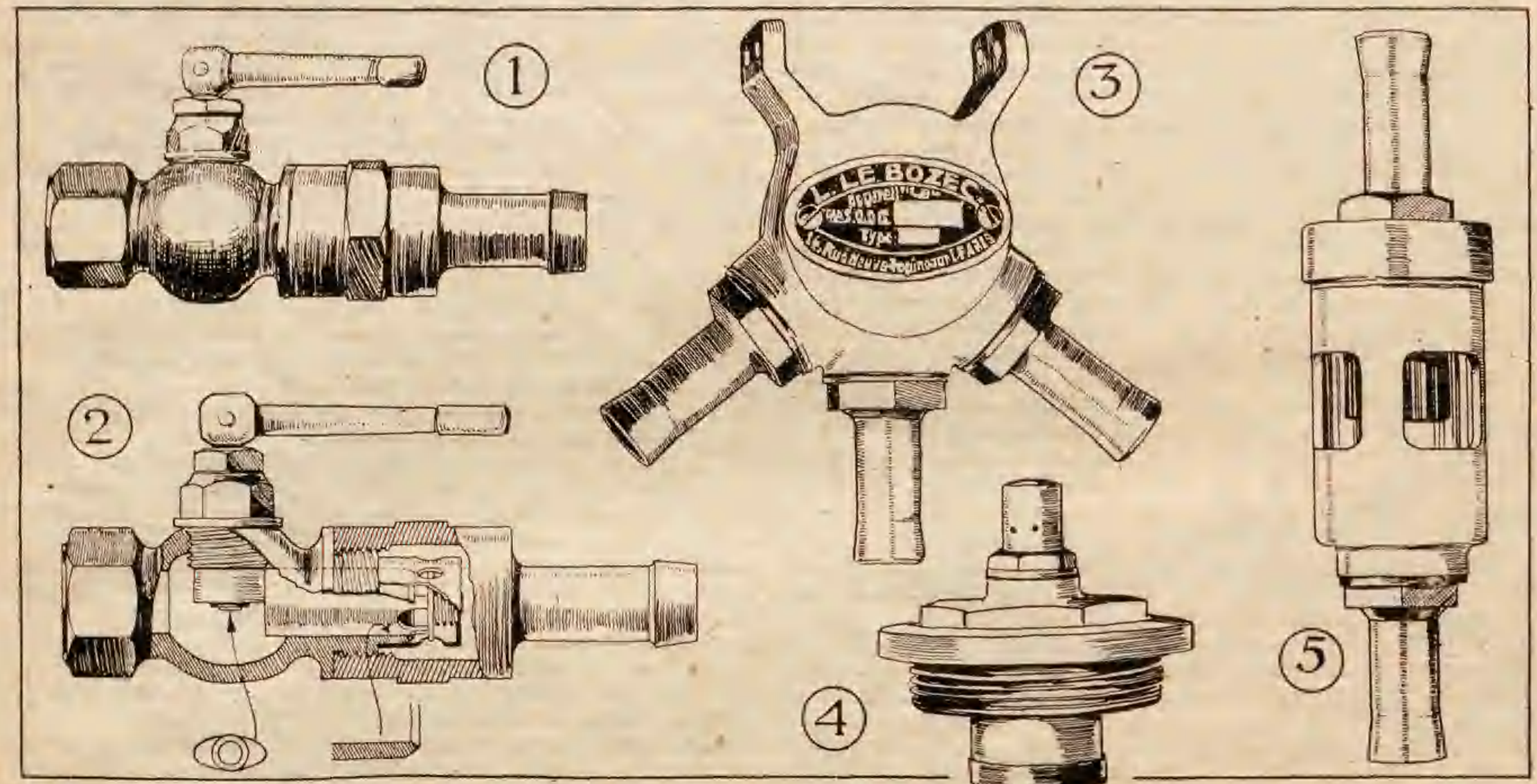
Royal Aero Club Celebrates

The banquet at the Savoy Hotel on October 26, organised by the Royal Aero Club to celebrate the British victory of the Supermarine-Napier flying boat in the Jacques Schneider seaplane race and the holding of the Circuit of Britain air race for the King's Cup promises to be an outstanding success, and the seating accommodation available looks like being strained to the utmost. Lieut.-Col. J. T. C. Moore-Brabazon, the Chairman of the Club, will preside. Applications for tickets should be forwarded promptly to the Secretary of the Club at Clifford Street, to ensure being included in the dinner plan.

LE BOZEC AERO ACCESSORIES

ALTHOUGH, perhaps, known only to those more intimately connected with aircraft construction in this country, the name "Le Bozec" has a considerable reputation in France, for during the War practically all the aircraft employed by the French Government—and some of the British machines as well—were equipped with sundry fittings bearing this name. These fittings, in the nature of petrol cocks, petrol flow indicators, etc., during that time gave excellent results, with the result that they are now fitted as standard by many of the present-day French aircraft manufacturers, and arrangements have just been made for placing Le Bozec accessories on the market in this country, and they can now be obtained from W. Ryan Hart (McCreath Taylor and Co., 34, Victoria Street, S.W. 1).

Before describing some of these accessories it should be mentioned that the primary Le Bozec feature is a patent valve device, which is embodied in most of the various Le Bozec fittings. This valve consists of a small disc, suitably housed in a cage, with or without a spring, as the case may be, which rests on an annular seating. The seating of the disc is bevelled, in order to form a sharp circular edge determined by the intersection of two inverted cones having the same longitudinal axis. This annular edge having a surface theoretically *nil* and practically extremely small, the pressure per unit of surface on the seating is very great for a very slight pressure on the disc, thus giving complete tightness. For the same reason there can be no sticking of the disc on its seating. The disc is very thin and light, and is extremely sensitive, responding to very small pressure changes.



SOME "LE BOZEC" AERO ACCESSORIES: 1. The "L.B." Petrol Cock. 2. The same in section, showing the disc valve. 3. The "L.B." Petrol Centraliser. 4. The "L.B." Automatic Anti-leak vent for gravity tanks. 5. The "L.B." Petrol-flow Indicator.

The principal application of this device is as a non-return valve, in which capacity it is employed in an extensive range of Le Bozec fittings designed to meet various requirements—according to different petrol or engine systems. One such application is in the "L.B." Centraliser, which, as its name implies, is an arrangement to centralise the supply of petrol off two or more tanks, or compartments of tanks, delivered to the engine or engines, and which will, also automatically, shut off any tank or compartment that may become damaged, but without affecting the common petrol feed. As there is considerable variation in the petrol and engine systems employed on different types of aircraft, there are various types of "L.B." Centralisers to suit any particular scheme. The general principle is the same, however, in each case, and may be described as follows: Each tank or compartment is in communication with the centralising chamber through an independent non-return valve—of the type in question—which is mounted in the chamber itself. Should the level of the petrol in one of the tanks drop, through any particular cause, the pressure in the corresponding pipe will decrease. The pressure existing in the centralising chamber, due to the head of liquid in the other tanks, will force the valve of the first tank shut, thereby isolating this tank. In the event of this tank still containing a certain amount of petrol, the latter will come into circulation as soon as the level of petrol in the other tanks drops sufficiently as to allow equality of head.

It is claimed for the "L.B." Centraliser that it not only greatly simplifies the whole petrol system, but eliminates the necessity for safety cocks, or complicated multi-way cocks which have to be manipulated when it is necessary to isolate one or more of the petrol tanks in the event of a leakage, etc. The pilot is thus relieved of one of the many items requiring his attention and necessary action. As previously stated, "L.B." centralisers are supplied in a variety of types to meet almost every scheme of petrol system, and we show in the accompanying illustrations one collecting from two tanks. The two outer connections, each containing a non-return valve, are from the tanks, the central one being the delivery to pump.

Another Le Bozec fitting, also illustrated, is a petrol flow indicator, whereby the pilot is warned of any defect in the flow of petrol. In this device, which is also fitted with one of the disc non-return valves, a small red float contained within the body of the fitting, and directly in the path of the flow of petrol, comes into full view of a glass window immediately any defect or stoppage in the flow of petrol occurs. A similar model to the one illustrated is also made in which an electric lamp is fitted in the body, just behind the glass, whereby the action of the float is rendered visible at night.

"L.B." petrol cocks—which are made in a variety of types to suit different requirements, and have given very satisfactory results on the various French machines on which they are fitted—employ the Le Bozec disc valve as a means of controlling the flow of petrol to great advantage, inasmuch as the whole fitting is not only greatly simplified, but the risk of leakage has been reduced to a minimum, and it is practically impossible for it to get out of order. The principal element controlling the flow of petrol in this case is not, it will be seen, subjected to friction—resulting in wear and leakage—as is the case in the ordinary type of cock.

The "L.B." petrol cock works equally well in any position. The construction of this cock is clearly shown in one of the accompanying sketches, so that no further description should be necessary. It may be pointed out, however, that the disc is opened or shut, against the action of a light spring, by the cam on the end of the lever impinging against a tube, which is in contact with the disc.

Another important "L.B." fitting is an automatic anti-leak vent for service (gravity) petrol tanks. In this device—which we also illustrate—the "L.B." disc valve is incorporated in the vent cap in such a manner that when the tank becomes full a float, in the base of the vent cap, rises and closes the valve. Thus, no petrol can possibly escape through the vent. This is undoubtedly a great advantage, as it has frequently happened that more or less serious fires have been caused by the petrol leaking over from the vent in the services tank.

In conclusion, mention may be made of another "L.B." accessory, which is applicable to both aircraft and motor-cars. This is the "L.B." Radiator filler, which is claimed to prevent troubles arising from air locks in the cooling system. Filling a radiator from the top is liable to cause air pockets, which seriously affect the proper working of the water circulation and produce air locks. With the "L.B." radiator filler the radiator is filled from the bottom, by way of a connection, to which a hose may be fitted, provided with the "L.B." disc non-return valve. This device also serves as a drainage, a "shifter" being fitted which holds the disc away from its seating for this purpose.

THE ROYAL AIR FORCE

London Gazette, October 10, 1922

General Duties Branch

Flight Lieut. R. J. Sanceau (Lieut., E. Surrey R.) is granted permanent commn., retaining his present substantive rank and seny.; Aug. 31. Flying Offr. L. C. Wynne-Tyson is granted permanent commn., retaining his present substantive rank and seny.; Sept. 12, 1919 (*Gazette*, Sept. 12, 1919, appointing him to short service commn. is cancelled).

The follg. are granted temp. commns. in the ranks stated, on seconding for four years' duty with the R.A.F.:—

Flt. Lieut.—V. A. Albrecht, O.B.E., M.C., Capt., Manchester R.; Sept. 25.

Flying Offr.—M. H. Fitzgerald, Lieut., E. Yorks R.; Oct. 3.

The follg. are transfd. to the Reserve:—

Class B.—Flying Offr.—H. Hoad, F. W. Martyn; Oct. 10.

Class C.—Flying Offr.—A. S. Budge; Oct. 10.

Observer Offr. M. St. J. Ross relinquishes his short service commn. on acct. of ill-health, and is permitted to retain rank of Lieut.; Oct. 12.

Medical Branch

C. Y. Roberts is granted a short service commn. as Flt. Lieut., with effect from and with seny. of Sept. 21; Lieut. N. F. Smith, Dental Surgeon, Gen. List, Army, is granted temp. commn. as Flying Offr. on attachment for four years' duty with R.A.F.; Sept. 28 (he will continue to receive emoluments from Army funds). Flying Offr. (Hon. Flt. Lieut.) B. C. W. Pasco to be Flt. Lieut.; Oct. 1. Flt. Lieut. T. H. K. MacLaughlin relinquishes his temp. commn. on ceasing to be empld.; Oct. 6.

Memoranda

Hon. Sec. Lieut. E. A. Bacon relinquishes his hon. commn. on joining the Territorial Army; May 9, 1921.

London Gazette, October 13, 1922

General Duties Branch

Obsrvr. Offr. J. R. Stafford-Langan, D.F.C., is transfd. to Reserve, Cl. B; Oct. 15. Flt. Lieut. A. W. Symington, M.C., is placed on h.p., Scale A, for six months; Oct. 1. Obsrvr. Offr. R. Nicholson is restored to full pay from h.p.; Oct. 1. Flt. Lieut. F. J. Hooper is placed on retd. list; Oct. 4 (substituted for *Gazette*, Oct. 3).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Flight Lieutenants: S. E. Elphick, from R.A.F. Hospital, Cranwell, to Baghdad Combined Hospital (Iraq). 14.9.22. A. C. Ransford, from School of Technical Training (Men) (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. J. B. Woodrow, from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. J. M. A. Costello, M.C., M.B., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. W. D. Miller, M.B., from R.A.F. Depôt (Inland Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. R. Boog-Watson, M.B., D.P.H., from R.A.F. Central Hospital (Coastal Area) to Headquarters, R.A.F., Iraq. (Supernumerary.) 14.9.22. R. M. Trevethan, M.C. The notification which appeared in R.A.F. Intelligence, No. 77, dated 5.9.22, wherein this Officer was posted from No. 207 Squadron to School of Photography, with effect from 25.9.22, is cancelled. J. F. Gallagher, from No. 1 School of Technical Training (Boys) (Halton) to No. 39 Squadron (Inland Area). 20.9.22. Substituted for the notification concerning this Officer which appeared in R.A.F. Intelligence, No. 79, 21.9.22. D. J. Jones, M.B., from No. 1 School of Technical Training (Boys) (Halton) to No. 1 Flying Training School (Inland Area). 20.9.22. Substituted for the notification concerning this Officer which appeared in R.A.F. Intelligence, No. 79. 21.9.22. W. A. C. Morgan, M.C., from R.A.F. Depot (Inland Area) to School of Photography (Inland Area) (Supernumerary). 16.10.22. A. N. Benge, from No. 5 Flying Training School (Inland Area) to No. 207 Squadron (Inland Area) for duty as adjutant. 28.9.22. R. Whitaker, M.B.E., from School of Technical Training (Men) (Inland Area) to School of Photography (Inland Area) (Supernumerary). 16.10.22. D. C. Balfour to Headquarters, R.A.F., Iraq. 1.10.22. A. C. Collier, from R.A.F. Depot (Inland Area) to No. 24 Squadron (Inland Area) for duty as Adjutant. 1.10.22. W. E. Hodgins, M.B., from R.A.F. Depot (Inland Area to Research Laboratory and Medical Officers' School of Instruction (Coastal Area). 30.9.22. C. Y. Roberts, to Research Laboratory and Medical Officers' School of Instruction (Coastal Area). 21.9.22. W. H. de W. Waller, A.F.C., from No. 100 Squadron (Inland Area) to Command Headquarters, Palestine. 15.6.22. For duty as A.D.C. General Officer Commanding. Substituted for the notification concerning this officer which appeared in R.A.F. Intelligence No. 71, dated 7.7.22. A. H. Stradling, C.B.E., from Air Ministry (D. of P.) to School of Technical Training (Men) (Inland Area). 1.10.22. L. Wanless-O'Gowan, from No. 10 Group Headquarters (Coastal Area) to No. 39 Squadron (Inland Area). 9.10.22. J. A. Glen, D.S.C., from No. 39 Squadron (Inland Area) to No. 11 Wing Headquarters (Inland Area). 16.10.22. R. A. Young, from R.A.F. Depot (Inland Area) to Air Ministry (D. of P.). 1.10.22. D. Drover from R.A.F. Depot (Inland Area) to Inland Area Aircraft Depot (Inland Area). 1.10.22. (Hon. Sqdn. Leader) H. B. Smith, M.B., from No. 207 Squadron (Inland Area) to No. 1 Flying Training School (Inland Area). 23.9.22.

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AUXILIARY AIR FORCE ORGANISATION

ON Monday, October 16, recruiting for the two newly-formed London anti-aircraft defence brigades began, and it looks as if there is likely to be keen competition for enrolment in the corps. Those wishing to join the artillery of the County of London section should present themselves at the former headquarters of King Edward's Horse, Duke of York's Headquarters, Chelsea, while for the artillery to be formed by the City Association recruits should apply at Lytton Grove, Putney. For the battalions of Royal Engineers, recruits may enlist either at the old headquarters of the London Electrical Engineers, Regency Street, Westminster, or at the headquarters of the 47th (2nd London) Divisional Train, at the Duke of York's Headquarters, Chelsea.

The following officers have been appointed to command units:—

No. 2 Anti-Aircraft Defence Brigade, commanded by Col. Douglas Gill, C.M.G., D.S.O.—Lieut.-Col. W. M. Thompson, D.S.O., to 3rd Artillery Brigade; Lieut.-Col. W. B. Brittain to 4th Artillery Brigade; and Lieut.-Col. B. S. Millard, T.D., to 2nd Battalion, Royal Engineers.

No. 3 Anti-Aircraft Defence Brigade, commanded by Col. H. S. de Brett, C.B., C.M.G., D.S.O.—Lieut.-Col. Buckle to 5th Brigade, R.A.; and Lieut.-Col. W. Edgecumbe (late London District Electrical Engineers) to 3rd Battalion, Royal Engineers.

No appointment has yet been made to the 6th Brigade, R.A. Col. M. W. Emley, O.B.E., T.D., will command Nos. 2 and 3 Anti-Aircraft Defence Brigades Signal Companies.

In regard to the general plans the organisation will consist of an Auxiliary Air Force and an R.A.F. Reserve, besides the London Air Defence Division mentioned above. Each body is entirely distinct, and we understand that the Auxiliary Force will consist of five squadrons of aeroplanes, employing 60 pilots. These pilots will not be found from among ex-R.A.F. officers, but will be newly commissioned, and the *personnel* will be raised at big industrial centres, thus preserving the territorial idea. It is understood, *The Times* states, that these squadrons will have machines and aerodromes of their own, a consideration which will materially assist in bringing out the true squadron spirit and promoting rivalry between the squadrons themselves and between the Auxiliary Force as a whole and the Regular R.A.F.

The new Royal Air Force Reserve will consist of a large number of all ranks who have passed through the Regular R.A.F. and come up annually for a period of training and refresher courses. This they will serve with Regular units, and it is proposed that actual flying practice and work in connection with the assembling, repair and overhaul of machines shall be done in the aerodromes belonging to aircraft manufacturers. The machines used in this case will be the property of the manufacturers in question, whose pilots will supervise all practice. Their mechanics will be enlisted to take part in the exercises while they are in progress. Pilots and mechanics will, for the time being, revert to whatever rank they held in the R.A.F., and will be paid accordingly. Payment will also be made by the Air Ministry for the use of the aeroplanes.

LEGAL INTELLIGENCE

Unlicensed Pilot

AT Croydon County Police Court, on October 14, Thomas Baden Powell, 22, of the Bridge Hotel, Tunbridge Wells, was summoned by the Air Ministry for flying on August 20 from Croydon to Penshurst without a pilot's licence, and also for flying in an unregistered machine.

Mr. W. Paling, for the Treasury, said that last March the defendant applied for a registration certificate for his machine, but failed to enclose the fee of one guinea, and no registration took place. He also applied for a private pilot's licence, and was informed that a condition would be the production of the Royal Aero Club's certificate of competency. Some months afterwards, as no certificate had been received, the Air Ministry warned him that it would be an offence to fly without a licence. On August 20 he flew from Croydon to Penshurst, and his machine crashed on arrival.

The defendant said he had not undergone any pilot's test. He had flown about twelve times between Penshurst and Croydon, and had not been stopped by anyone. He knew nothing about the rules. He had been flying for about fourteen months at Penshurst, and had taken up a passenger once or twice.

The Chairman (Sir Arthur Spurgeon) said the magistrates were much concerned about these revelations because they seemed to indicate that the regulations would require a good deal of overhauling.

Mr. Paling said he would convey that opinion to the Air Ministry.

The defendant was liable, the Chairman said, to penalties totalling £400, but as this was the first case of its kind he would be fined £20 on each summons—£40 in all; but any further cases of the kind would be treated drastically.

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AIR MINISTRY NOTICES

British Aircraft Personnel : Visas

1. UNDER reciprocal arrangements made with the Governments of Holland, Italy and Norway, the pilots and other operative members of the crews of British aircraft no longer require a *visa* when flying to these countries.

NOTE.—A *visa* is not required for British subjects travelling to :—

France.
Belgium (*unless a stay of more than three months is intended*).
Switzerland (*unless taking up residence or employment there*).

2. Passports are essential in each case.

(No. 110 of 1922.)

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International Commission for Air Navigation

NEXT week, on October 24, the Members of the International Commission for Air Navigation who are attending the Meeting in London will be officially entertained at dinner at Lancaster House (London Museum), St. James's, by the First Commissioner of Works on behalf of His Majesty's Government. Capt. the Rt. Hon. F. E. Guest will preside.

A Real Flying Minister

IN M. Laurent Eynac, the Under-Secretary for Aeronautics, France has a very live Air Minister. His latest effort this month is a flight of 1,875 miles over the Protectorate of Morocco, which he accomplished in five days. He flew from Toulouse to Rabat on October 3, from Rabat to Casablanca on October 4, from Rabat to Marrakesh and back on October 5, from Casablanca to Fez on October 6, and returned on the following day to Malaga, where he took train for Madrid to visit Señor Ruiz Fery, President of the Aero Club of Spain.

Fortunately, England now also has an equally enthusiastic Chief in Gen. Sir Sefton Brancker, although his air activities naturally have not so full a scope as our French friends. But that will come.

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PUBLICATIONS RECEIVED

Advisory Committee for Aeronautics. Reports and Memoranda.—No. 541, *Stability and Resistance Experiments on a Model of Vickers Rigid Airship, R.*80. By J. R. Pannell, R. Jones and G. N. Pell. August, 1918. Price 6*d*. net, post free 7*d*. *No.* 790 (*Ae.* 47), *On the Determination of the Stresses in Braced Frameworks*; Part II, *The Effect of Shear upon a Framework of Uniform Rectangular Cross-Section.* By R. V. Southwell. February, 1922. Price 6*d*. net, post free 7*d*. *No.* 791 (*Ae.* 48), *On the Determination of the Stresses in Braced Frameworks*; Part III, *The Effect of Axial Loading, Torsion, Flexure and Shear upon a Braced Tube of any Uniform Cross Section.* By R. V. Southwell. April, 1922. Price 6*d*. net, post free 7*d*. London: H.M. Stationery Office, Kingsway, W.C. 2.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero Models Association),

SUNDAY, October 22, at 10.30 a.m., a Flying Demonstration will be given at Bunkers Hill, Hampstead.

Sunday, October 29, the Competition for Mr. D. H. Pilcher's Challenge Cup for enclosed fuselage models will be held at Hackney Marshes at 12 o'clock noon. For full particulars, rules, etc., see FLIGHT, September 28.

Paddington and District Model Aero Club, of which Mr. W. E. Evans is Secretary, have started operations on their old ground at Sudbury. Their official observer, Mr. M. Levy, reports that Messrs. Carter, Evans, Gray, Woolley and himself were flying models last Saturday. Mr. Gray's large enclosed machine put up some excellent flights, one of which was over 450 yards. At Hampstead, on Sunday, a large and enthusiastic meeting was held, when again some excellent results were obtained, particulars of which it is hoped will be ready for publication next week.

Arrangements have been made for a number of members to go by char-à-banc to Itford on Saturday, October 21, to witness the *Daily Mail* Gliding Competition. The char-à-banc will leave from outside the Royal Air Force Club, 128, Piccadilly, at 8.30 a.m. The arrangements are in the hands of Dr. Thurston and Mr. L. G. H. Hatfull.

The Hon. Sec. hopes to have a programme of lectures, debates, etc., ready for publication as soon as final dates are fixed.

Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1.

Hon. Sec., A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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22,788. J. A. HERRING. Inclinometers. (186,235.)
27,154. LUFTSCHIFFBAU ZEPPELIN GES. and L. MERZ. Engine gondolas for airships. (170,839.)
30,026. G. SHIELDS and C. L. MORRILL. Rotary engines. (186,268.)

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If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

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(*Continued from* p. xiv.)

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INSULATING MATERIALS—

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MACHINING—

Monk Engineering Co., Ltd., Coventry. Coventry 807; "Assistance," Coventry.

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British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry. Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—

Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

METAL PARTS AND FITTINGS—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Monk Engineering Co., High Street, Coventry. Coventry 807; "Assistance," Coventry.

Rubery, Owen & Co., Darlaston. Darlaston 87; "Roofs," Darlaston.

MODELS—

Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.

D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—

E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.

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Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds. Roundhay 601 (5 lines); "Propellers," Leeds.

Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.

Lang Propeller, Ltd., Weybridge, Surrey. 520-521, Weybridge; "Aerosticks," Weybridge.

PUTTEES—

Fox Bros. & Co., Ltd. (Dept. R), Wellington, Somerset.

RADIATORS AND RADIATOR REPAIRS—

Serck Radiators, Ltd., Warwick Road, Greet, Birmingham. Victoria 531 (3 lines); "Nerleak," Birmingham.

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Rubery, Owen & Co., Darlaston. Darlaston 87; "Roofs," Darlaston.

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Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1. Holborn 2041; "Aerography," London.

STABILIZERS—

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Barimar, Ltd., 10, Poland Street, London, W. 1. Gerrard 8173; "Bariquamar," Reg, London.

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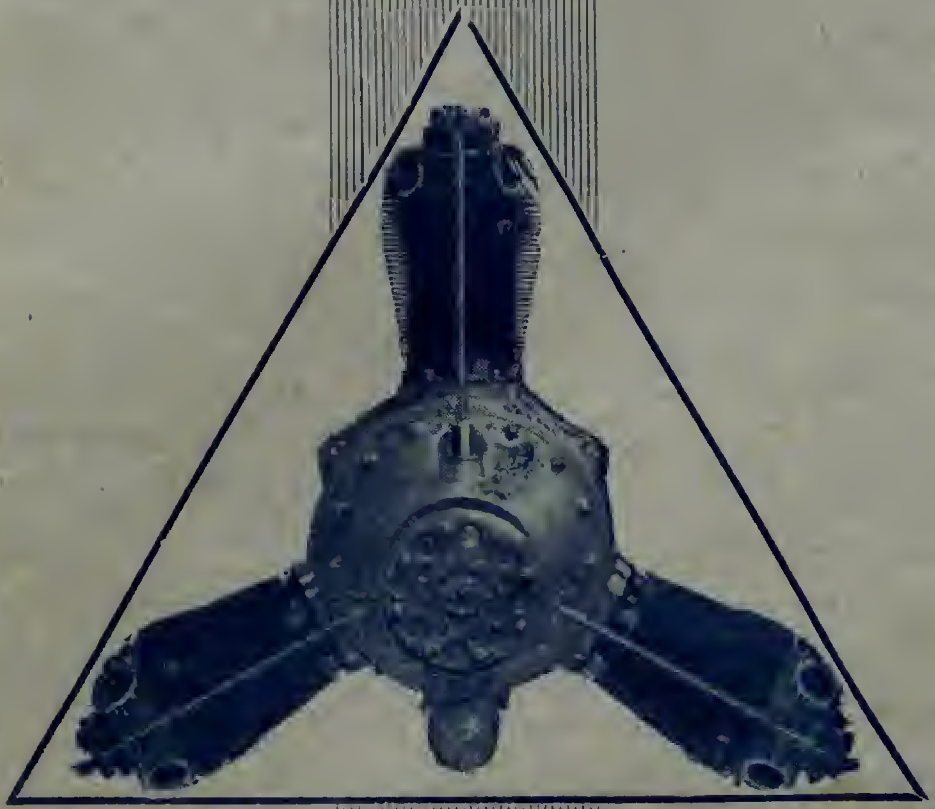

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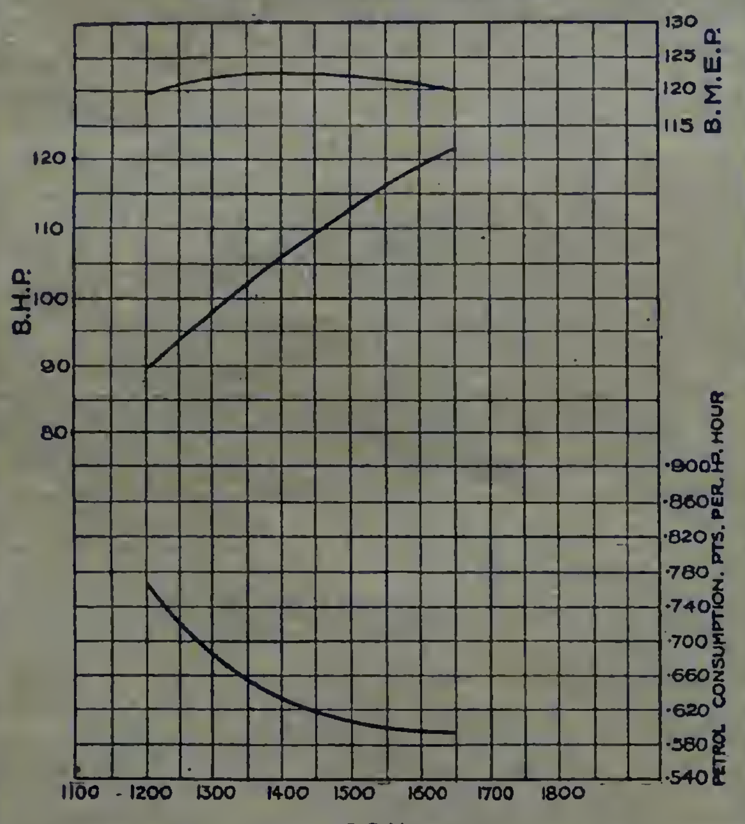

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FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Oct. 26	**Royal Aero Club Dinner at Savoy Hotel, celebrating the Schneider Cup victory and first King's Cup Race**
Nov. 2	**Lecture, "A Review of Airscrew and Helicopter Theory," by Maj. A. R. Low, before R.Ae.S.**
Nov. 30	**Closing date for FLIGHT Glider Designing Competition**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

THOSE who had expected Mr. J. D. North to give, in his lecture before the Royal Aeronautical Society, an historical sketch of the development of metal construction of aircraft, were doomed to disappointment, as were also those who had expected him to expound a process of design. Mr. North wisely chose to refrain from dealing with his subject from either of these points of view. Instead

The Case for Metal Construction

he confined himself to general remarks on the pros and cons of metal construction, and indicated certain advantages which may be obtained by its use. First and foremost among these he placed reduction in structure weight, which he estimated as somewhere in the neighbourhood of from the present average of 33 per cent. to about 25 or 27 per cent. of the total. He showed that this reduction, which at first sight does not appear particularly startling, results in an increase in the revenue load of from 34 per cent. to 42 per cent., or an increase of nearly 25 per cent. in the utility of the aeroplane. These figures relate to machines having a power loading of 15 lbs./h.p., which is a very fair average for the modern commercial aeroplane. In the case of high-performance military machines, the gain is vastly greater, and Mr. North pointed out that, in many cases, the reduction in percentage of structure weight which can be gained by the employment of metal construction, makes possible a type of machine which would otherwise be placed out of court. He did not suggest that the whole of this gain was immediately capable of realisation, but, on theoretical and practical experimental grounds, he considered that there was a reasonable probability of arriving at a structure weight of 25 per cent. to 27 per cent. at no very distant date.

As Mr. North and Boulton and Paul's, of Norwich, have probably had greater experience of metal construction than any other British firm at the present time, we can only accept their views, and express the hope that metal construction will be given the encouragement which its promises appear to warrant. That the work is difficult will be readily granted, and there can be few who will not agree with Mr. North when he states that "Aeroplanes are not designed by science but by art, in spite of some pretence and humbug to the contrary." Particularly happy is, we think, his illustration of the manner in which, to a very great extent, the aircraft designer works. "To arrive analytically," he says, "by measuring the frictional coefficient of the cloth and the resilience of the balls and cushions, at the precise way to play a complicated stroke at billiards is practically hopeless, but practice and a knowledge of principles deduced from scientific analysis of simple cases will produce surprising results. So it is that, over a wide range, light metal members can be designed with every confidence that they will fulfil their designer's expectations and realise the advantages in weight economy foreshadowed by the properties of the materials."

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The Gliding Competition

There was a strong dramatic element in the finish of the gliding competition for the *Daily Mail* £1,000 prize and several subsidiary prizes. The winning machine, as well as that which made the second best showing on the last day of the competition, had not been out of its tent until brought out for its record-breaking flight. As it was wheeled along the ridge towards Firle Beacon, it is a fair guess that not one out of every thousand who saw it recognised in it the prize-winner. Yet the minute the Peyret had left the ground it was obvious that here was a machine which had controllability to an amazing extent, and M. Maneyrol very soon proved himself not only a good pilot, but an excellent judge of wind conditions. With perfect mastery of his craft he swung to and fro, and appeared to have not the slightest difficulty—except for a short period just before he reached Raynham's duration—in remaining in the ascending air currents.

No less of a surprise was Sqdn.-Ldr. Gray's machine, which was composed of an old Bristol Fighter fuselage, on which had been fitted a Fokker D. VII wing. The "Brokker," as it was nicknamed, caused great amusement when it failed to get off in the first start, but the amusement changed to admiration when the machine got away and soared upwards under perfect control. Both machines handled extremely well, and the "Brokker" appeared to indicate that ample controllability is not necessarily incompatible with "orthodox" design.

Until the appearance of the Peyret and "Brokker," there had been no serious challenger of Raynham's performance, and the opinion was freely expressed on Saturday morning that the prize was as good as won. The win by another competitor at the eleventh hour was but another instance of Raynham's proverbial luck—or ill-luck. Time after time Raynham has been within sight of winning a big event, and time after time something has happened at the last moment to snatch victory from his grasp. We are extremely sorry that Raynham's ill-luck should have dogged him again this time, but we hope and believe that he will not let himself be discouraged from trying again. We realise that this may sound a good deal like a council of perfection, and that after his many disappointments Raynham might well be excused from further attempts. Should this be the case, the loss to British sporting aviation would be a great one, as Raynham is extremely popular in all aviation circles.

To Gordon England we express our sympathy in his sad misfortune. His machine was a fine piece of work, and he had been flying it very well indeed up to the moment of his accident. In spite of its small size, the machine was one of the steadiest of all the competing machines, and but for this stroke of bad luck it would undoubtedly have done well on the last day, when the wind was of suitable force for it.

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And the Lesson

Several facts appear to stand out clearly as a result of the competition. One of these is that ample controllability is of greater importance than extreme efficiency, and another is that light loading is not imperative. We do not know what is the weight of Sqdn.-Ldr. Gray's "Brokker," but in view of the fact that both its wing and its fuselage were designed for very much greater loads than those encountered in a glider, the structure weight must have been very considerable. Yet the machine performed extraordinarily well.

A further point brought out was that the country around Itford and Firle is very suitable for gliding, at any rate with northerly and easterly winds. How machines will fare in the winds which had been expected, *i.e.*, southerly and south-westerly winds, yet remains to be seen. The southern slopes are not nearly so steep, and the extent to which they give soarability is at present a matter for speculation. However, if, as we hope, the site is to be retained permanently, this problem should be solved before long.

In the meantime, our congratulations to all concerned in the meeting, competitors as well as organisers!

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Japanese Decorations for Air Mission Members

FROM Tokio it is announced that in recognition of their great service to the naval flying forces of Japan, decorations ranging from the Third Class Order of the Rising Sun to the Sixth Class Order of the Sacred Treasure have been granted by Imperial decree to the thirty commissioned and non-commissioned officers composing the British aviation mission in Japan. The decorations were presented at a full dress parade held at Kasumigaura flying station by Rear-Admiral Tajiri, of the Imperial Japanese Navy.

Captain the Master of Sempill, commanding officer of the mission, was given the Third Class Order of the Rising Sun, and Commander Meares was given the Third Class Order of the Sacred Treasure.

Other decorations are Lieut.-Commanders Fowler, Atkinson, Eldridge, Brackley, Smith, and Orde-Lees, Fourth Class Order of the Rising Sun. Lieut.-Commander Orde-Lees has gained widespread recognition in Japan on account of his parachute descents, and because of his feat in climbing Mount Fuji last mid-winter, something that Japanese have never accomplished, though they have made many attempts.

Lieuts. Pollard, Bryan, Loton and Vaughan-Fowler and Surgn.-Lieut. Jones, Fifth Class Order of the Rising Sun; Sub-Lieuts. Brutnell, Sheret Hatfield, Landamore and Volkert, Sixth Class Order of the Rising Sun; Warrant Officers Crisp, Satchell, Bond, Williams, Farwaker, Redmond, Adams, Manton, Hunter, Ellis Ford and Sherras, Sixth Class Order of the Sacred Treasure.

In all probability the British instructors will remain attached to the Japanese Navy until 1924, or even longer.

Groves Memorial Prize Essay Awards

THE awards in the 1922 competition for the R. M. Groves Memorial Essay on "A Forecast of Aerial Development," open to members of the R.A.F., are as follow:

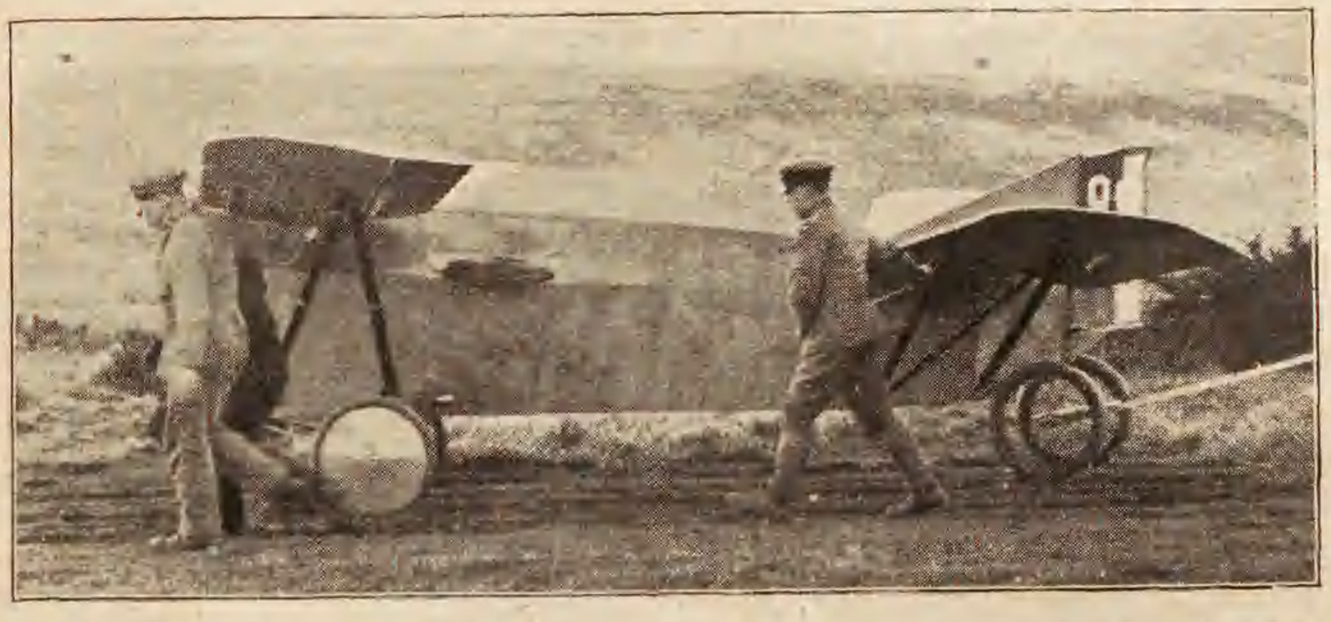
1. Squadron Leader A. A. Walser, M.C., D.F.C., Air Ministry.
2. Squadron Leader B. E. Smythies, D.F.C., R.A.F., Staff College, Andover.
3. Wing Commander J. T. Babington, D.S.O., Headquarters, No. 7 Group, Andover.

Special prize for imaginative *résumé* on "Aviation in the Next World War"—Wing Commander J. T. Babington.

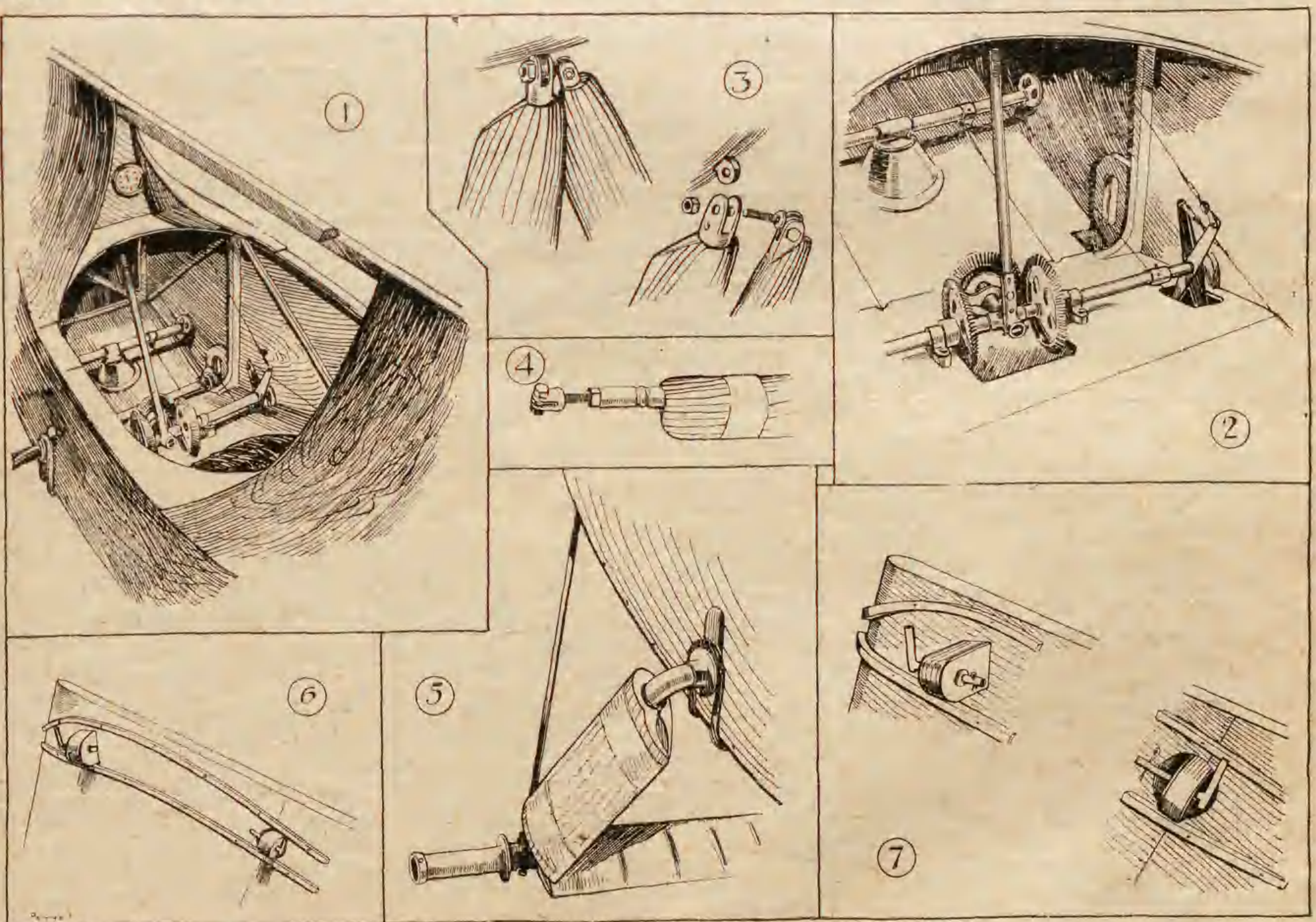
THE PEYRET TANDEM MONOPLANE

Details of the Winning Machine

Unusual as is the aerodynamic design of the Peyret tandem monoplane, its construction appealed to all experts at the first glance, and even before the machine took the air it was conceded that, whatever peculiar views M. Peyret might have on the subject of disposition of wing surfaces, side areas, etc., he knew how to build a glider. The three-ply mahogany fuselage was evidently the work of an expert, and the wing bracing with one set of "N" struts on each side gave great rigidity in spite of evidently slender spars. Also, the differential control arrangement certainly looked extremely unlike what one would expect from an amateur enthusiast. Yet the fact remains that no one, ourselves included, really took the machine seriously until it had left the ground. It is useless to pretend that it was otherwise. Everybody was "taken in," and before the start most of us expected to see the machine crash on the hill-side. No sooner was it in the air, however, than it became evident that here was a machine which had something that most of the others lacked, *i.e.*, controllability to an amazing extent. That it was as efficient, regarded purely as a glider in still air, as some of the others might be open to doubt, but that the pilot did have abundant control could not be doubted for one moment. The short, sharp turns bore testimony to that, as did the fact that even the most vigilant observation of the machine failed to reveal more than the slightest movement of the ailerons, indicating that at no time were the controls used to anything approaching their fullest extent. The rudder could be seen moving slightly from side to side,



The Winner: Bringing the Peyret monoplane up to the top of Firle Beacon.



THE PEYRET MONOPLANE: Some constructional details. 1, View into the cockpit, showing controls and position of air speed indicator. 2, The differential control by which the flaps are operated as combined ailerons and elevators. 3 and 4, Details of the wing bracing strut attachments. 5, One side of the undercarriage. The wheel has been omitted for the sake of clearness. 6, Front wing roots on fuselage. 7, Details of spar attachment to fuselage. Note metal-faced ply-wood wing roots, and quick-release bolts.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

THE Designing Competition for which FLIGHT is offering prizes of £25 and £10 closes on November 30, 1922. Designs should be sent in marked with a *nom de plume*, and an envelope containing the competitor's name and address, marked on the outside with the *nom de plume* chosen, should be sent in with the design. Full particulars of the rules, etc., were published in our issue of August 31, 1922. Aerodynamic estimates and stress calculations must accompany the designs.

* * *

Arrangements are now in progress for holding a gliding meeting at Biskra in Algeria. The meeting is to be held in January next, and the chief prize will be one of 10,000 francs, offered by M. Dal Piaz. Biskra has been chosen partly because a range of hills 12 miles long and rising to 1,350 ft. is situated here, and partly because it is thought that it may prove possible to soar in the rising air currents from the hot desert.

ACCORDING to *le Temps*, M. Gabriel Voisin is offering a prize of one million francs for the glider which first covers one kilometre on a circular track at Issy-les-Moulineaux.

* * *

BOTH the winning French Peyret monoplane and Raynham's Handasyde are on view at Selfridge's during this week. This affords an excellent opportunity for those who did not visit Itford to see the two famous machines at close quarters.

* * *

SQUADRON-LEADER GRAY'S "Brokker" will probably be tried again at Itford this week-end. Its performance in the competition was extraordinary, and it seems quite possible that, given suitable weather, the "Brokker" may beat M. Maneyrol's "Peyret." We should like to see a British pilot on a British machine as holder of the world's record.

* * *

As a piece of "cheek" it would be difficult to beat the competitor who telegraphed to the Royal Aero Club officials that he had "crashed *en route*" and doubted if he would be able to take part in the competition.

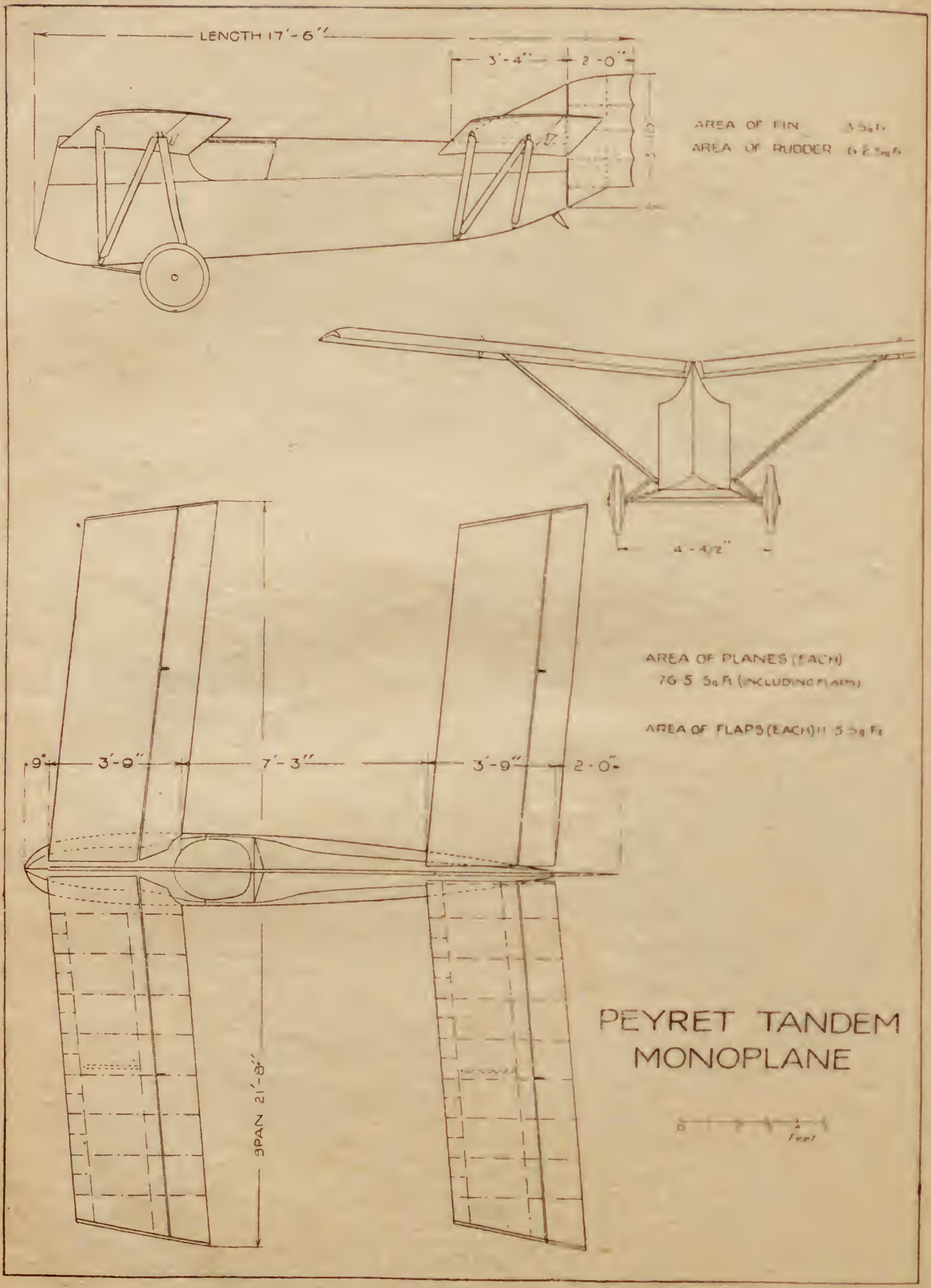
THE BRITISH GLIDING COMPETITION

LEWES, *Wednesday, October* 18.

WEATHER conditions were not at all favourable for gliding on the third day of the British Gliding Competition, for the wind had not only considerably increased in force, but was unpleasantly gusty. It was from much the same direction, and down by the hangars below Itford Hill gusts of 20-30 m.p.h. were not infrequent, whilst up on top of the hills the wind velocity was given as 40 m.p.h. and upwards. We no longer had the pleasant blue sky and fleecy clouds of the previous days, but low grey clouds threatening rain.

Nevertheless, Gordon England brought his machine out early, and had it carried up to Firle Beacon. Arriving there, he "went over the top" shortly after nine o'clock, and was immediately "rocketed" upwards in a by no means pleasant

SOARING AT FIRLE BEACON HILL : General view, showing a small section of the crowds who watched M. Maneyrol's splendid performance. Note the altitude above starting point.



THE PEYRET MONOPLANE : Plan, side and front elevations, to scale.

but otherwise only a minimum of control appeared to be required. Having thus frankly admitted our failure to appreciate at first sight the merits of the Peyret monoplane, we may proceed to give a detailed description of the machine.

The Peyret monoplane glider is of a type which has for many years been considered rather inefficient. Wind tunnel experiments on tandem surfaces have shown the rear plane to be far less efficient than the front one, and consequently, when large area was required combined with small span, designers got into the habit of choosing the biplane or triplane arrangement. Nor should we like to assert that they were wrong where power-driven machines are concerned. To employ the large rear plane means carrying about a considerable amount of rather superfluous structure weight which can ill be afforded. In a glider, however, this is but a small price to pay for the amazing controllability which the tandem arrangement gives, and to M. Peyret is due the credit for having realised this. Not only so, but having failed to find a French constructor willing to build the machine, M. Peyret set to work and built it himself. The whole of the work, therefore, is his own, from the first conception to the finished machine.

The tandem arrangement of the lifting surfaces necessitates a very strong fuselage; especially is this so when one considers the torsional stresses to which the fuselage may be subjected owing to a gust striking one wing before the other. Now the ply-wood covered type of fuselage is exceptionally good in torsion, hence this form of construction was chosen. The internal framework is very light, consisting of spruce longerons and struts, with here and there a multi-ply former (reduced to a mere skeleton by sawing away most of the material except diagonals) where local stresses call for extra rigidity. Over this light framework is placed a covering of three-ply mahogany, approximately $\frac{1}{32}$ in. thick.

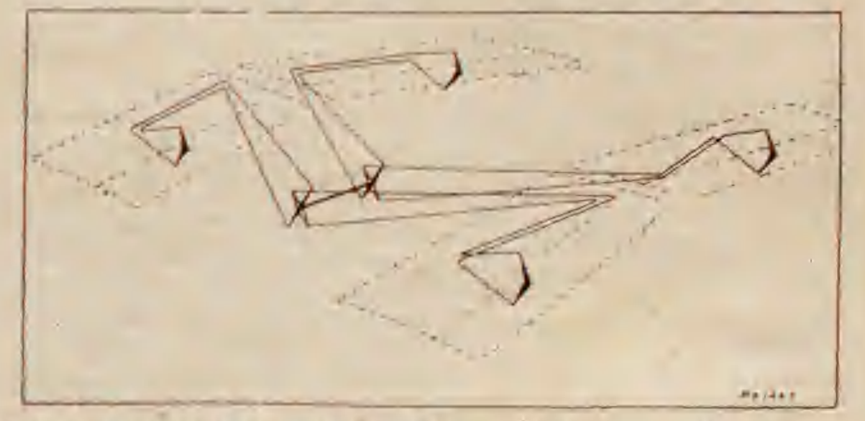
In section the fuselage varies considerably from point to point. At the cockpit the section is approximately rectangular, while forward and aft of this point the sides are of the "tumble-home" variety. The front two-thirds of the body is surmounted by a triangular section, which towards the stern merges into the inward-sloping sides of the main structure. Immediately in front of, and also behind, the cockpit the triangular section has its sides curved inwards, so as to improve the pilot's view. Along the ridge of the triangular "roof" runs a nearly straight longitudinal member, which is extended over the pilot's cockpit. Thus a weakening of the structure at this point is avoided.

The wings are characterised by a pronounced dihedral and back sweep. The former has doubtless been necessitated by the large side area of the fuselage, and the latter by a desire to place the pilot behind the trailing edge and yet get the centre of gravity sufficiently far forward to make the front plane more heavily loaded than the rear, thus obtaining longitudinal stability by placing the front wing at a larger angle of incidence than the rear.

Constructionally the wings, front and rear of which are of equal span and area, consist of light ribs, placed somewhat far apart, carried on tubular spars of Duralumin. Short nose ribs extending from leading edge to front spar are placed half-way between main ribs. The wing section used is fairly thin, although of considerable camber, and the wings are braced by a single pair of "N" struts (Duralumin tubes enclosed in wood fairings) on each side. These struts work in compression as well as in tension, there being no top bracing. Attachment of spars to the fuselage is by short "T"-shaped bolts passing through the ends of the tubular spars and through short roots, made of wood, built into the fuselage just below the "ridge pole."

The undercarriage is of somewhat unusual design, although being of the simple two-wheel type. The axle passes across underneath the floor of the fuselage, but another member, also a tube, shaped somewhat like a very flat inverted "U," passes through slots in the sides and carries the rubber-cord shock absorbers. Radius rods in the form of tubes run from the axle forward to points underneath the floor of the body, a short distance behind the nose. The undercarriage is divided in the centre so as to allow of removing the inverted "U," the two halves fitting into a central sleeve, where they are held by bolts.

As the greatest merit of the Peyret monoplane lies in its very effective controls, these will be dealt with at some length, and in order further to facilitate understanding of their working we would refer readers to the accompanying diagram. The essential feature of the controls themselves, apart from the system of working the four wing flaps simultaneously, is the use of a differential, formed by three bevel gears. One of these is mounted on the control column, and is placed in a transverse plane. This wheel engages with two others of the same size, but placed in a longitudinal plane. The action is similar to that of the differential of a motor-car. When the control column is moved in a fore-and-aft direction, the two side wheels move with it, without any movement relatively to one another. When, however, the control column is moved from side to side, the two side wheels move in opposite directions. To the two side wheels are attached short shafts, carrying on their outer ends cranks from which cables run to the wing flaps. The manner of connecting up the control cranks and flap king-posts will best be understood from a reference to the diagram. From this it will be seen that when the "stick" is pushed forward the flaps of the front wing are raised, those of the rear wing lowered. When the control column is pulled back, the reverse is the case.



THE PEYRET MONOPLANE: Diagrammatic representation of the control system, by which the wing flaps are used as combined ailerons and elevators.

When the column is pushed to the left the starboard flaps of both front and rear wings are depressed, those on the port side being elevated at the same time. Pushing the "stick" to the right has, of course, the reverse action, while any combination of lateral and longitudinal movement is possible.

The same movement could, of course, be obtained by the use of crank levers, but arrangement would have to be made for the ends of one lever sliding in slots in the other, and the use of bevel gears results in a much more positive, and mechanically better, action.

Directional control is by rudder worked from a foot bar in the ordinary way. We are not quite certain as to how great effect the rudder has, placed as it is so close behind the rear plane, but it appears probable that, even assuming the rudder to be not particularly effective, the machine can be easily turned by the use of the wing flaps. In other words, the machine can probably be turned easily with the flaps, even with the rudder central, whereas we are somewhat doubtful regarding directional control with the wing flaps locked in the neutral position. Nor does it appear to matter very much, as the machine can undoubtedly be turned in a very short radius by the combined use of rudder and flaps.

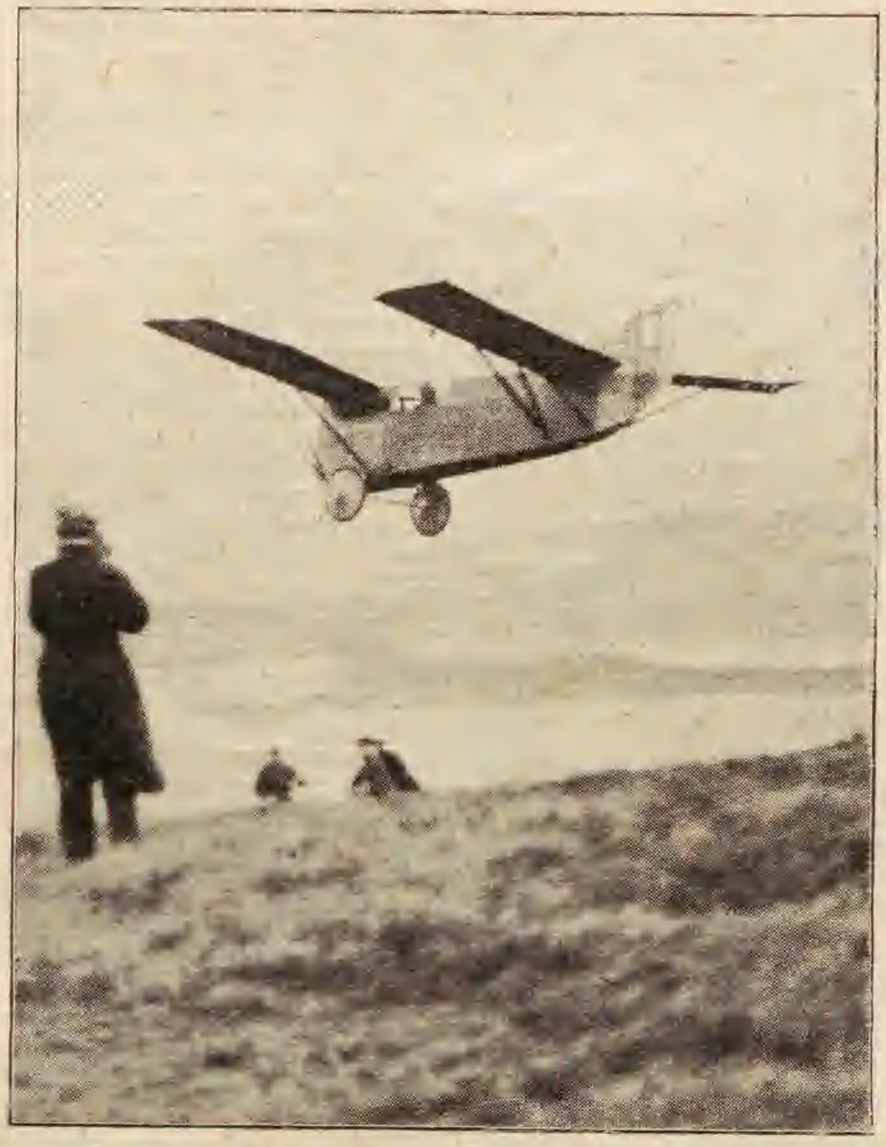
Apart from its extraordinary controllability, the Peyret monoplane would appear to possess certain other advantages. Thus the view obtained from the pilot's cockpit is exceptionally good, owing to the fact that the front wing is placed relatively high so that the pilot's eyes are approximately in line with the wing chord, while he is situated behind the trailing edge and therefore has an unrestricted view downwards. Also, in a crash, the machine should offer a maximum of protection to the pilot, as there is a good deal of fuselage both in front and behind him, while laterally the two pairs of wings project a considerable distance, reinforced by the "N" struts.

Altogether, the Peyret monoplane is a machine of more than ordinary interest, and there can be little doubt that it will, as the French say, *faire école*. The tandem arrangement offers so many advantages that it is not to be doubted that machines of similar design will appear, probably incorporating detail improvements, but following the Peyret (and incidentally S. P. Langley, whose "aerodromes" were of the tandem type, and whose ideas have been vindicated to no small extent by the performance of this machine) in the disposition of their lifting surfaces.

The weight of the Peyret glider is given by M. Peyret himself as 67 kgs. (147.4 lbs.). The machine looks as if it might be heavier than that, but the wings are certainly very light, and the fuselage is probably lighter than it appears to be. The undercarriage, however, is probably fairly heavy. Assuming the weight to be 150 lbs., and the same figure for the pilot, the total weight is 300 lbs., which, with an area of 153 sq. ft., gives an *average* loading of 2 lbs./sq. ft. Actually the loading of the front wing is greater and that of the rear wing smaller than this figure.

manner. Then the struggle commenced, and he made a plucky fight to master the gusty currents. It was not long before he began to drift backwards and sideways, and eventually came down—still moving backwards!—on the edge of a slope some quarter of a mile from the starting-point. He remained at the controls, to prevent the wind taking charge of the machine, until help arrived, when the glider was carried to a more sheltered spot on the other side of the ridge. It was, he said, the first time he had ever landed backwards! His air-speed indicator showed 45 m.p.h. while he was up, and 40 m.p.h. when he was landing. His flight lasted about 1 min. 30 secs.

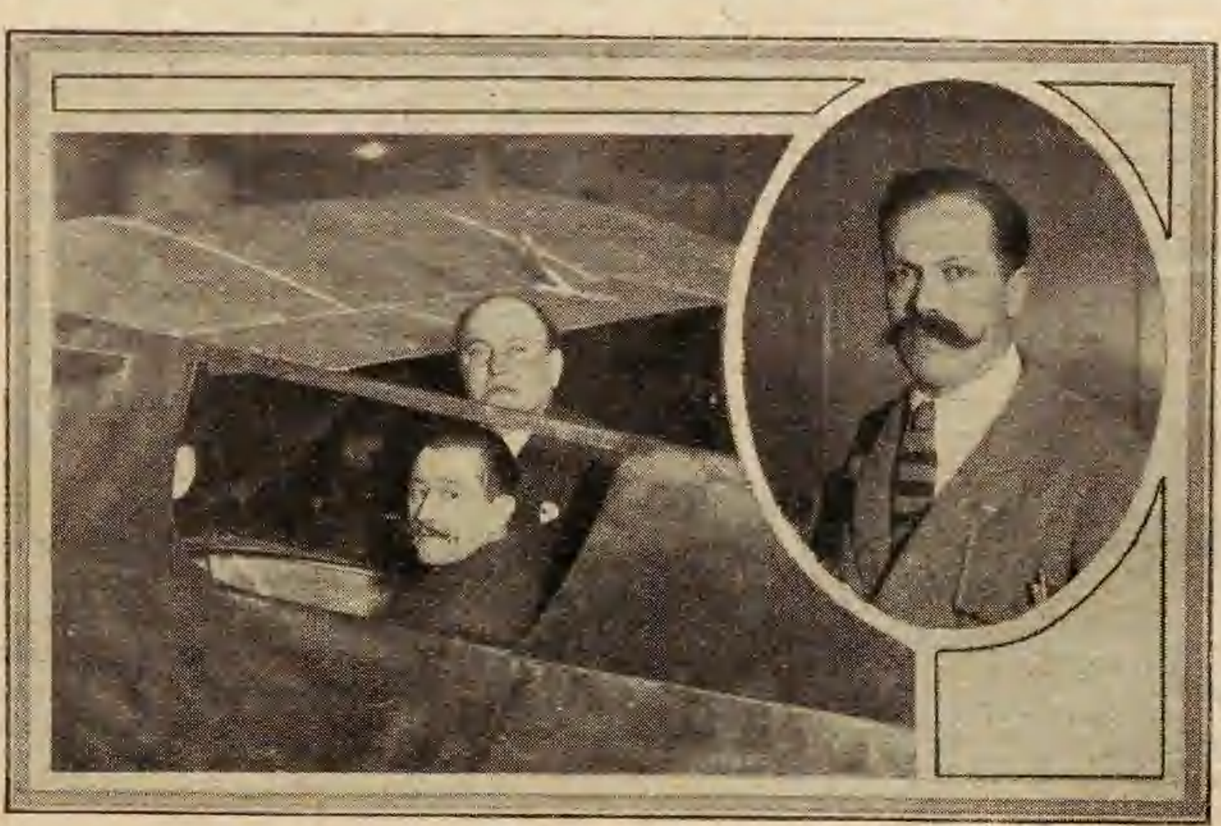
Shortly after this Jeyes brought his Aachen glider out, and proceeded to a point on the ridge between Beddingham and Firle Beacon. He took off at about 10.46 a.m., and got several nasty up-and-down bumps immediately he left the ground. Then, rising the meanwhile, he got blown gradually back, and so he put the nose down and slowly proceeded alongside the hill towards Firle, loosing height until he reached a spur on the side of the hill, and here he attempted to land. On turning, however, the right wing tip struck the ground, and the whole wing broke completely off and started a glide on its own—landing several hundred feet away. The rest of the glider, of course, came down with a bit of a bump, upside down. As Jeyes did not make an immediate appearance some anxiety as to his safety was felt, and a rush was made to his assistance. Owing to the steep nature of the hill-side some minutes elapsed before an R.A.F. mechanic reached the machine and speedily raised the fuselage—when Jeyes stepped out, apparently untouched. The mechanic, however, fell flat on his back, and stayed there several minutes, whether from exhaustion after his record glide down the hill or from sheer relief, we know not. Shortly after, the remains of the glider were brought up and then carried back, with the help of Boy Scouts, to Itford. Jeyes' glide was, also, of about 1½ minutes' duration.



THE START OF A FAMOUS FLIGHT : M. Maneyrol's Peyret monoplane gets away on October 21 for its record flight.

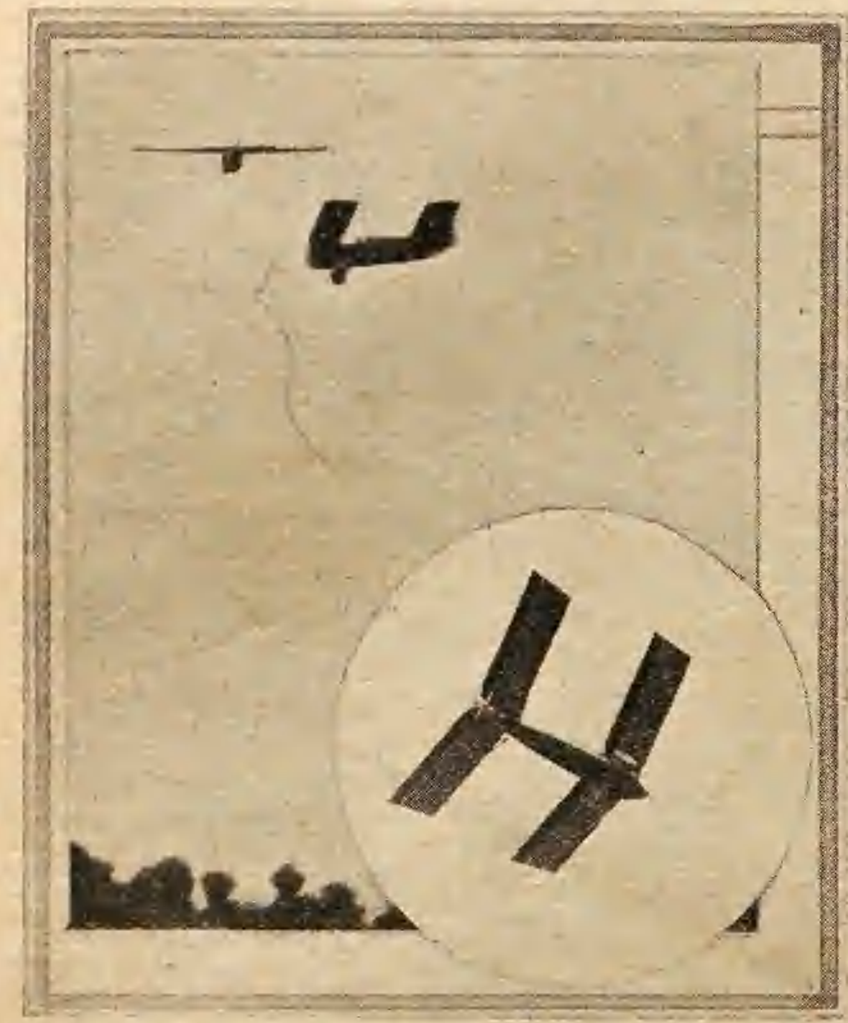
During the remainder of the day the wind, if anything, increased in force, and there was nothing further doing except a gliding contest, down the slope in the lower valley, on the two six-wheeler trolleys (used for conveying sundries up the hill by means of the kite-balloon winch). The R.Ae.C. team, piloted by Secretary Perrin, won the first race easily, but the second race ended in a dead heat—and disaster! One of the 'buses at the end of the run made a sharp left-hand turn, and, continuing down the opposite slope of the hill, eventually crashed into a gate at the bottom. Some of the "crew" managed to drop off before the crash, but some — including our old friend Howard Wright—"dropped" off after and received sundry damages to noses, legs, etc. Well, well! we *had* to do something to pass the time, and the spirit of the early days of flying had returned to one and all. In the meantime work on the various gliders in the hangars proceeded.

Thursday, October 19.—The wind on this, the fourth, day of the Competition was even stronger than ever, and during the night one of the hangars was blown down, with unfortunate results for Mr. Prosser's biplane glider. There was plenty to be done on the various machines, however, and we were glad to be able to make ourselves useful lending a hand at doping, filing, riveting, etc., when required. The rudder on Raynham's 'bus looked smart with a new extension, and by the end of the day the movement of the ailerons had successfully been increased and a new air-speed indicator fitted, and all was ready for the next flight. The S.C.W. glider was also practically completed, and the Peyret tandem



The Winner : M. Maneyrol, in the cockpit of his machine, photographed at Selfridges, where the Peyret monoplane is on view this week. Behind the machine may be seen Lieut.-Commander Larrouy, manager and interpreter to M. Maneyrol. Inset, M. Louis Peyret, who designed and built the winning machine.

monoplane was beginning to look ready for business. Herne's D.H. monoplane had been converted to wing warping and was now ready for a trial flip, so late in the afternoon it was taken up to the low ridge to the north of Itford Hill. It left the catapult quite gracefully, but when about 20-30 ft. from the ground the wings were seen to start warping somewhat excessively and with increasing vigour, until both wings suddenly collapsed under the strain and folded up back over the machine, which pancaked hurriedly and not too gently on a more or less even keel. Herne stepped out immediately, shaken but unhurt, and so ended the only glide of the day. It was fortunate that the wings broke just when they did, as a little farther on there was a considerable dip in the ground, which would have increased Herne's fall to an alarming extent.



NEAR THE FINISH: Our photograph shows the Peyret monoplane and Sqdn.-Ldr. Gray's "Brokker" in the air together. Inset, another view of the Peyret. As the machines approached one another the two pilots would wave a cheery greeting and then drift apart once more. In spite of the darkness the machines did not appear to be in any danger of colliding.

During the day Gordon England, Raynham and many other enthusiastic helpers converted one of the six-wheeler trolleys—these trolleys had a rough time of it!—into a "sail-plane," by means of a mast, bowsprit, Jeyes' broken wing and sundry other items. A successful trip was accomplished, with the assistance of a few Chinese crackers, and a safe anchorage effected in a barbed-wire fence. This time there were no casualties!

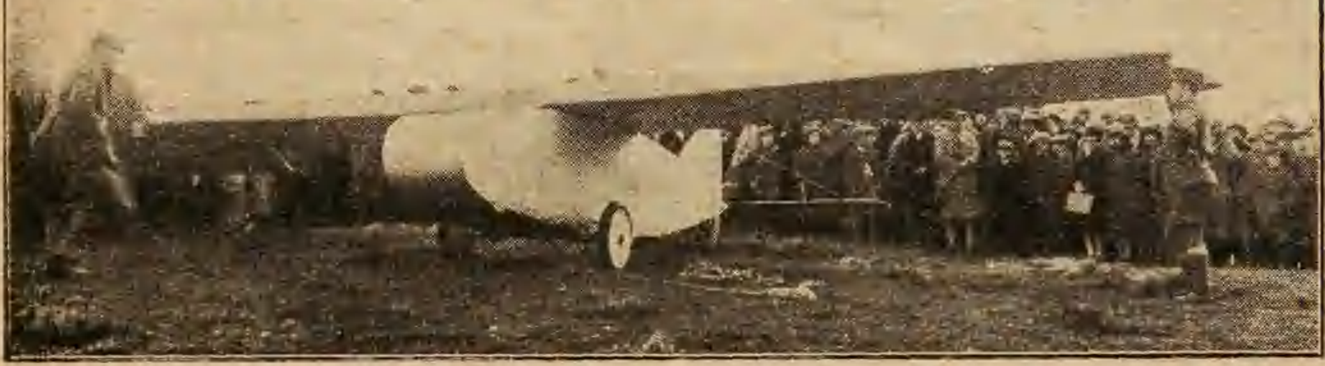
Friday, October 20.—The strong wind of yesterday died away during the night, and this morning there was but a gentle breeze, while mist hung about among the hills. Nevertheless several gliders were taken from their tent hangars at Itford to the top of Firle Beacon. As it was quite obvious that the wind was insufficient for soaring, at least by any of the gliders which had been tested up till then, no flights were attempted until, shortly before 1 p.m., Stocken had his "Airdisco" monoplane Phi-Phi placed on the brow of the hill and made a start. This machine, designed by Major Grant and Mr. Rankin, and built by the Aircraft Disposal Co., is a parasol monoplane with crescent-shaped wings. Originally it was fitted with two small wheels, but on a short trial flight these gave trouble and were replaced by a couple of aeroplane tail-skids. At the first attempt today the skids appeared to dig into the ground too much, and the machine could not be got off. A pair of small wheels were then fitted on the skids, and this time the machine got away after a very short run, hanging in the air for quite a long time. At first Stocken turned towards the left, *i.e.*, towards Itford, travelling down wind, but he then made a right-hand turn. The machine, however, took so long in answering the rudder that by the time the turn was completed it was out of the ascending currents, and there was nothing for it but to make a glide into the valley. The machine appeared to float along, apparently indifferent to forward speed, and nearly as indifferent to her rudder controls. However, she certainly gave the impression that with improved controllability she would soar in very light airs. Stocken's time was 3 mins. 18 secs.

As soon as Stocken had landed Mr. Olley made a start on the Fokker biplane, but, like Stocken, he lost the ascending current and had to glide into the valley, making a good landing after being in the air about 3 mins. 20 secs. During his flight Mr. Fokker caused considerable amusement by shouting repeatedly to Olley "Come 'ere, come 'ere." While waiting for the wind to get up many of the competitors and officials amused themselves by "launching" one another on cushions and pieces of fabric, the record "flight" being made by Mr. Manning, who was treacherously and suddenly left alone on a piece of fabric by the other two passengers.

A little later in the afternoon the Fokker single-seater was got ready for a start, Fokker having very sportingly given permission for Merriam to make a flight on it. As everything was ready a heavy mist rolled up, and it was wisely decided to postpone the flight. Then followed a wait of about half-an-hour, but as there was no prospect of improvement in the weather, Raynham, England and Fokker agreed to return to camp, so that no one should have an unfair advantage over the other.

Late in the afternoon Fokker gave three demonstration flights on the single-seater, starting from Itford hill. At the end of the first two, he landed on the western slope, behind the hangars, but in the third he promised to make an attempt to land right in front of the tents, a space being cleared for him. There was a great search for a cinematographer, as Fokker would like a film of this landing, but no one seemed to be sufficiently familiar with this kind of photography, and Fokker had to do without his "pictures." He started again from Itford hill, and swung to the left as in the previous two flights, but just before getting to the barbed wire fence, he turned to the right, coming in a couple of feet off the ground. As he floated by he whistled and shouted "I cannot do it, too much speed, too much speed." He just managed to touch in front of the tents, but had to carry on down the slight slope. Nevertheless, the performance was a very pretty one.

The Sayers monoplane was ready just before dusk, and Courtney made a short flight. Control troubles had kept the machine from doing anything much, and although there was



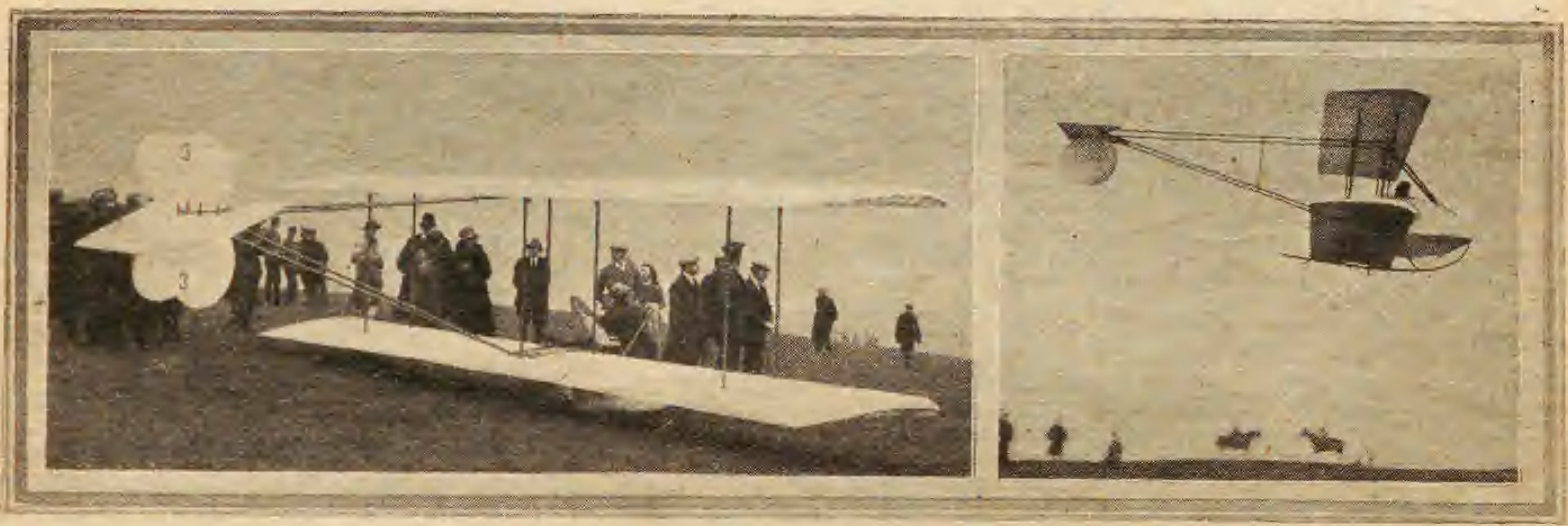
A late-comer with a fine performance: Three-quarter front view of Sqdn.-Ldr. Gray's monoplane. This machine was made from the fuselage of a Bristol Fighter and the top plane of a Fokker D.VII, and was consequently nicknamed the "Brokker."

The Merriam-Newman monoplane photographed just before the start of the flight which ended in a crash.

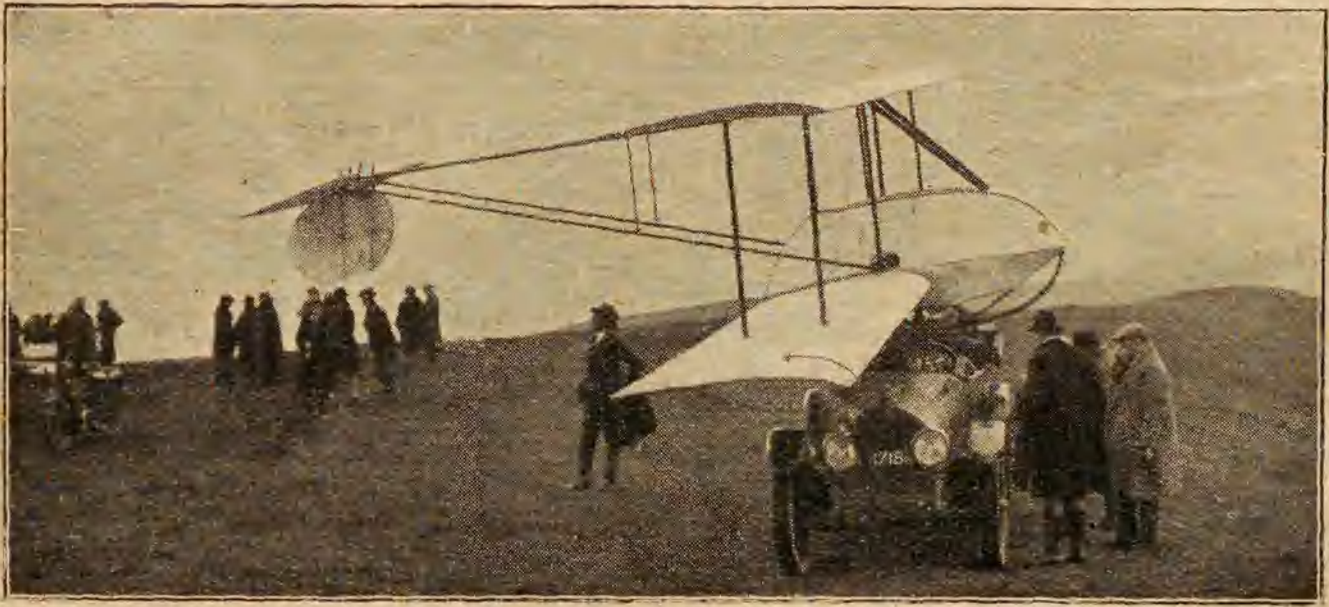
a decided improvement, further adjustments were still considered necessary.

Saturday, October 21.—A brisk wind was blowing from the north-east on the last morning of the competition. In the early morning a pedal-propelled monoplane was being tried on Itford hill, being started from a comparatively safe height. A couple of short hops of a few feet, about one foot off the ground, was the nett result, and the inventor decided to refrain from challenging Raynham's 1 hour 53 minutes.

In the meantime Raynham had had his machine brought to the top of Firle Beacon, and made an early start. He did not, however, succeed in remaining aloft for any great length of time, landing well to the east of Firle. Gordon England was next to start, but when he had been up for a few minutes he got blown back over the top of the ridge. He tried to get back by making a sharp turn, but while the machine was well banked for this a gust struck it, tilting it over further and causing it to strike the ground, nose first. Assistance was rushed to the spot, which was but a short way from the summit of Firle, and England was extricated. He was conscious, and expressed the opinion that his leg was broken. In spite of the pain, he pluckily smiled to his friends, and expressed regret that his accident should have happened just when he was doing very nicely, and was keen to know how long he had remained up. The machine was but little damaged. The extreme nose was crushed in, and much of the rest of the front portion was damaged in getting England out, but otherwise the machine had withstood the shock admirably, and the construction must certainly have been uncommonly sound to stand up as it did. No ambulance was in sight, nor had it arrived one hour after the crash. In the meantime poor England was lying on the ground with a double fracture of his ankle, and some highly uncomplimentary things were said about the ambulance, which was nowhere to be found. On the previous morning it had been seen busily engaged carting flat-footed policemen up to the top of Itford Hill, but this morning it had vanished utterly and completely.

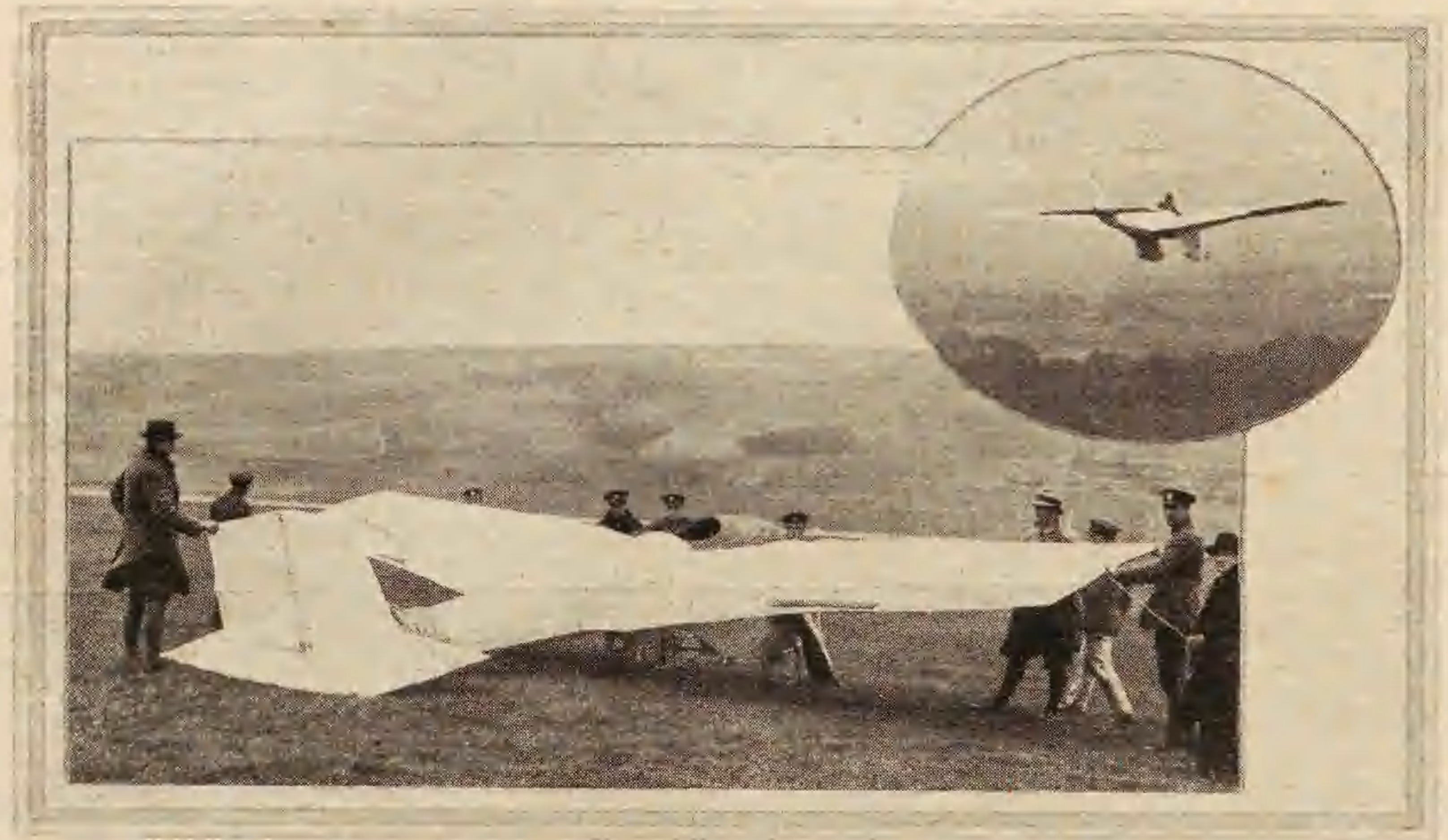


THE FOKKER MACHINES : On the left, the small single-seater biplane, with pilot's seat on lower wing. On the right, the two-seater, which has an enclosed nacelle, is seen in the air, piloted by Mr. Olley. Note the central skid and wing-tip guards.



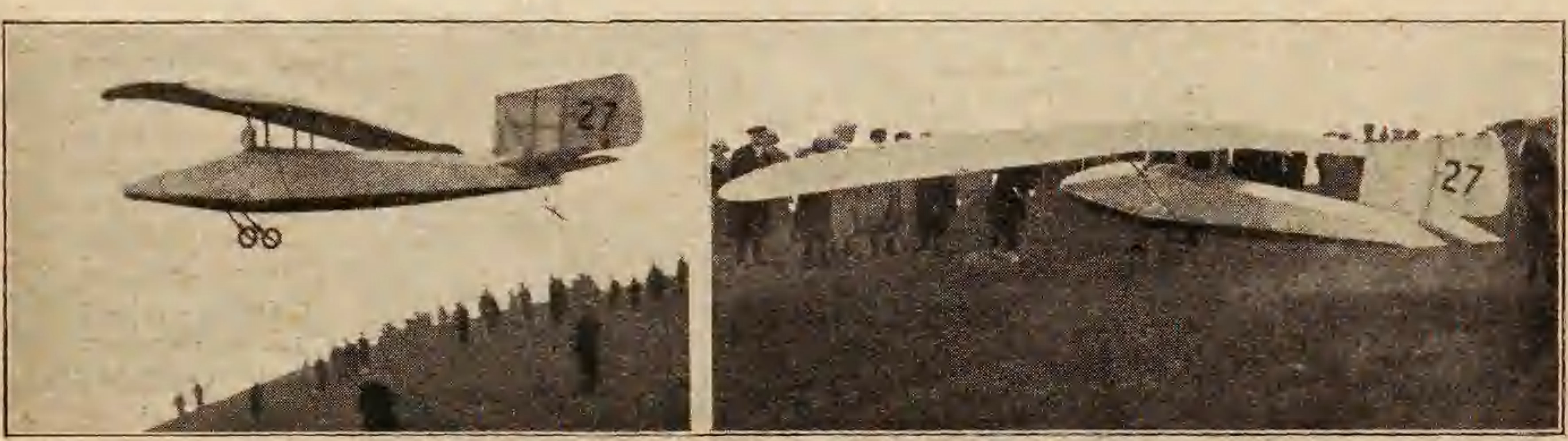
Fokker's method of transport: The biplane glider is placed on a plank resting on the sides of the car, and the machine is lightly braced fore and aft by two ropes.

The Fokker two-seater passed the scene of the crash shortly after 10, and proceeded to a point some little distance east of Firle, to a place which Gordon England had nicknamed "Fokker Point" from the preference which Fokker had shown for this spot. Here it was lifted off the car and got ready for flight, taking off about 10.40, piloted by Olley, who was accompanied by a passenger (Observation Officer Rodgers of the R.A.F.). The machine was violently blown about, and Olley had all his work cut out to manage it. The gusts struck it violently, and it rocked as it rose and fell on the air currents, the warp being in constant and violent use. On one occasion the machine got blown, while at a low altitude, towards the side of the hill, but by skilful piloting Olley managed to save a crash. Fokker kept shouting advice to him, telling him to get up higher, but either Olley could not hear or he was unable to get up very high; at any rate, the machine never reached any great height above the starting-point. For over three-quarters of an hour Olley struggled with the wind, and the general opinion was that he might carry on too long, getting exhausted and out of control. The end came with dramatic suddenness. While apparently flying well the machine must have got into a strong down-current. It disappeared from view in a flash, but when spectators ran to the edge of the hill they saw the machine gliding down into the valley under good control and land safely by a clump of trees. The duration was about 49 minutes, which constitutes a world's record for glider with a passenger. It cannot be pretended that it was pleasant to watch this flight. The machine looked as if it had St. Vitus' Dance, and one did not envy the passenger. However, it probably looked worse than it felt, otherwise it must have been agony to the occupants. In bringing the machine back to the top the plank on the car broke and the glider toppled over backwards, damaging the tail. Afterwards a small Boy Scout was seen triumphantly carrying one of the rudders about and nearly taking the air in the strong wind.



MR. JEYES' AACHEN MONOPLANE: Inset, the machine in flight.

Raynham had by now got his machine back to the summit of Firle, but as no other competitor appeared likely to beat his record, he decided to wait until the wind dropped a bit. A brown machine could be seen approaching from Itford along the ridge, but it seemed to take a very long time in getting to Firle. As it came closer it could be identified through field-glasses as the French Peyret monoplane. A stop was made at every little hill, and apparently Peyret and Maneyrol could not make up their minds to start from any of them. Finally, about 2 p.m. they reached Firle, and decided to make a start from there. The wind was strong and extremely gusty, but the Frenchmen had made up their minds. Most of us thought the machine would crash as soon as it got off, but about 2.30 it rose very steadily and immediately soared to a considerable height. Maneyrol at once proceeded to beat backwards and forwards along the side of the hill, going on his first "tack" as far west as



THE "AIRDISCO" MONOPLANE: On left, machine is seen taking off for a flight, piloted by Rex Stocken. On the right, a three-quarter rear view of the machine. Note the crescent-shaped wing.

Firle (he had started from "Fokker Point"), but finding the air troublesome here, he did not venture so far west again. "Tacking" backwards and forwards over quite a narrow strip, he reached much greater altitudes than had any previous competitor, and it was obvious that the machine was under perfect control the whole time. Not only so, but never did the pilot appear to use more than a small fraction of the control available. It was also noticed that in the gusts he did what no other competitor had done; he climbed with the nose well up. Other pilots had floated up on the currents, but with the noses of their machines well down. Altogether the flight of the Peyret resembled that of a bird, and after the first few minutes one never felt any doubt that the machine was making light of the wind. Every now and then it would hover, with its nose to the wind. Sometimes the wind would drop, and the machine began to glide forward, the pilot then resuming his "tacking." At other times the wind would blow it backwards slightly, but by diving Maneyrol got it away from the hill, apparently without an effort.

When Raynham saw how well the Peyret monoplane was handled he made a start from Firle, slightly to the west of the Frenchman's "beat," but, good sportsman that he is, he chose to go west towards Itford, so as not to interfere with Maneyrol. He disappeared behind Beddingham hill, going down wind but keeping his height well. It was afterwards learned that he had reached Itford, turned back, but "lost his wind" and had to land near the foot of Beddingham hill, having been in the air some eight minutes.

At Firle M. Maneyrol continued his ceaseless beating to and fro. When he was within ten minutes or so of beating Raynham's time a shower fell, and in the disturbed air Maneyrol had all his work cut out to remain up, having to "tack" much more frequently than hitherto. For a few minutes it looked as if he was going to be forced down without having beaten Raynham, but when the shower had passed the wind got up again and the Peyret soared to a greater height, where the air appeared to be much more steady.

The Joke of the Meeting

While the shower and clouds were making things uncomfortable for the French pilot, Sqdn.-Ldr. Gray's machine was brought to Firle and got ready. This machine had arrived during the morning, and did not look particularly impressive. It was learned that the machine had cost the fabulous sum of 18*s*. 6*d*. to build, of which 5*s*. bought the Bristol fuselage, another 5*s*. the Fokker D.VII top plane wing, the rest being spent on dope. The machine was fitted with wheels, which, however, were left behind as it took off. At the first attempt the "Brokker" came down after a "flight" of two seconds. A second attempt was more successful, and to the amazement of every one the "Brokker" soared into the air majestically, turning to the right towards Bostal Hill, climbing well and appearing to be under perfect control. Sqdn.-Ldr. Gray took up a "beat" to the east of that used by Maneyrol, and the two machines swung backwards and forwards, sometimes meeting at the end of their beats, when the pilots would wave to one another, and sometimes swing to right and left in perfect synchronisation. It was a wonderful sight, and the "Brokker" caused great admiration owing to its extremely steady flight and perfect controllability. There was a great difference between the two machines. The Peyret was quick on the controls and rapid in its manœuvres. The "Brokker" was slow and stately, looking like a Blimp that had grown wings.

Suddenly a great cheer went up, when Maneyrol had reached Raynham's time of 1 hour 53 minutes. The Frenchman waved acknowledgment, and proceeded in an attempt to beat the German duration record. The two machines were by now mere silhouettes in the sky, and as the minutes went they got dimmer and dimmer. Finally it was decided to make arrangements for lighting up the top of the ridge with motor-car lamps, and a space was cleared for the two machines to land on. When cheering and hooting of motor horns announced that the German record had been equalled Maneyrol came down low and shouted that he would land in a few minutes. He stayed up another 20 minutes or so, and finally both he and Squadron-Leader Gray made perfect landings, *on the summit of the ridge*, about 100 yards from their starting point.

Maneyrol's time was given as 3 hours 21 minutes 7 seconds. But for the darkness there was no reason why he should not have stayed up for several hours. Gray had been up about 1½ hours, a very wonderful performance.

During the afternoon Stocken attempted a flight on "Phi-Phi," but crashed, without injuring himself fortunately.

In the evening there was a dinner at Seaford, where the prizes were presented.

The *Daily Mail* Prize of £1,000 was won by Maneyrol. Royal Aero Club's £50 Prize won by Squadron-Leader Gray. Lieut.-Col. Ogilvie's Prize of £50 won by Raynham. The Seaford Chamber of Commerce £20 for longest aggregate time in the air won by Olley, and longest straight flight by Raynham was rewarded by a prize of £10. Mrs. C. G. Grey's Prize of £10 awarded to Gordon England, and Col. Bristow's Cup to Rex Stocken.

PERSONALS.

Married

Capt. Alastair C. Bolton, M.C., late R.S.F. and R.F.C., only son of Mr. and Mrs. F. C. Bolton, of Aberfoyle, Perthshire, was married on September 11, at St. Andrew's Church, Livingstone, N. Rhodesia, to Dorothy E. Anstey (Doshie), widow of Sqdn. Ldr. Chisholm W. Anstey, S.W.B. and R.A.F., and eldest daughter of the late Col. H. R. Westmacott, the Welch Regt., and Mrs. Westmacott, of 2, Millfield, Folkestone.

Walter Holcroft Cam, M.B., B.Ch., late M.O. i/c XI. Wing, R.A.F., was married on October 19 at Paulerspury, to Ruth, widow of Major Gerald Jamieson, Indian Army, daughter of the late Rev. Frank Cobbold.

To be Married

A marriage has been arranged, and will take place on December 1, between Clement Hugh Greswell, only son of the late Leonard Greswell, of Alveston Grange, Gloucestershire, and Mrs. Caversham Simonds, of Wellesbourne Hall, Warwickshire, and Violet Constance Moore, daughter of the late Capt. G. H. Moore, R.N., and the late Mrs. Moore, formerly of Camden Hill, Cranbrook.

Killed

Flight Lieut. Robert Charles Lyon Holme, M.C., R.A.F., late of the 1st Somerset L.I., who died on October 4 at Kirkuk, Mesopotamia, as the result of an aeroplane accident, in his 26th year, was the only son of the late Robert Francis Lyon Holme, and grandson of the late Charles Trask, of Norton-sub-Hamdon, Somerset.

Death

Flying Officer Basil Arthur Foord, R.A.F., M.C., D.F.C., who died on October 18 at the Central R.A.F. Hospital, Finchley, aged 25, was the youngest and last surviving son of the late J. A. Foord of Fort Jameson, Northern Rhodesia.

Item.

Lieut.-Col. Ronald Waterhouse, C.B., C.M.G., by permission of the Duke of York, is relinquishing his present appointment as Private Secretary and Equerry to His Royal Highness, in order that he may take up the position of Principal Private Secretary to the Prime Minister. Lieut.-Col. Waterhouse acted in a similar capacity when Mr. Bonar Law was Leader of the House of Commons.

Colonel Waterhouse, who was born in 1878 and educated at Marlborough and Oxford, was in the 6th Dragoon Guards and the R.A.F. His War service comprises Mashonaland, 1896–7, the South African War (six clasps), and the European War (C.M.G. and "mentioned"). He was formerly private secretary to the Chief of the Air Staff and to the Controller-General of Civil Aviation. Last year he received the C.B.

LONDON TERMINAL AERODROME

Monday evening, October 23.

The first internal "airway" in Britain, between London and Manchester, was inaugurated today by the Daimler Airway, and, judging by the bookings already made, it promises to be a success. The machine left Manchester at 10 a.m. and arrived at Croydon 1 hour. 56 minutes later with eight passengers, two of whom were travelling on to Amsterdam by air. The others were business men who had urgent business in London, and were sampling the new super-express method of travel. One of them was a Manchester member of Parliament, *en route* to a political meeting at the Hotel Cecil, and it would appear that this air route will attract real business travellers as contrasted with the pleasure traffic of the London-Paris line.

The machine from Amsterdam left at 9.50 a.m. and arrived at Croydon at 12.5 p.m. This machine also carried eight passengers, which was very encouraging on a first trip. The bustle at Croydon, with two machines arriving within a few minutes of one another, and two more starting away again within three-quarters of an hour of the two arrivals, will no doubt become more orderly and smooth-running as the officials get used to it. As it was, the machines got away in reasonably good time, considering it was the first day's running.

Important Arrivals at the Air-Station

M. Flandin and M. Laurent Eynac arrived at the air-station this afternoon in one of the Grands Express Company's "Goliaths." They are here to attend the International Commission on Air Navigation, which will discuss the problem of the air services into Germany.

On Friday the wind had dropped, and was replaced by a thick mist, with accompanying low clouds, and, in consequence, the air services were held up almost entirely. The only machine to get through was one of the K.L.M. monoplanes, piloted by Mr. Van Der Hoop, who left Croydon early in the afternoon and—although the rest of the pilots shook their heads and talked of suicide—arrived safely at Rotterdam. A Goliath of the Grands Express was the only other machine to start, and this, after flying from Paris to Lympne, abandoned the journey till next day.

The Instone Air Line cancelled their service to Brussels and Cologne on Thursday, owing to the high wind, which, being dead against them, would have made the journey exceptionally long, and would have been risky with the present limited fuel capacity. I understand, in this regard, that both the Instone and Daimler 34's are to have larger petrol-tanks fitted.

Bad-Weather Flying Across Europe

Mr. Alan J. Cobham, who has been engaged on an "air-taxi" flight across Europe to Constantinople, arrived back at the air-station on Sunday at 11.40 a.m. He tells me that the weather throughout his flight has been awful. In fact, it is quite the worst flight he has ever made. It was impossible to fly direct across country, and he had to follow the windings of the rivers, often flying at a height of only 50 ft. above the water. Although the direct flight to Constantinople, and return, is about 3,200 miles Mr. Cobham had flown 5,000 miles by the time he arrived at the air-station, owing to the detours he was compelled to make to avoid the bad weather. His actual flying time from Constantinople to London was only 23 hours, and he covered the 290-miles stretch from Cologne to Lympne in a non-stop flight of two hours.

The second annual aerodrome dinner and smoking concert is to take place on November 6 at the Greyhound Hotel, Croydon. Maj.-Gen. Sir W. S. Brancker, the Director of Civil Aviation, is to take the chair, and, according to Mr. Coleman, who has organised the affair, the tickets are selling well, and everything points to a successful and pleasant evening.

During the week the Daimler 34, G-EBBS—which, by the way, has now flown something like 90,000 miles, and is still considered one of the best machines in commission—was flown to Manchester with Mr. Hinchliffe in the pilot's seat, and Col. Searle and Maj. Woods-Humpreys as passengers. I understand that they took the opportunity of alighting at the Coventry aerodrome, which adjoins the Daimler works, and thus gave the Coventry people an opportunity of inspecting the latest Daimler enterprise. The machine remained at Manchester to inaugurate the Manchester-London service this morning.

High winds have interfered with the regularity of the services during the week. Some exceptionally rapid trips have been made from Cologne and Rotterdam, but, on the other hand, the journeys to these places have, to say the least, been protracted. Mr. Holmes piloted one of the Napier-engined 34's of the Instone Air Line from Cologne to London in 2 hours 39 minutes, while on a flight from Rotterdam to London on a Daimler 34 Mr. Hinchliffe was only 1 hour 37 minutes from aerodrome to aerodrome. On the outward journey to Rotterdam the same day, the machine had to descend at Flushing for a further supply of petrol at the end of 3 hours and 5 minutes' flying.

On the same day, with a wind that was blowing at over 50 miles-an-hour above the Channel, a woman invalid, who was too ill to make the boat-and-train journey, was flown from Paris to London by the Daimler machine—which was returning after having taken newspapers to Paris. She expressed great satisfaction with her journey, and, in spite of the gale, suffered no ill-effects.

The chairman and secretary of the Manchester Chamber of Commerce were at the aerodrome on Friday, inspecting the Daimler organisation, in order to report to their members as to the arrangements made to provide Manchester with an efficient air-service. They spoke to the Manchester aerodrome by wireless, and were much impressed by the thoroughness of the Daimler methods of running an aeroplane service.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN OCTOBER 8 AND OCTOBER 21, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	61	183	19	52	57	3 9	H.P.W.8B G-EAPJ (2h. 8m.)	B. (6), D.H. 9 (1), D.H. 34 (2), G. (9), H.P.W.8B (4), Sp. (2).
Paris–Croydon	62	227	17	45	57	2 40	D.H. 34 G-EBBQ (1h. 44m.)	B. (6), D.H. 9 (1), D.H. 16 (1), D.H. 34 (2), G. (11), H.P.W.8B (4), Sp. (2).
Croydon–Brussels–Cologne	14	93	—	—	14	4 40	D.H. 34 G-EBBT (4h. 13m.)	D.H. 9 (1), D.H. 34 (3), D.H. 37 (1).
Cologne–Brussels–Croydon	11	73	—	—	11	4 7	D.H. 34 G-EBBT (3h. 29m.)	D.H. 9 (1), D.H. 34 (3).
Croydon–Rotterdam ...	23	37	23	23	23	2 57	D.H. 34 G-EBBS (2h. 10m.)	D.H. 34 (3), F. (8).
Rotterdam–Croydon ...	22	41	19	18	22	2 15	D.H. 34 G-EBBS (1h. 56m.)	D H. 34 (3), F. (8).
Total for 2 weeks ..	193	654	78	138	184			

* Not including "private" flights.

† Including certain journeys when stops were made *en route*

‡ Including certain diverted journeys.

Incidental Flying.—Messrs. Hayns, Perry and Piercey have been testing various machines (including Avro, D.H. 9, Martinsyde and Sopwith Snipe) at Croydon for the Aircraft Disposal Co., and each flew a Martinsyde over to Dublin on the 12th.

AIRISMS FROM THE FOUR WINDS.

With the political upheaval now in full blast, the air will have its share of new currents. That the new Government will revive the fatal error of combining the Secretaryships of War and Air is unthinkable. For office under the new *régime*, with Lord Londonderry ruled out, very live men are to be found in Sir William Joynson-Hicks and Col. Moore-Brabazon, who are well calculated to see to the requirements in their respective spheres of such leaders as Air Chief Marshal Sir H. M. Trenchard and General Sir Sefton Brancker.

* * *

Sir William is pardonably an enthusiastic air development advocate. He is Imperialistic in his views, and he is right. Speaking only the other day at Leeds, he asked during an address upon "An Imperial Air Service":—"What, however, of the future?" His view was that it was almost impossible by prophesying to keep ahead of realisation. The improvements, the developments, the inventions which had taken place in the last ten years, particularly even in the last five years, would be exceeded in the next five. It was a certainty that within the next ten years 200 miles an hour would be a common speed, and that flying the Atlantic would be not merely a heroic performance, but an everyday operation. Just as the last century was the century of railways and the beginning of the present century was the era of motor-cars, so the middle of this century would see—even with the development of our present engine and our present plane—the era of aviation, but beyond that he saw no reason to suppose that new types and new inventions might not be produced which would completely put in the shade even the marvellous productions of the present day.

* * *

Last week a paragraph attributed the defrayment of the cost of the "R.38" memorial at Hull to the generosity of the Air Ministry. All a mistake, and only an "imagination" of the correspondent who supplied the item. The entire cost is being met by private subscription, but, needless to say, the scheme has the approval and moral support of the Ministry.

* * *

Beaten at last! In the following characteristic little note Mr. L. M. Braund, of the Robinhood Engineering Works, the makers of those wonderful "K.L.G." sparking plugs, strikes a new note:—

"*The 'Daily Mail' Gliding Competition.*

"We regret to inform you that for the first time in the history of aviation, a notable performance has been achieved in the air without the use of 'K.L.G.' sparking plugs."

* * *

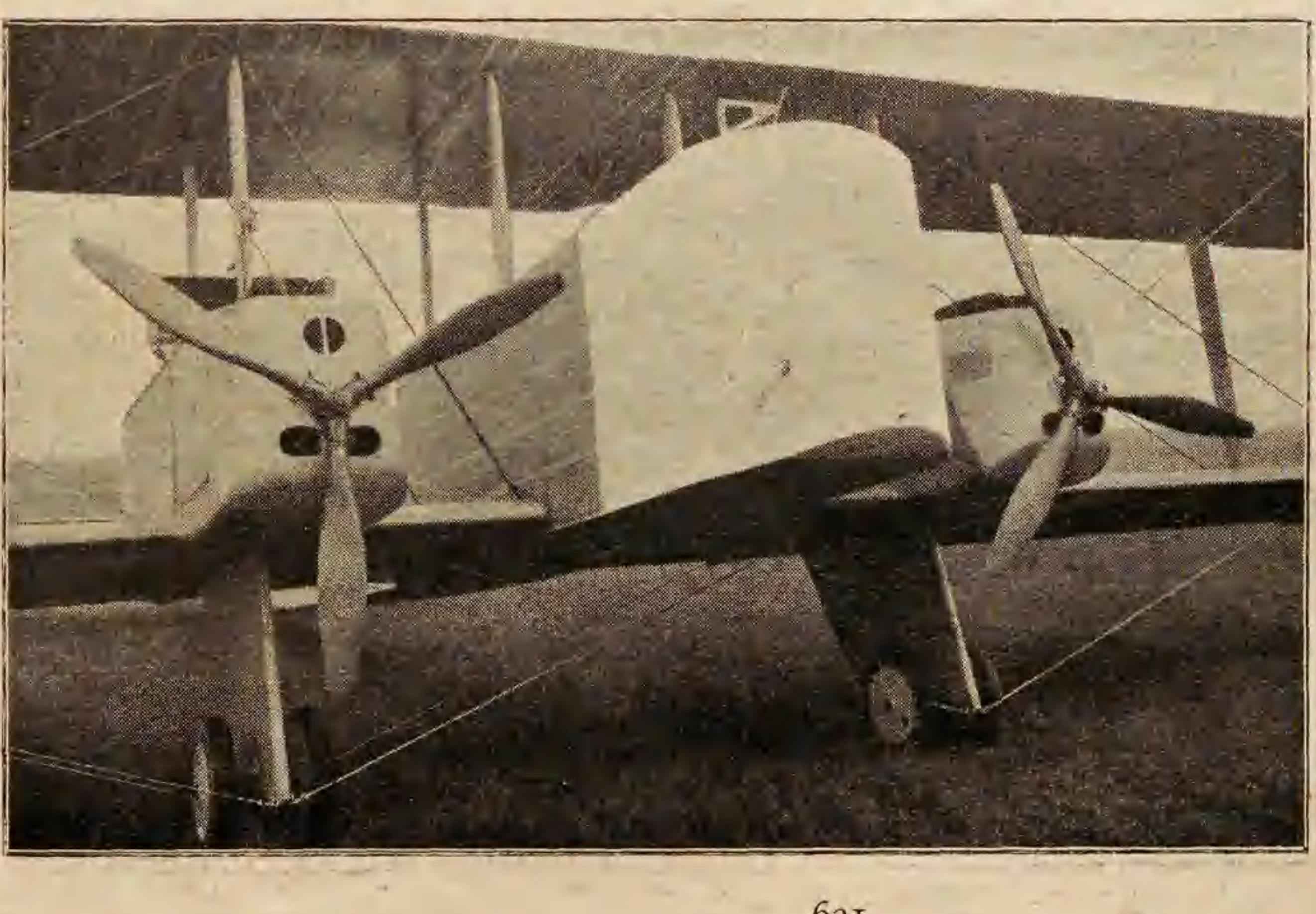
Several years agone we have detailed the wonderful possibilities of Prague as an important central point for aviation. General Brancker has also advanced views upon the subject from the report of his recent visit to that city. That Prague will form an important link in our Imperial air-chain is almost beyond question. Outside France and ourselves, Czecho-Slovakia has probably the most ambitious notions in regard to commercial aeronautics.

* * *

That Gibraltar might lend itself to adaptation as a great centre of aviation has been in the wind for some time. According to the Spanish review, *Alas*, *via* a correspondent of the *Matin*, the idea is to materialise and the "rock" transformed into a vast subterranean flying station, opening up visions of the craft coming home like huge pigeons to their "nests" on the ledges. In the centre of the rock, the *Alas* writer states, will be built a great square, whence tunnels will lead in all directions. There are to be several floors, connected by monster lifts. To enable aeroplanes to start and return a large tipping-up platform will be placed at the entrance to each tunnel. The scheme, the correspondent continues, will make it possible to shelter inside the rock the most important aerial fleet in the world. Thus Gibraltar recovers its former strategic importance.

* * *

Curious how dense some authorities are in imagination when any new era arises, thus putting back their chances of being in the front of a new movement, for the sake of a little speculative enterprise. From Melbourne it is now reported that owing to the Government's immediate want of aeroplane supplies the Cabinet has decided that it is unable to place orders with the recently-formed Australian Aeroplane Manufacturing Co. The latter therefore, it is stated, contemplates closing down, private demands not justifying the maintenance of the plant.



The Farman "Goliath" upon which Bossoutrot made his record flight, as recorded last week in "Flight." Note the pair of Leitner - Watts 3-bladed metal air-screws which helped the French machine to victory. Moreover, these nine-foot propellers are entirely British, being designed by Mr. Watts, and manufactured for the Metal Air-Screw Co., Ltd., at Messrs. Rubery Owen's well-known works.

THE CASE FOR METAL CONSTRUCTION *

By **JOHN D. NORTH** (Fellow)

ALTHOUGH I have been requested by the Council of this Society to read a paper on the metal construction of aeroplanes, there are two phases of the subject with which I do not feel prepared to deal. In the first instance, any paper dealing historically with this matter is likely to give rise to controversy which is of neither scientific nor engineering interest, and I propose to leave this aspect severely alone. Secondly, I do not pretend to expound a process of design. The technique of this new branch of the engineering art is still too fluid; while so far as experimental results are concerned, it is probable that more have been published than have been digested.

The aeroplane engineer, designer, constructor or user, not unnaturally, is inclined to pin his faith to the system of composite construction, which, brought to a state of high perfection, he has found to serve him well in the past. All the history of engineering relates the gradual displacement of timber by lighter and more durable structures of steel, but such a transition in aeroplanes he feels is difficult, if not impossible, to realise with advantage. Of the three separate metal aeroplane movements in Great Britain, Germany and France, that in this country, at least, received its principal impulse, not from a realisation of the great engineering advantages attending it, but from the pressure of a world shortage of the limited supplies of that class of timber most suitable for light structural purposes.

The cessation of the demand for the mass production of aircraft, coincident with the termination of hostilities, deprived the movement of its principal motive power, but not before it had been realised in some quarters that metal, and particularly steel, construction, could succeed on its own merits even in competition with a normal timber supply.

It may be helpful first to note some general criticisms of metal construction.

The principal argument which has been advanced is that metal construction has not demonstrated its advantages over the usual composite form of structure. This is not, strictly speaking, a sound criticism, being in the nature of an *argumentum ad ignorantiam*, and though it is quite true that in most cases the users of this argument have not had the necessary experience of metal construction to enable them to appreciate it, such an argument cannot be considered as conclusive. It may be inferred from various remarks that in the opinion of critics metal construction is expensive, perhaps heavier and, in temperate climates at least, not likely to be more durable than wood. It has further been criticised by analogy on the grounds that small motor-boats are invariably, or at least most successfully, constructed of timber, and in some cases it has been further put forward that metal construction must be associated with large aircraft just as it is associated with large ships. The weakness of this argument is immediately apparent when we consider that the first object of a boat is to keep out water, and the adverse experience of constructors of steel motor-boats is almost entirely due to the fact that it is difficult to make them watertight. These conditions are not analogous to those obtaining in aircraft, and it hardly seems necessary to pursue the argument further. With regard to the other criticisms, I hope to indicate in these notes that the following advantages may be obtained by the use of metal construction:—

(1) Retrenchment of weight.
(2) Improvement in the reliability of materials.
(3) A longer life, particularly under conditions of storage.
(4) A better resistance to adverse climatical conditions.
(5) An improvement in bulk manufacturing facilities.
(6) A reduction in some risks and effects of fire.

It is, I think, not always sufficiently realised what a very important effect comparatively small differences in the structure weight of an aeroplane have upon its general characteristics; particularly is this the case when the aeroplane is designed for a high performance or a very long range of flight. There has been some little tendency, and designers of equipment seem to be special offenders in this respect, to imagine that a few pounds here and a few there are negligible in regard to the gross weight of the aeroplane, and that special efforts to economise weight are therefore not necessary. If it is realised that the margin available for military load per unit horse-power is only the remainder after deducting the structure, the engine, installation and fuel weights, it will be appreciated that a saving in weight in an individual part is reflected in an economy on the gross weight, greater by the ratio of the gross weight to the military or revenue load. This is illustrated in Fig. 1, which shows the variation of revenue load—the revenue load in this instance includes pilot, instruments, equipment, etc., so that the influence of structure weight on revenue load is enhanced, particularly in the case of small aeroplanes—or military load with different percentages of structure weight for aeroplanes having various classes of performance. The variations in performance have been indicated by the power loading in pounds per horse-power, since this figure conveys in a simple manner the typical performance, to the aeronautical engineer. It will be noticed that even with a power loading of 15, which is representative

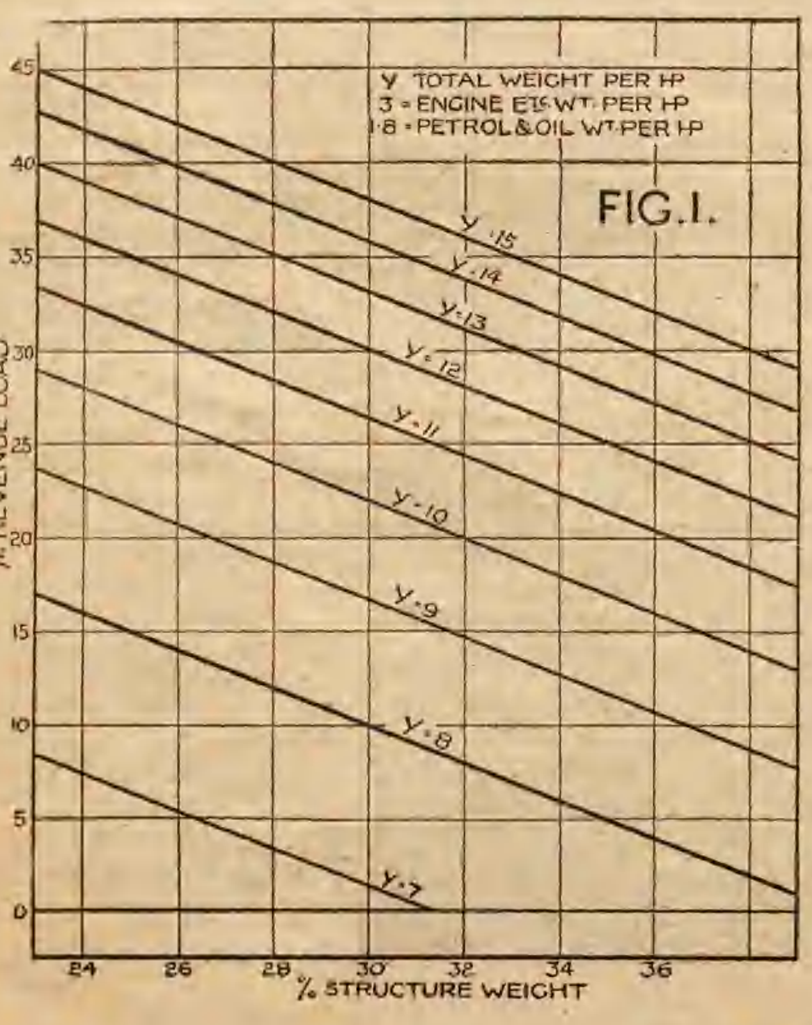


FIG. 1.

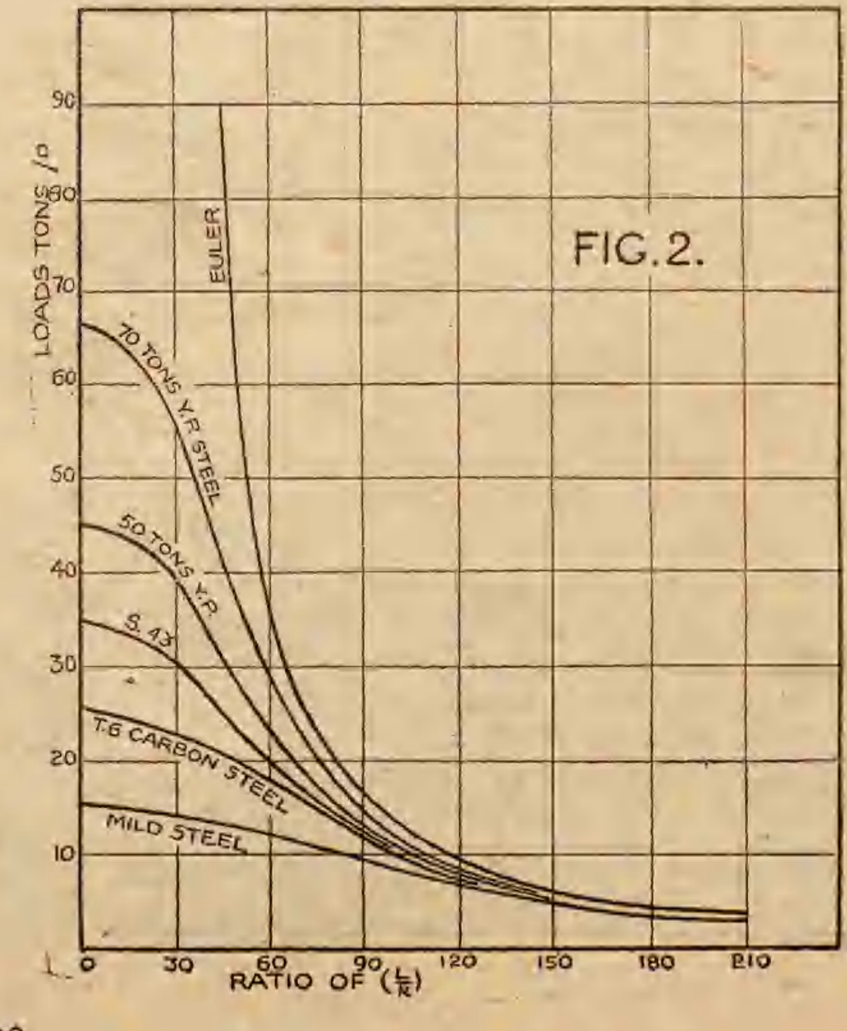


FIG. 2.

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* Paper read before the Royal Aeronautical Society on October 19, 1922.

of most modern commercial aeroplanes, a reduction of structure weight from 34 per cent. to 26 per cent. increases the revenue load from 34 per cent. to 42 per cent., an increase of nearly 25 per cent. in the utility of the aeroplane. In the case of the high performance aeroplane, the increase will be seen to be vastly greater, and in many cases makes possible a type of aeroplane which will be placed out of court with the heavier structure weight. I have every reason to believe that the structure weight of aircraft can be reduced from an average of 33 per cent. to an average of 25 per cent. to 27 per cent. by the use of metal construction, an advantage which, while extremely beneficial for commercial aeroplanes, is absolutely imperative in the case of military machines. I do not suggest that the whole of this gain can be obtained at once, but theoretical considerations and practical experience both indicate that there is a reasonable probability of arriving at such a figure at no very distant date, provided experiment on broad lines is continued unhampered by the necessity of obtaining immediate results from experimental expenditure.

Let us consider how this retrenchment of weight is to be accomplished. It can be shown from first principles that it is possible to make structural members of metal considerably lighter than of timber, and this has been borne out by practical experience. There are two physical properties of structural materials which are of first order of importance in considering the weight of the structure manufactured from them. Firstly, the ratio of the modulus of elasticity to the specific gravity, and secondly, the manner in which this ratio falls off with increase of stress intensity. This latter property is generally considered by focussing the attention upon the yield point of the material at which, in the ordinary normalised carbon steels, a critical change in the value of E occurs. In the case of timber, which is a vegetable growth itself of complex structure, it is only possible to discuss the change of elasticity with stress in reference to a similar critical case, and indeed since the cause of failure in light compression members of wood and metal is somewhat dissimilar, the difficulty of an exact comparison is enhanced. The following table summarises the elastic moduli of a number of materials, either most commonly used in aircraft construction or by reason of their properties most suitable. In the last column of the table these values have been made specific by dividing them by the specific gravity of the material, and from this it will be seen that in the case of these materials there is very little to choose between them, though metal is at some advantage.

Material.	"E" (tons/sq. in.)	Specific Gravity.	E/Sp. Gr.
Spruce (Spec. 2 V.1) ..	670	0·45	1,490
Steel	13,000	7·8	1,667
Duralumin alum. alloy (Spec. 2 L. 3)	4,700	2·85	1,680
Magnesium alloys	[illegible],400	1·75	1,370

If we were to imagine that the structure of an aeroplane were composed entirely of "Euler" struts, in which the modulus of elasticity would be the only property of the material of importance, it would be apparent that that form of construction, which would give us members with the greatest radii of gyration, would give us the lightest structure. The second table furnishes the critical stress which will be obtained in the outer compression fibres of a strut or a beam, at failure. This stress is again made specific by dividing by the specific gravity of the material, and in this case it is found that there are marked differences between the various types of material showing an advantage for certain of the light alloys over timber, and of certain classes of steels over both. If an aeroplane were constructed entirely of short struts failing in pure compression and of ties failing in pure tension, it is obvious that, supposing the other physical properties of the material to be suitable, the greatest advantage could be obtained by using the material having the highest critical stress, so far as compression failures were concerned, and the highest ultimate stress so far as the tension members were concerned. These maxima are usually to be found in the same material. In making these statements, it is postulated that the design of the member is such as to enable the critical stress to be realised. In other words, for the purpose of our argument, this stress is the critical stress by definition, and the circumstances under which it can be realised will be discussed later. We can now consider the properties of the materials in a more general way.

Fig. 2 shows the ratio of the intensity of load to the free-length radius of gyration of struts manufactured from materials of different critical stress. This figure will be familiar to most as representative of the characteristic curves of Mr. Southwell and Prof. Robertson. The first inspection of this figure will show that in order to realise the advantage of materials having a high critical stress, it is necessary that the ratio of l/k should be kept as low as possible.

It is at this point that the principal structural characteristic of the aeroplane exercises an important influence. The aeroplane is a very large structure for its weight, which means that struts with a low l/k must have very thin walls where they are made of dense material, such as steel, or, in a lesser degree, aluminium and its alloys.

It is a well-known experimental fact that, where the thickness of the wall is small compared with the radius of curvature and the length of the arc, the intensity of load indicated in Fig. 2 is not realised owing to the crinkling or buckling of the shell at a stress less than that which has been assumed as the critical stress. The lightest strut, therefore, will be that one in which the compromise between low l/k and high critical stress is best effected. (*To be concluded.*)

THE ROYAL AIR·FORCE

London Gazette, October 17, 1922

General Duties Branch

Flight Lieut. H. H. James is granted a permanent commn., retaining present substantive rank and seny.; Sept. 16, 1919 (*Gazette* Sept. 16, 1919, appointing him to short service commn., is cancelled).

Medical Branch

The follg. are granted short service commns. as Flight Lieuts., with effect from, and with seny. of, the dates indicated :—F. F. Johnson; Sept. 30. R. G. J. McCullagh; Oct. 4.

Chaplains' Branch

The Rev. J. G. Stephens is granted short service commn., with relative rank of Squadron Leader; Sept. 12.

Memorandum

Lieut. S. V. Towers relinquishes temp. commn. on ceasing to be empld., and is permitted to retain rank; Oct. 8.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Air Vice-Marshal: Sir J. M. Salmond, K.C.B., C.M.G., C.V.O., D.S.O., from Headquarters, Inland Area, to command Royal Air Force, Iraq. 1.10.22.

Wing Commander: D. L. Allen, A.F.C., from R.A.F. Depot (Inland Area), to command Headquarters, Constantinople Wing. 28.9.22.

Squadron Leaders: H. J. Down, from Headquarters, Coastal Area, to Headquarters, Constantinople Wing (Supernumerary.) 5.10.22. J. Rylands, from No. 1 Stores Depot, to Headquarters, Constantinople Wing. 5.10.22. A. J. O. Wigmore, M.B., from No. 14 Squadron (Middle East) to Palestine) Wing Headquarters (Middle East). 11.8.22. G. Blatherwick, from School of Photography (Inland Area), to No. 1 School of Technical Training (Boys) (Halton). (Supernumerary.) 16.10.22.

Flight Lieutenants: F. J. Cooke from Headquarters, R.A.F., Iraq. to R.A.F. Depot (Inland Area) (Supernumerary). 20.8.22. J. C. Smyth, from Aircraft Depot (India) to R.A.F. Depot (Inland Area) (Supernumerary). 21.6.22. G. H. H. Maxwell, M.B., from R.A.F. Depot (Inland Area) to Headquarters, R.A.F. (Middle East) (Supernumerary). 16.9.22. A. E. Jenkins, from No. 1 Flying Training School (Inland Area) to R.A.F. Depot (Inland Area). 26.9.22. J. R. Crolius, M.B., from No. 4 Squadron (Inland Area) to R.A.F. Depot (Inland Area). 21.9.22. T. McClurkin, M.B., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Depot (Inland Area). 25.9.22. G. S. Ware, M.B., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Depot (Inland Area). 25.9.22. E. B. Mason. The notification which appeared in R.A.F. Intelligence, No. 77, dated 5.9.22, wherein this Officer was posted from No. 25 Squadron to School of Photography, with effect from 25.9.22, is hereby cancelled. J. S. T. Fall, D.S.C., A.F.C., from Marine and Armament Experimental Establishment (Coastal Area), to No. 56 Squadron (Inland Area). 1.11.22. J. McGowan Glen, M.C., from No. 4 Squadron (Inland Area) to R.A.F. Depot. (Supernumerary.) 26.9.22; and from R.A.F. Depot (Inland Area) to No. 5 Flying Training School (Inland Area). 16.10.22, for duty as Adjutant. J. Dunnay, from R.A.F. Depot (Inland Area) to Headquarters (Coastal Area). 16.10.22. C. P. Barber, from R.A.F. Depot (Inland Area) to Armament and Gunnery School (Inland Area). 16.10.22. A. Durston, A.F.C., from Headquarters, R.A.F. (Mediterranean), to H.M.S. "Argus" (Coastal Area). (Supernumerary.) 23.9.22. J. A. Sadler, from No. 267 Squadron (Mediterranean) to H.M.S. "Argus" (Coastal Area). (Supernumerary.) 23.9.22. J. H. Hagon, from School of Photography (Inland Area) to R.A.F. Base (Leuchars) (Coastal Area). 16.10.22. W. R. Curtis from No. 267 Squadron (Mediterranean), to H.M.S. "Argus" (Coastal Area). (Supernumerary.) 23.9.22. J. K. Ritchie Landells, M.B., from No. 2 Squadron (No. 12 Wing, Ireland) to Headquarters (No. 12 Wing, Ireland). 4.10.22. T. McClurkin, M.B., from No. 2 Squadron (Inland Area) to Research Laboratory and Medical Officers' School of Instruction (Coastal Area). 11.10.22. P. Huskinson, M.C., from Boys' Wing (Cranwell) to R.A.F. Cadet College (Flying Wing) (Cranwell). 9.10.22. A. W. Mylne, from R.A.F. Cadet College (Flying Wing) (Cranwell) to R.A.F. Cadet College (Ground Wing) (Cranwell). 9.10.22. R. B. Waite, M.B.E., from Headquarters, Inland Area, to Air Ministry (Director of Personnel). 9.10.22. A. W. Symington, M.C., from R.A.F. Depot (Inland Area) to Half-Pay List. 1.10.22.

ROYAL AERONAUTICAL SOCIETY NOTICES

Elections.—The following new members were elected at a Council Meeting held on October 17th :—

Associate Fellow : H. F. Parker.

Students : W. H. Broom, P. B. Humphrey, C. J. Sanders and F. E. Siggers.

Associate Member : M. F. Wren.

Scottish Branch—Associate Member : C. Veitch.

Examination.—The Council announce the following list of successful candidates in the Associate Fellowship Examination held on September 26 :—

Theory of Structures, etc. : K. W. Berger, G. E. Page, S. O. Smith.*

Theory of Structures, etc., and Aerodynamics : S. H. Evans, T. A. Kirkup, H. J. Mackintosh.

Heat Engines and Meteorology and Navigation : S. E. Taylor.

* These candidates already possessed qualifications which exempted them from the necessity for taking the paper in Aerodynamics.

Lectures.—Owing to the continuance of rebuilding operations at the Royal Society of Arts, members are asked to note that Maj. A. R. Low's lecture, "A Review of Airscrew and Helicopter Theory, with Aeroplane Analogies," will take place at 5.30 p.m., in the theatre of the Royal United Service Institution, Whitehall, on November 2.

W. LOCKWOOD MARSH, Secretary

* * *

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association)

AT the meeting held at Headquarters last Friday, reports of the Official Observers were read.

Mr. Burchell reported that a good muster of members congregated at Parliament Hill, nearly all the members flying models. A discussion followed this report on a formula worked out by Mr. Whelpton and Mr. Burchell for governing competitions, and was very much appreciated.

Members who went to Itford on Saturday last had a most enjoyable day, witnessing many excellent glides. All are enthusiastic over the arrangements made for them by Dr. Thurston, who obtained special permits from the Royal Aero Club for all the members to view the gliders. The party did not arrive back in London till 10.15 p.m. This did not prevent many of them from attending the special Flying Display at Bunker's Hill next morning.

Meetings are held at Headquarters every Friday at 7.30 p.m.

Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1.

A. E. Jones, Hon. Secretary, 48, Narcissus Road, West Hampstead, N.W. 6.

* * *

London-Brussels-Cologne Air Mail Service

IN regard to the air mail service from London to Brussels, which was reopened on Monday last and extended to Cologne, the General Post Office states that the special air fee (in addition to the appropriate ordinary postage) will be *2d.* per oz. for either destination. The air mail will be closed at the counter of the General Post Office, London, at 9.0 a.m. each weekday, and will be due to reach the Brussels and Cologne aerodromes on the day of dispatch at 1.30 p.m. and 3.30 p.m. respectively.

The places which will be served by the air mail and the times at which delivery should be obtained are shown below; time of delivery is reckoned from the time of air departure from London :—

Destination.	Time of delivery.
Brussels	Same afternoon.
Antwerp and most of Belgium ..	Same evening.
Cologne	Same afternoon or evening.
Central Germany (Berlin) .. .. South Germany (Munich)	Next morning (through connection with night mail trains from Cologne).

The service should be especially useful for night mail postings in the provinces (the South-East of England excepted) and for late night postings in London.

The latest time of posting for the air mail can be ascertained from any Head Post Office. A leaflet giving particulars of the service and of other air mail services will be forwarded on application to the Secretary, Air Mails, General Post Office, London, E.C. 1.

28th Squadron Annual.

THE 3rd Annual Reunion Dinner was held at Anderton's Hotel on October 7. Twenty-eight diners—an appropriate number—assembled, and the function was enthusiastically successful. Messages were read from some half-dozen of the Vice-Presidents, and a long list of letters from members in various parts of the country was the justification for a sincere toast to those absent friends who had been unable to attend because of distance or other reason. Lieut. S. Yates, retiring President of the 28th Squadron Old Boys' Association, was in the chair, supported by four of the Vice-Presidents in the persons of Lieuts. Cooper, Sinclair-Hill, Mackereth and Shanks. Of the Committee Messrs. Collins, Goodwin, Murchison, Preston and Williams were much in evidence, whilst the Secretary (Mr. C. Hodges, 102, Camden Street, N.W. 1) spent a very strenuous evening ; so that there was no doubt as to their re-election for the ensuing year. Messrs. Corner and Matthews were added to the Committee.

Following the Loyal Toast, Mr. Murchison—our own Mr. Murchison's cousin, who worked admirably as accompanist to the musical items—proposed "The Squadron," the response being given by Lieut. Mackereth and Mr. Preston. "The Visitors" were toasted by Lieut. Cooper, and Mr. Hesketh replied. Lieut. Sinclair-Hill moved the toast to "Absent Friends." Lieut. Shanks proposed "The Committee and the Association," and the Chairman replied.

The necessary annual business was transacted expeditiously. Lieut. S. Yates, who had occupied the Presidential Chair since the inception of the Old Boys' Association, desired to be relieved of office by reason of growing commitments in other directions ; and after his endeavour had been acknowledged in strenuous manner, Lieut. D. Shanks was elected unanimously and with enthusiasm as the new President.

During the course of the evening a spontaneous proposal was put forward with a view to arranging a wedding gift to the Secretary, who had recently rushed into matrimony. It is understood that a substantial sum was collected at once, and the remaining members will be circularised in due course.

By 8.30 p.m. the company had settled down to the after-dinner songs and general social items. Talent was plentiful, those helping including the retiring and the new Presidents, Messrs. Corner, Erry, Sinclair-Hill, Murchison, Partridge, Preston, Spong and Monty White, the proceedings being brought to a close with every intention of renewals of acquaintanceship at the next half-annual and annual functions.

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xvi).

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from p. xvi.*)

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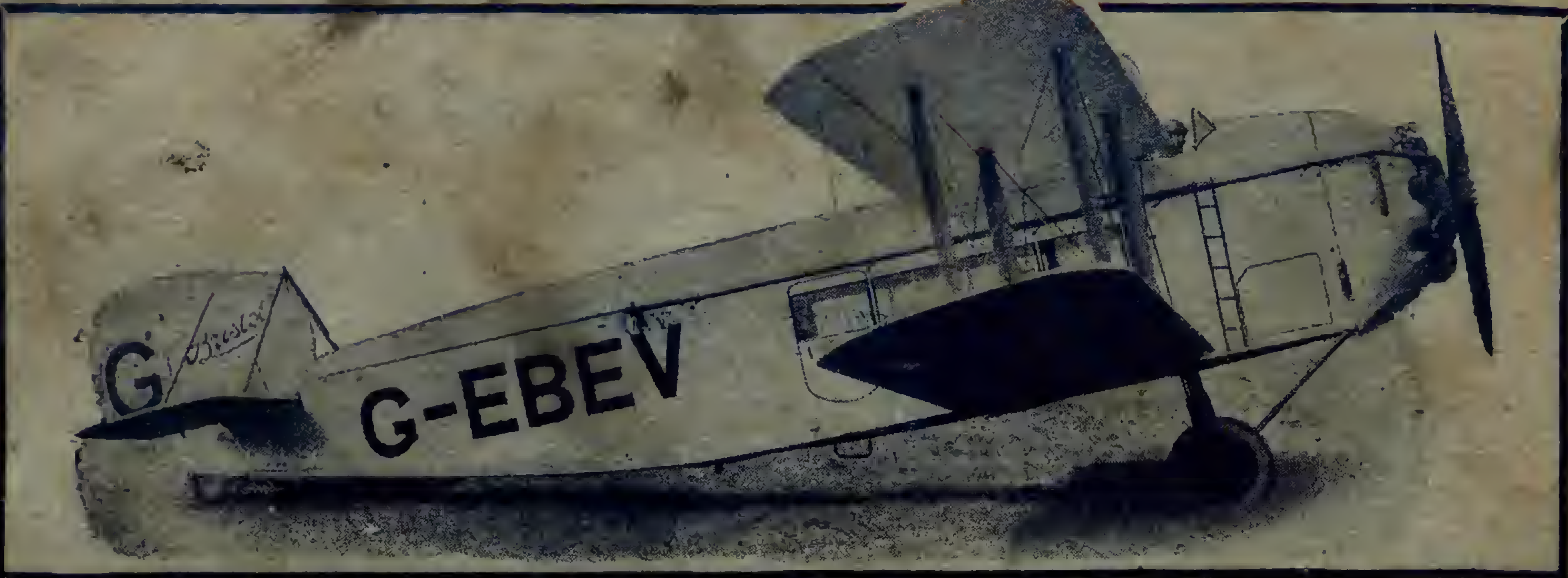

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OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Nov. 2	**Lecture, "A Review of Airscrew and Helicopter Theory," by Maj. A. R. Low, before R.Ae.S.**
Nov. 30	**Closing date for FLIGHT Glider Designing Competition**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

WHEN the announcement was first made that Gen. Sir Sefton Brancker had been appointed to the post of Director of Civil Aviation, we expressed satisfaction with the choice, knowing that in Gen. Brancker we should have a D.C.A. who was not afraid to express his views in forcible terms, who had kept in the very closest touch with commercial aviation, and who had eminently sound views on aviation matters—neither suffering from an undue optimism nor, on the other hand, going so far as did the late Under-Secretary of State for Air as to believe, and frankly state in public, that he could see no future for aviation in Britain. During his few months' term of office Gen. Brancker has already shown himself—as we expected—ready to put into practice the suggestions which he has so long advocated for progress in the air. At every point concerning aviation he is on the alert, and no function of any importance takes place without the presence of the D.C.A. So much is this the case that no surprise is evinced if Gen. Brancker attends a meeting in London today, presides at an aviation function in Prague tomorrow, and suddenly bobs up in Paris within 48 hours. Certainly nobody could accuse him of taking things easily, and it is to be noted that he has now given in writing to the Press some very sound conclusions, whatever the Government views in the matter are. Perhaps without any Government actually in being, regulations also are in the air. At any rate, there can be no doubt that whatever may be the attitude of "those in high places," Gen. Brancker is doing good work. His article in the *Financial Times* of October 28 deals with Great Britain's need of air transport, and in it the D.C.A. puts the case for aviation very succinctly. The article does not, perhaps, contain anything very novel, nor anything very original, but it is calculated to explain to the man who has not made a special study of aviation the precise reasons why Britain must have air services, why these cannot pay at the moment, why there is reason to hope that they will pay within a very few years, and why, even if there were no hope of them ever paying their way, Imperial

General Brancker on Air Transport

needs would still necessitate our carrying on with them. As it is the man-in-the-street upon whom, ultimately, the fate of aviation must depend, such articles, from one in authority, cannot fail to do a great deal of good, and we therefore welcome them whether or not there is precedent for their publication.

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Success of Manchester Service

Those who have expressed the view that internal air services in Great Britain could not be a success will be given food for thought by the report, under our London Terminal Aerodrome Notes this week, that up to the present the new service to Manchester has met with outstanding success, the bookings in several instances exceeding the available seats. Nor is there any reason to believe that, when the novelty wears off, the use of the air service will fall off. It is not as if the service ended at Croydon. If that were the case we quite agree that there might be scant prospects of lasting success for internal air services. But when it is remembered that at Croydon the internal service links up direct with a network whose branches run to many countries, and a network, moreover, which is bound to spread rapidly until it covers the entire globe, then services in Britain assume quite a different aspect.

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British "Airways"

The announcement that the three companies now operating air services from Croydon intend to amalgamate to the extent of running their advertising and booking business in common will be received with satisfaction. As the three firms are no longer in competition with each other, there would appear to be no reason for a continued separate organisation, and very considerable reductions in certain expenditure should be possible with the new arrangement, thus bringing nearer the day when these air services can pay their way without other Government assistance than wireless and meteorological services. Certain overhead charges are very much the same whether one runs a service of one machine per day or ten machines per day, and anything which tends to reduce such charges should be welcomed. Some might object that the new arrangement is tending towards such undesirable words as "trust" and "monopoly," but while the Government virtually is conferring a monopoly on the firms selected to run these services and is paying them subsidies, this objection hardly holds good. Later on, when subsidies are a thing of the past, the position may need revising.

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A New Glider Prize

Major Turner's mention in the *Daily Telegraph* of October 31 of a new prize of £1,000 for the greatest distance covered in a glider during next year, brings up the subject of new rules. When the rules for the *Daily Mail* competition were drafted there were many who firmly believed, and said so, that the minimum duration of 30 minutes would not be attained. Yet this minimum was actually exceeded on the very first day of the competition. It is obvious that little is to be gained by offering prizes for still longer durations. Theoretically, if a man can remain up for three hours there is no reason why he cannot remain up for 30 hours if the wind holds and he is physically capable of standing the strain.

The Royal Aero Club will, therefore, be faced with the problem of devising new rules for any new competitions which may take place in the future. In view of our present comparative ignorance of the subject, the task will by no means be an easy one, and the framing of rules may have the most far-reaching effects on the future development of the sport. It is, therefore, imperative that no hasty steps should be taken, and ample time should be devoted to the framing of new rules. The distance competition suggested, with a minimum of some 50 miles, may sound somewhat severe. So, for that matter, did the minimum of 30 minutes' duration, considering that not one of our pilots had had any experience before the opening of the competition. If it could be arranged to retain the rights to fly from and over the ridge from Itford Hill to Firle Beacon permanently, it seems probable that the best plan might be to delay the framing of any rules until pilots have had an opportunity of doing a certain amount of experimental work. If rules are drafted without the knowledge that would be thus accumulated, there appears to be a danger that such rules might, on the one hand, be so severe as to preclude success, or, on the other hand, be so easy of attainment that full benefit of the prizes—as regards real progress in the design, construction, and use of gliders—would not be attained, and the money thus largely wasted.

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Air Ministers of the New Government

JUST as we go to press the announcement is made that His Majesty the King has been pleased to approve the appointment of Sir Samuel Hoare, Bt., C.M.G., to the post of Secretary of State for Air, and of His Grace the Duke of Sutherland to the post of Under-Secretary of State for Air.

The appointment of Sir Samuel Hoare comes somewhat as a surprise, as nothing in his Parliamentary career has hitherto associated him with aviation. Sir Samuel as a banker and recognised authority on financial matters is paramount, but whether that is an advantage or the reverse in an Air Minister yet remains to be seen. Possibly it may be regarded as a good omen that the new Air Minister is the eldest son of the late Sir Samuel Hoare, Bt., who was M.P. for Norwich, the home of the famous Boulton and Paul all-metal aircraft.

The Duke of Sutherland has been associated with aviation for some years, being President of the Air League of the British Empire, and again quite recently he entered a machine in the race for the King's Cup. By tradition also His Grace is connected with flying, his father, the late Duke of Sutherland, being for a considerable period a member of the Council of the Royal Aero Club. Both men have the advantage of youth, Sir Samuel Hoare being 42 and the Duke of Sutherland only 35.

Although not directly connected with aviation under the new Government, Sir William Joynson-Hicks, as Parliamentary Secretary to the Overseas Trade Department, may be able to lend valuable assistance in matters relating to Imperial air communication, and thus his intimate knowledge of, and enthusiasm for, aviation matters may not be entirely wasted in his new post.

Aerial Photography at the Royal Photographic Society

SQUADRON LEADER F. C. V. LAWS last week gave a lecture at the Royal Photographic Society on "Progress in Aerial Photography," during which lantern slides of great interest were shown. Major Laws stated that, whereas in 1914 it was difficult to locate dismounted troops on photographs taken from the air at any altitude above 3,000 ft., it was now possible to see even birds when photographed from a distance of a mile and a-half. This he illustrated by showing a picture of pigeons feeding on the steps of St. Paul's Cathedral taken from that height.

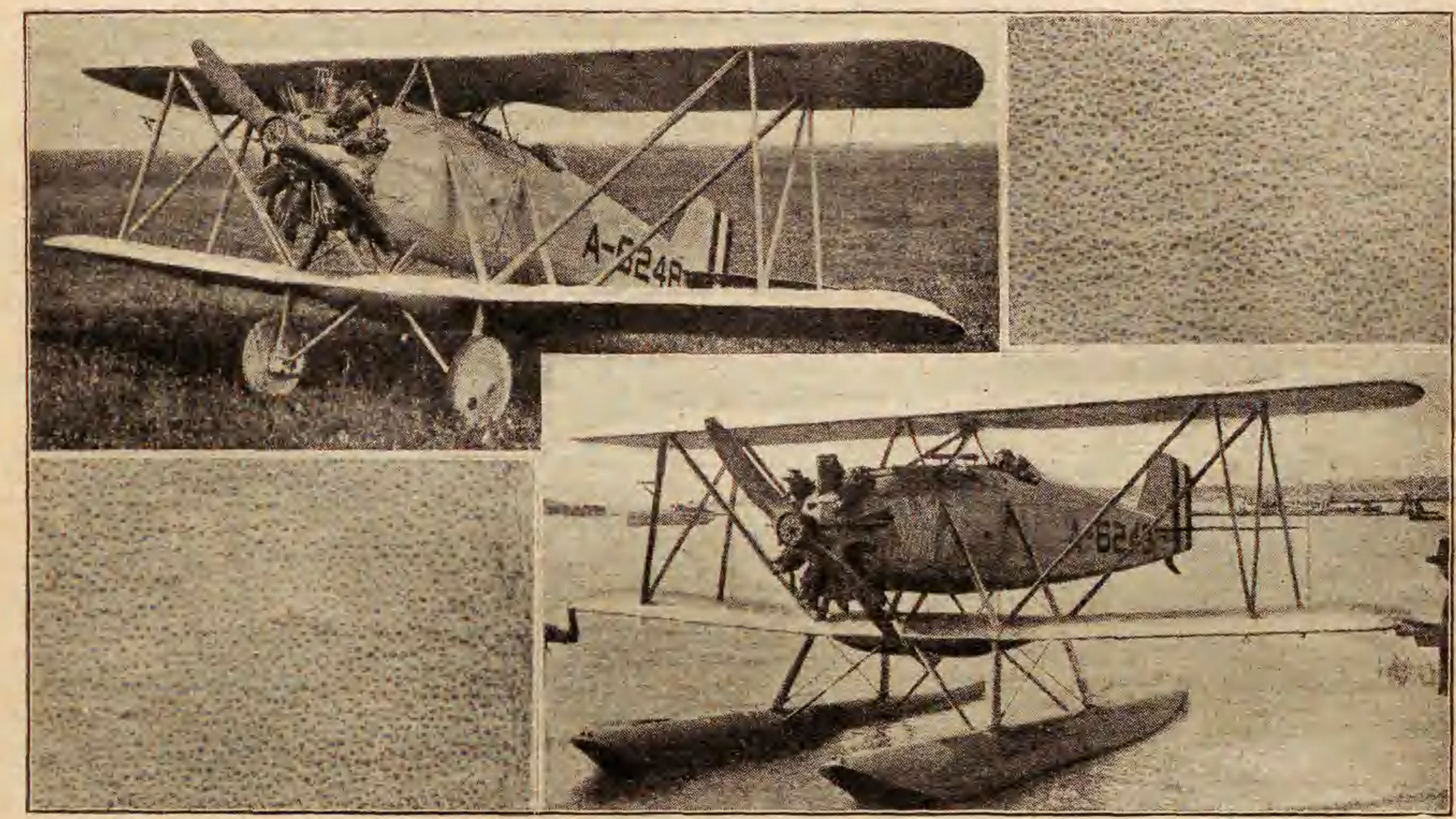
THE CURTISS MARINE FLYING TROPHY RACE

THE Curtiss Marine Flying Trophy Race, which was held at Detroit on October 8 last, provided several exciting thrills. Postponed from the previous day on account of unfavourable weather, the conditions under which it was flown were by no means ideal, and out of the eight starters (ten entered) only two completed the course. The latter comprised a closed circuit of 20 miles, which had to be covered eight times, making a total of 160 miles. The start and finish were opposite Memorial Park, facing Belle Island in Detroit River, the course running along Belle Island and south of Peach Isle to a barge moored off the Canadian shore, thence across the mouth of the Detroit River and back along the northern bank.

The first four laps had to be covered entirely in flight, but at the end of the fifth, sixth, and seventh laps the competitors had to come down and taxi on the water for a distance of 400 yds. over a hairpin section marked out around the starting barge, then take off again and proceed on the next lap. This was quite an original and interesting feature for a seaplane race, and one that helped considerably to liven up the proceedings.

Excitement came with the fifth lap when the leading man, No. 15, came to taxi, which he did at rather high speed, in a cross wind, and narrowly missed the barge. No. 15 was more successful, going at less speed, but No. 4 more or less repeated No. 5's performance. The others came along in the same order as before. No. 3 experienced difficulties in taxi-ing and came to a stop between the two barges, and whilst motor boats were towing the machine out of the way No. 15, flying high, and No. 4 close behind, low down, came along for the taxi list. The former overshot the commencement of the taxi line, whilst the latter dived down close to the barge. Both managed to round the barge, but with great difficulty, and only fine piloting avoided a collision.

A surprise marked the end of the sixth lap, for No. 10, previously last, came in third, Nos. 5 and 12 having dropped out—the former crashing (fortunately without hurt to the pilot) near the Edison Station, and the latter through engine trouble. There were now only three left in the race, Nos. 4, 15, and 10. The last lap had to be completed in full flight, and No. 4 (Lieut. Sanderson) was almost on the point of victory when he ran out of petrol when half-way home, almost in sight of the finishing line. Thus, No. 15 (Lieut. Gorton) finished first, with No. 10 (Lieut. Elliott) not far behind.



THE CURTISS MODEL TS BIPLANE : **This machine, which was built under special contract for the U.S. Navy, can be adapted for either land or sea work, the substitution of pontoons for land gear, as seen above, being easily accomplished. Note the petrol tank formed in lower centre section.**

The eight competitors were started off at intervals of one minute in the following order: (No. 5) Lieut. R. Irvine, Curtiss 18.T triplane, 375 h.p. Curtiss D.12; (No. 16) Lieut. D. Rittenhouse, Navy-Curtiss TR.3 biplane, 220 h.p. Wright E.3; (No. 12) Lieut. S. W. Calloway, Navy-Curtiss TS.1, 220 h.p. Lawrance J.1; (No. 15) Lieut. A. W. Gorton, Navy-Curtiss TR.1, 220 h.p. Lawrance J.1; (No. 3) Lieut. W. K. Patterson, Gallaudet D.4, 420 h.p. Liberty; (No. 4) Lieut. L. H. Sanderson, Curtiss 18.T triplane 375 h.p. Curtiss D.12; (No. 10) Lieut. H. A. Elliott, Vought VE.7.H biplane, 220 h.p. Wright E.2; and (No. 11) Lieut. H. J. Brow, Navy-Curtiss, TS.2, 240 h.p. Aeromarine U.8.D.

Lieut Gorton (No. 15) won the Trophy at an average speed of 112·65 m.p.h., the only other to finish being Lieut. Elliott (No. 10), whose average was 109 m.p.h. We refer briefly to the machines later. At the end of the first lap No. 16 overtook No. 5, and the others remained as before. In the second lap Nos. 16 and 5 were first and second respectively, but No. 15 obtained third place from No. 12, and No. 4 changed position with No. 3. In the third lap the only change was that No. 4 got ahead of No. 12. In the next lap two machines, Nos. 15 and 11, dropped out of the race, the former's propeller having worked loose, and the latter losing all his cooling water through a leak.

The winning machine, the Curtiss TR.1, and the TR.3, TS.1 and TS.2 are all very much the same type of machine, differing only in the engines fitted and the wing sections employed. These machines were designed to give the smallest and most compact type giving the maximum facilities for erection and take-down on board ship. With this end in view all wires and turnbuckles in the wing bracing have been eliminated. The fuel tank is carried in the lower plane centre section, and is detachable so as to be dropped out of the machine at the will of the pilot. Another feature is the provision of interchangeable landing gear, enabling wheels to be fitted for land work or twin pontoons for water work as desired.

The TS models have the U.S.A.27 wing section, and the Lawrence J.1 220 h.p. 9 cyl. radial air-cooled engine is fitted to the TS.1, whilst the TS.2 has an Aeromarine U.8.D 240 h.p. 8 cyl. water-cooled V engine. The TR models have modified R.A.F.15 wing sections, and TR.1 is fitted with the Lawrance J.1, and TR.3 the Wright E.3 220 h.p. 8 cyl. water-cooled V engine.

We show in the accompanying illustration two views of the Curtiss type TS. The following characteristics apply to all four models, except where specified: Span, 25 ft.; chord, 4 ft. 9 ins.; gap, 5 ft. 6 ins.; length, 24 ft. 7 ins.; height, 9 ft. 6¾ ins.; incidence, 0°; dihedral (lower), 3°; wing area, 225 sq. ft.; gross weight, (TS.1) 2,025 lbs., (TS.2) 2,085 lbs.' (TR.1) 1,790 lbs., (TR.3) 1,980 lbs.; maximum speed, (TS.1) 125 m.p.h., (TS.2) 130 m.p.h., (TR.1) 130 m.p.h.

We are indebted to our American contemporary *Aviation* for the foregoing particulars.

ROYAL AERONAUTICAL SOCIETY NOTICES

Lecture.—The next fortnightly meeting takes place on November 16, at 5.30 p.m., when Mr. R. McKinnon Wood, Fellow, will read a paper on "The Co-relation of Model and Full-Scale Work," at the Royal Society of Arts, 18, John Street, Adelphi, W.C. 2.

Students' Section.—The Annual Meeting of the Students' Section was held in the Library, at 6.45 p.m., on October 12, when Mr. T. C. Sharwood was appointed Honorary Secretary in successtion to Mr. S. H. Evans. It was decided that each college or group of students should nominate a student to represent it, and to further the interests of the Students' Section in the particular college or group concerned.

The annual meeting was followed at 7.30 p.m. by the inaugural address of the session from Dr. A. J. Sutton Pippard on "The Aeroplane considered as an Engineering Proposition," illustrated by lantern slides. The next Students' Meeting will take place in the Society's Library on November 9 at 7.30 p.m., when Mr. H. C. Brown will inaugurate the discussion with a paper on "Airships."

W. LOCKWOOD MARSH,
Secretary

A PRIZE FOR PAPERS ON AIRSHIPS

The Council of the Royal Aeronautical Society have decided to institute forthwith from the funds of the "R. 38" Memorial Research Fund, an annual prize for a technical paper on Airships. The regulations covering the award of this prize are given below, from which it will be seen that the date for the receipt of the names of intending competitors for the first award is December 31, 1922, while the papers themselves must reach the Secretary on or before March 31, 1923.

"*R. 38*" *Memorial Prize Regulations*

From the income of the above Fund, a sum of 25 guineas will be offered annually as a prize for the best paper received by the Royal Aeronautical Society on some subject of a technical nature in the science of Aeronautics. Other things being equal, preference will be given to papers which relate to Airships.

The prize is open to international competition. The Royal Aeronautical Society retain the right to withhold the prize in any year, if it is considered that no paper is of sufficient merit to justify an award.

Intending competitors should send their names to the Secretary of the Royal Aeronautical Society, 7, Albemarle Street, London, W. 1, on or before December 31 of each year, with such information in regard to the projected scope of their papers as will enable arrangements to be made for their examination. The closing date for the receipt of papers will be March 31 in each year.

Papers should in all cases by typed, and a copy should be retained by the author, as the Society can take no responsibility for the loss of copies submitted to it.

Successful papers will become the absolute property of the Society, and will in most instances be published in the Society's *Journal*. In regard to unsuccessful papers, the Society retains the right of publication in its *Journal*, but in each case will notify the author, shortly after the award, whether it intends to exercise this right. If not, the author will be free to publish elsewhere. A signed undertaking must accompany each paper to the effect that publication has not already taken place, and that the author will not communicate it elsewhere until the Society's award is published. Due acknowledgment must be made by the author of the source of any special information.

R.A.F. MEMORIAL FUND

The first meeting of the Executive Committee of the Fund, subsequent to the summer vacation, was held at No. 7, Iddesleigh House, Caxton Street, on October 18. There were present: Lord Hugh Cecil (Chairman), Lady Leighton, Dame Helen Gwynne Vaughan, Mrs. Barrington-Kennett, Mrs. L. M. K. Pratt-Barlow, Sir Charles McLeod, Air Vice-Marshal J. F. A. Higgins, Air Vice-Marshal A. V. Vyvyan, Group Capt. Ludlow-Hewitt, F. E. Rosher, W. S. Field.

The Hon. Treasurer, Sir Charles McLeod, submitted a financial statement to September 30 last, and reported that the "Struben Memorial Trust Deed" had been completed by the trustees of the Fund, constituting a capital sum of slightly over £1,000, the interest on which is to be used annually in the provision of assistance to the family of any officer of Maj. Struben's late son's unit, No. 25 Squadron, R.A.F., who meets with any casualty whilst actually flying on duty with No. 25 Squadron.

The Committee were unanimously of opinion that the time had arrived when the Sub-Committee dealing with grants for the assistance of ex-officers and men should be authorised to increase the amount of their grants, it being considered that the money would be better spent now than kept for subsequent years.

It was reported that the War Memorial on the Thames Embankment would be completed and ready for unveiling early in the new year, and it was decided to offer the wooden model of the War Memorial, which is now at the offices of the Fund, to the Air Officer Commanding, R.A.F. Cadet College, Cranwell, Sleaford, Lincs.

It was announced that the tablet in memory of the officers and men of the Flying Services, which is being put up in St. Mark's Church, South Farnborough, Hants, would be unveiled in the early spring of next year.

Mr. W. S. Field, Deputy Chairman of the Vanbrugh Castle School Sub-Committee (in the absence of the Chairman, Air Vice-Marshal Sir Geoffrey Salmond, K.C.B.), reported that 23 boys are now in residence at the school, and that two vacancies are shortly to be filled. He further reported that ten of the boys have qualified for entrance to the Roan Secondary School. The Committee approved of a suggestion made by Mr. Field, that the school accommodation be increased by the erection of an army hut in the grounds; this would admit of 25 more boys being taken. It being reported that the Sub-Committee found considerable difficulty in obtaining for admission the sons of airmen who had lost their lives in the Great War, who by age and otherwise were eligible for admission, the Committee sanctioned the admission to the school, in the near future, of the sons of serving airmen, always provided that no orphan boys were available when a vacancy arose.

R.A.F. Club

Dance Notice.—As the Victory Ball at the Albert Hall is to be held on November 8, 1922, the Committee have decided to alter the date of the next Club Dance to Friday, November 10.

Airship Service Re-union

The fourth annual re-union dinner of the R.N.A.S. and R.A.F. (Airships), Pulham, will be held at the Holborn Restaurant on November 11, at 6.45 p.m. The cost of tickets is fixed at 10*s*. (exclusive of wines). It is requested that those intending to be present would notify, on or before November 4, the number of tickets required to the secretaries, Mr. R. P. Pierce, the Great Hall, Tunbridge Wells, Kent, and Mr. F. W. H. Spratley, 8, Milner Road, Merton Park, S.W. 19. Arrangements are being made to join with other organisations in the Armistice Day services and placing of a wreath on the Cenotaph.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

M. MANEYROL, winner of the *Daily Mail* Gliding Competition, was the guest of honour at a reception given at the Sorbonne, on October 26, by the French Aerial Association. M. Laurent Eynac, Secretary of State for Air, presided at the reception. An assembly of nearly 2,000 applauded the speeches by M. Eynac, Col. Quinton, etc. Later it is announced that M. Laurent Eynac has recommended M. Maneyrol for the Cross of Chevalier of the Legion of Honour.

* * *

OUR unique photograph on this page shows the wings of the de Havilland glider breaking just after the starting ropes dropped off. The centre section remained intact, and may have contributed to a certain extent in breaking the fall of the machine. Capt. de Havilland points out that the wing structure of this glider had a factor of safety of 8 when rigidly braced for ailerons. There is little doubt that the wing structure was far too flexible for warp control, and the fact of fitting it could only be justified by the natural desire to obtain better lateral control in the very limited time available. The original ailerons were found to be rather ineffective, and this may also have been due to too great flexibility in the wing, which allowed the wing to twist under the load imposed by the aileron, thus destroying the effect by twisting the wing into a smaller angle, with a reduction in lift coefficient.

* * *

THE Sayers glider failed to come up to expectations at Itford, but when certain alterations have been made to the controls it is expected to be thoroughly tested out. From the way it floated off the ground there is little doubt that if the controllability can be improved the machine will glide well in fairly light airs.

* * *

MUCH the same applies to the Aircraft Disposal Co.'s monoplane, which appeared to float about like a parachute, and which evidently required very little wind to keep it up.

* * *

GORDON ENGLAND'S little monoplane must be of very sturdy construction, in spite of its light weight (100 lbs.). Although it struck nose first at a fairly high speed, the only damage actually caused by the crash was to the front portion of the *fuselage*. As far as could be ascertained the machine only required a new nose to be as good as new. The wings appeared to be as sound as ever after the crash.

* * *

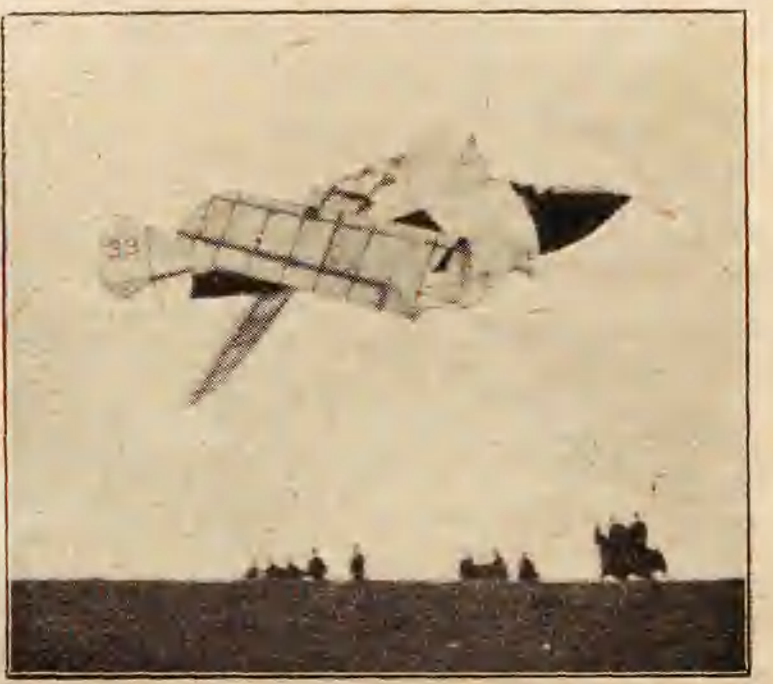
"THE lighter side of gliding" was not entirely neglected at the Itford competition. Officials and competitors were able to enjoy, while waiting for the weather to improve, team races between two of the Palmer wheel trucks used for hauling gliders up to the top of the hills. One race ended in a bad "landing," with several of the crew somewhat damaged but still cheerful. Our photographs show various incidents from these races.

* * *

ALTHOUGH visitors to Itford did not get an opportunity of seeing a great deal of the wing-flapping, pedal-driven, direct-lift machines, one or two provided a few moments' amusement. One was a little monoplane built on to an ordinary push bicycle. The designer tried once or twice near the foot of the hill, but being unable to get up sufficient speed, he had the machine taken some distance up the slope. Several R.A.F. airmen gave him a gentle push, and as the machine gathered speed it struck a rut, which sent it up in the air to a height of about 1 ft. and allowed it to make a "glide" of about 6 or 8 ft. In the landing a man was knocked over by a wing tip, but otherwise no untoward incident happened.

* * *

ANOTHER weird contraption became known as "the Bride," owing to its trailing tail, which had to be held up by "pages." So far as we could ascertain this machine was never tested, but its constructor probably had a good deal of fun in building it. That readers should not miss it, we publish a photograph in this issue.



The D.H. glider "finishing."

* * *

FROM Germany it is reported that Herr Hentzen recently made an attempt to beat Maneyrol's duration record. He succeeded, however, only in remaining up for about 40 minutes, owing, it is stated, to unfavourable weather conditions.

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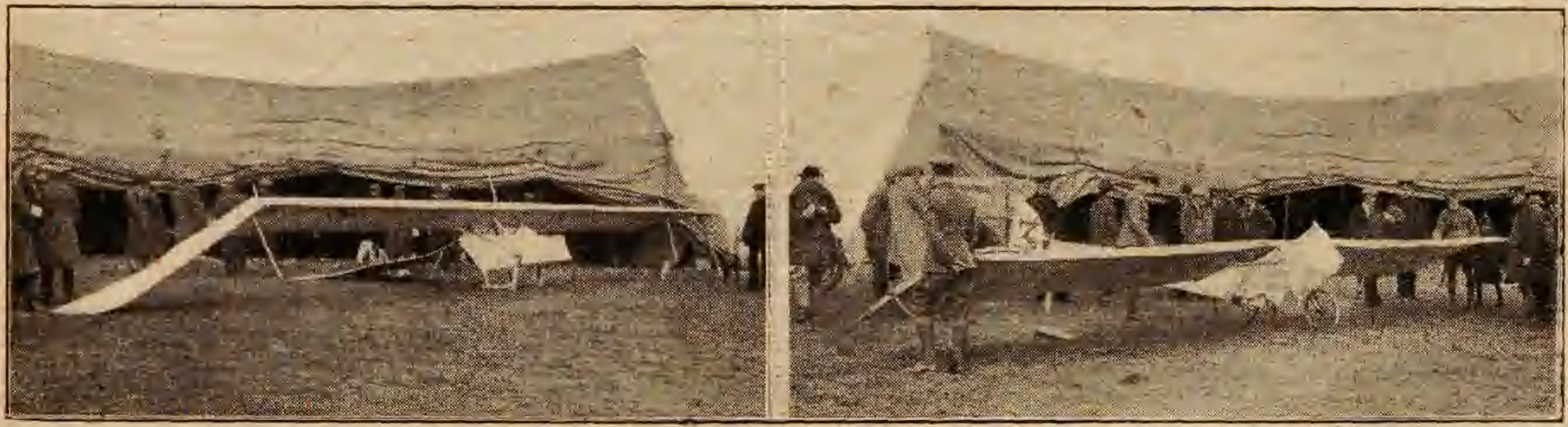
WE learn that Mr. G. H. Handasyde and Mr. Sydney Camm are busily at work re-designing the Handasyde glider.



A COUPLE OF NON-STARTERS AT THE GLIDING COMPETITION: On the left the "Bride," so-called from the large flexible trailing tail, which had to be carried by "pages." On the right, a bicycle fitted with wings. This machine made one "flight" of about 8 feet, at an altitude of 18 inches.

A TROLLEY-RACE BETWEEN TWO TEAMS : On the left, Raynham, Wallace Barr, and Flight Lieut. Longton are seen wheeling their machine to the top of the hill, while Commander Perrin is trying to light a cigar. On the right, Perrin, Longton, Raynham and Wallace Barr are getting away from the rival team, one of whom is Howard Wright, who was somewhat knocked about when his " Ship " struck a gate.

Although the machine did exceptionally well in the competition, it is felt that certain improvements are required, and these will be incorporated in the next machine.

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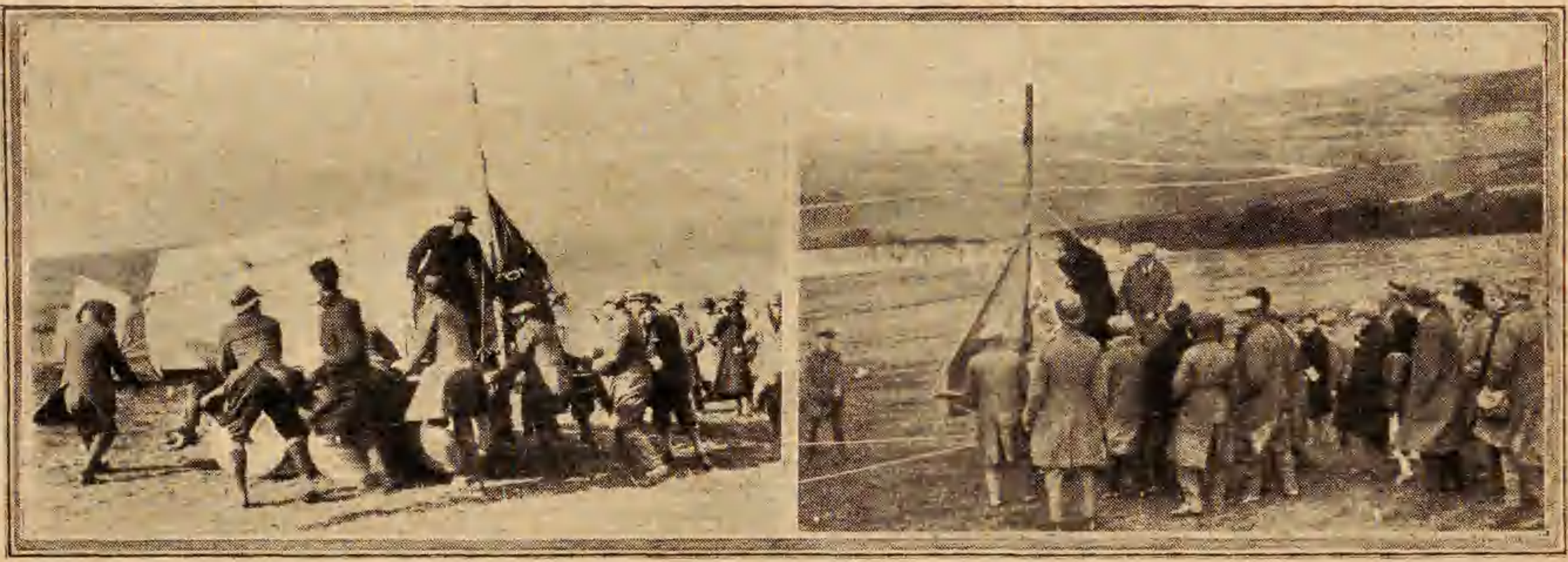
A YOUNG German lady, Fräulein Hansen of Magdeburg, is reported to have made a flight of five minutes' duration in a glider designed and constructed by herself.



FOR IDLE MOMENTS : Competitors and officials were never at a loss for amusements during unsuitable weather conditions. Our pictures show the " Sand Yacht " rigged up from a trolley, a glider wing, etc., making successful beats down the hill-side.

A GLIDING club, to be known as *l'Icare,* is being formed in France. A technical committee of the club is being formed so as to deal with inventions and designs. The President of the Club is M. Lucien Martin, of 51, Rue de Belleville, Paris.

* * *

MR. J. W. HOLMES, of 18, Ocean View, Whitley Bay, Northumberland, writes us that he is desirous of getting in touch with others on Tyneside interested in gliding, in order to discuss the formation of a gliding club, with the object of designing, building and flying gliders.

* * *

MR. ALEX. PEACOCK, of 37, Oakland Road, W. Jesmond, Newcastle-on-Tyne, informs us that he is willing to join in the formation of a gliding club in his district. As he is he states, a partner in a woodworking and engineering firm his services and experience might be of considerable value to a club in the district.

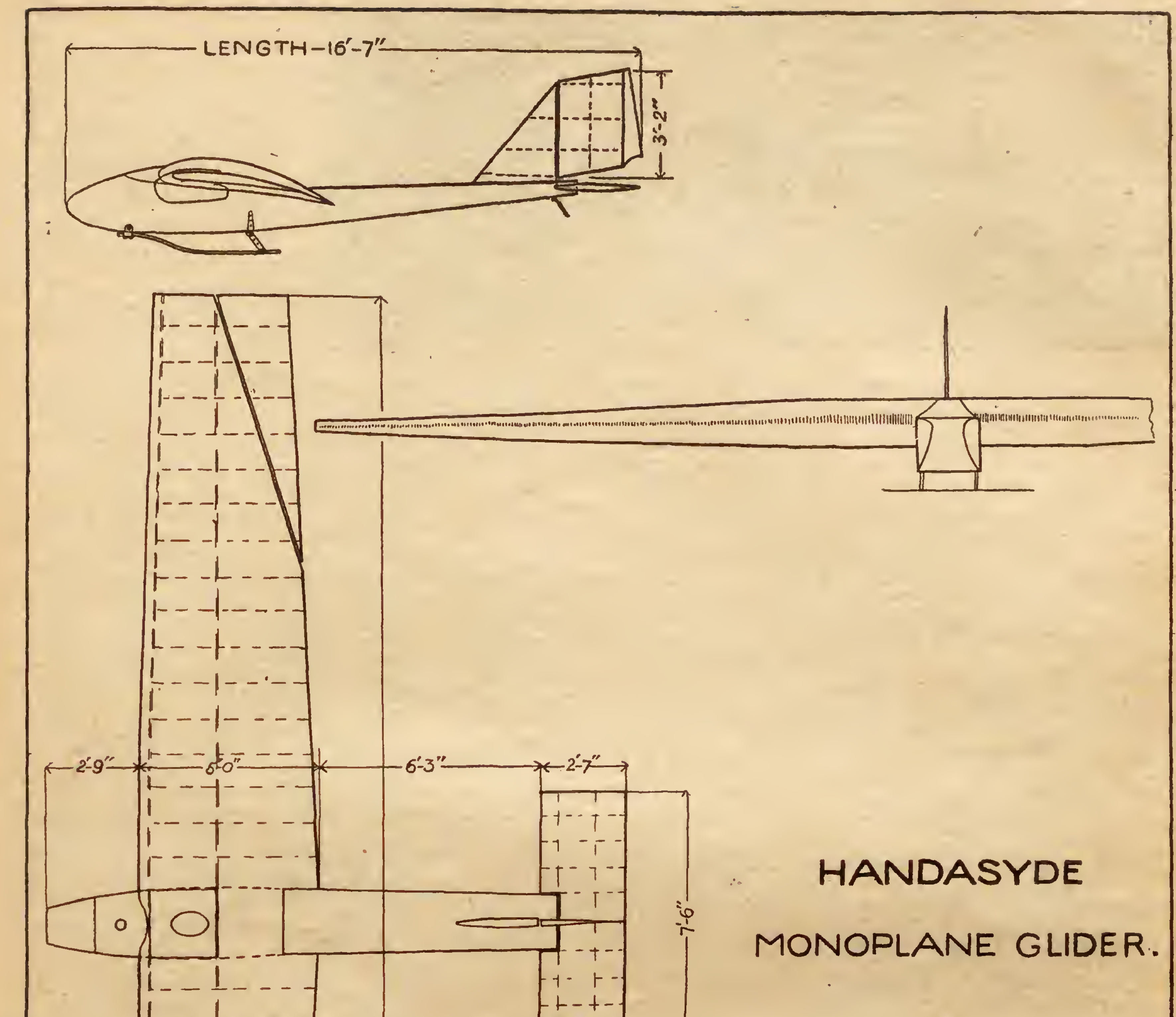
* * *

MESSRS. BEARD AND FITCH, of 34, Aylesbury Street, London, E.C. 1, wish us to state that, although they are gear-cutting specialists and experimental engineers, they are quite prepared to undertake construction of gliders to clients' own designs, and to give advice on inventions in connection with gliders.

THE HANDASYDE MONOPLANE GLIDER

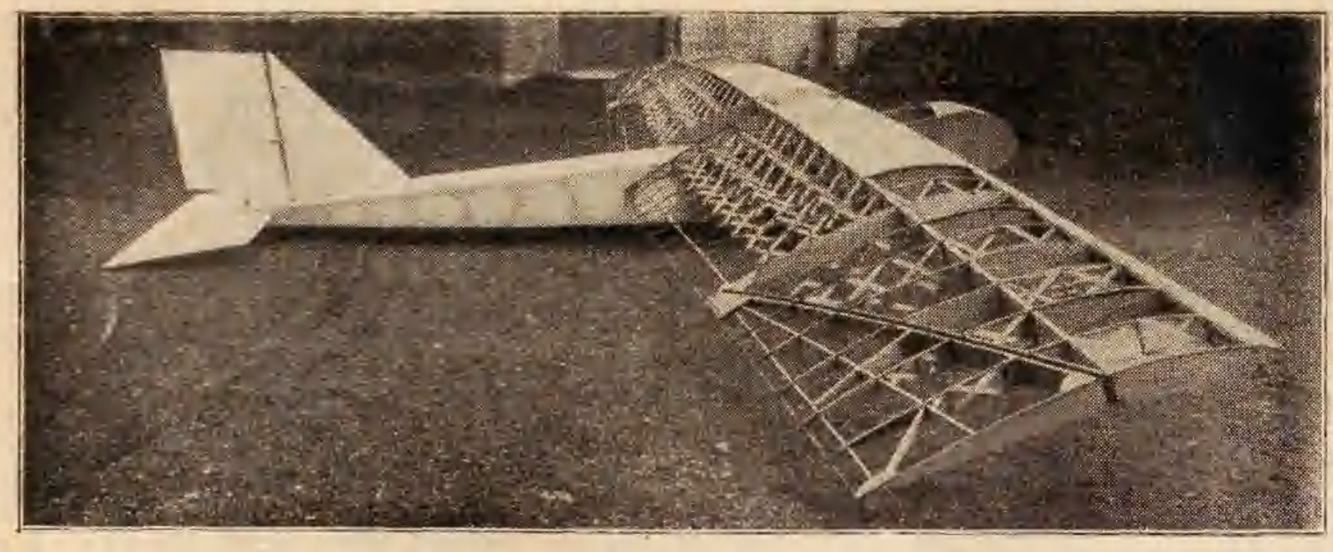
The Machine on which Raynham Remained Up for Nearly Two Hours

THE Handasyde Monoplane Glider was designed by Raynham and Sydney Camm in conjunction with Mr. Handasyde. It was built for the Handasyde Aircraft Co. by the Air Navigation Co. (Blériot's) at Addlestone. It is characterised by a large tapered cantilever wing, whose section at the root, and for a distance of 4 ft. out from the centre line, is that known as Göttingen No. 441. The *fuselage* is of very small cross-sectional area, and is constructed of a light framework of spruce, covered with three-ply. In order to lighten the *fuselage* the ply-wood covering has had circles cut out in each bay, but fabric covering is put on over the three-ply. It would appear that the particular method of cutting away is open to criticism, and it might have been better to leave diagonal strips in each bay, cutting away triangular pieces only, as in this manner each bay would have been triangulated, which can scarcely be the case with the whole centre cut away. However, in spite of this the *fuselage* appears to be very rigid, also against torsional stresses, and no difficulty whatever was experienced in this respect. At the stern the body terminates in a horizontal strip about 2 ins. deep, to



AREA OF MAIN PLANE	157·0	Sq Ft.
AREA OF ELEVATOR	17·0	Sq Ft.
AREA OF FIN . . .	3·5	Sq Ft.
AREA OF RUDDER . .	6·0	Sq Ft.

THE HANDASYDE MONOPLANE GLIDER: Plan, side and front elevations, to scale.



The Handasyde Glider : View of the machine in skeleton, taken during construction at Addlestone.

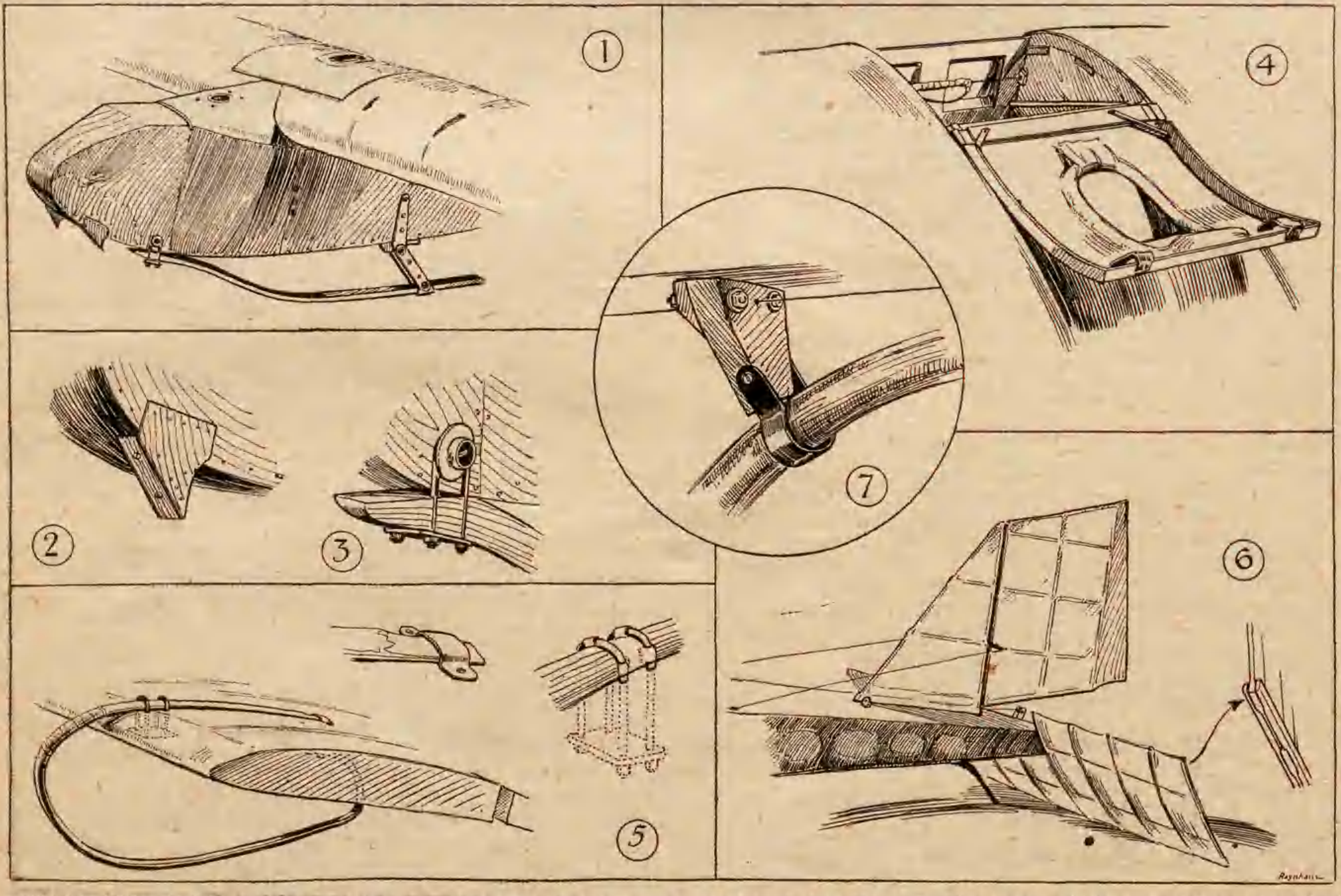
which the balanced elevator is hinged. A light tail skid keeps the elevator from touching the ground in getting off and landing.

In front the *fuselage* shows a rounded nose (as seen in plan), and the top *longerons* slope upwards slightly from the rear spar to the nose. The wing spars are secured to the *fuselage* by long "stirrups" of duralumin, and no external bracing of any sort is provided, the wing being so constructed as to be very rigid both in direct bending and in torsion.

The wing is built up on two spars, formed by top and bottom flanges of spruce, with a three-ply web on one side only, except at certain points where both sides of the spars are covered with three-ply. In order to strengthen the wing the covering over the inner portion is three-ply wood underneath the fabric. This ply-wood is used both on upper and lower surfaces, being in fact bent over the leading edge and extending back, top and bottom, to the rear spar, which is placed well forward in the section so as to give a flexible trailing edge. The latter is formed by a wire. The taper is fairly pronounced, both in plan and thickness, and the wing is given a "humped" appearance by the fact that the taper in the spars is greater on top than underneath. As a matter of fact, we believe that at the tip the lower surface of the main spar is only about $1\frac{1}{2}$ ins. above the *longeron*, while the upper surface slopes down to it.

Triangular *ailerons* are fitted at the tips, being hinged to strips carried on the overhanging portion of the outer ribs. A light stringer runs through the whole wing a few inches forward of the wire trailing edge, and, although not taking any part in the direct loads, serves to stiffen the wing structure, notably the ribs, very considerably.

The controls are of somewhat unusual type. The "joy stick" is placed on the right, and is used for operating the balanced elevator only. The rudder is worked by two pedals, so that when the pilot's feet are off the pedals the rudder cables hang quite slack. This gave many the erroneous impression that the cables were broken. The *aileron* control is of the simplest possible type. In fact, there is none, in the ordinary sense of the term. The *ailerons* are operated by the pilot gripping the *aileron* cable with his left hand and pulling the cable to one side or other. As the cable passes along the front spar, in front of the pilot, it was decided that a lot of unnecessary complications, such as pulleys, crank-levers, etc., could be dispensed with by using



THE HANDASYDE MONOPLANE GLIDER : Some constructional details. 1. The nose of the machine, showing landing skids. 2. One of the cleats which support the launching rope during the start. 3. Front attachment of landing skid. 4. Cover over cockpit thrown back. When the cover is pulled down the pilot's head projects through the small opening. Note the hand guard on the aileron cable. 5. Details of a wing tip skid. 6. The tail. 7. Detail of tail skid attachment.

this form of control, and Raynham, once he had got used to the controls, found no difficulty in handling the machine. At first his fingers used to get cramped with gripping the bare cable, but later a guard was fitted, and tape wrapped around the cable, which improved matters considerably.

The vertical tail members consist of a triangular fin and a rudder of approximately parallelogram shape. The first rudder fitted was found to be too small, and a larger one was made, which gave some improvement. An addition to this was, however, found advisable, and this is shown in the side elevation of the general arrangement drawings. As a matter of fact we rather think that the rudder was large enough, and that what was really the trouble was that there was not sufficient fin area forward (the *fuselage* being of small depth) to afford a pivot for the machine to turn upon. In other words, the machine would probably fly somewhat like the old box kites, which had no fin surface forward, and which had to be assisted in a turn by the *ailerons*.

The pilot's cockpit is a very small one, and we believe that actually Raynham was measured for it. He certainly seemed to fit it with but little room to spare. The cockpit is placed between the main wing spars, and is covered with a three-ply panel in which is cut a hole for the pilot's head. We believe that when flying Raynham found this position quite comfortable, as there was very little draught, the air probably shooting up above the pilot's head. Let into the coaming over the cockpit is one of the new Smith and Sons' air speed indicators.

The undercarriage consists of two ash skids, anchored at their front ends to the lower *longerons*, and supported at the rear by short struts which are so pivoted that they are free to swing back as the load comes on the skids. The machine pulls up almost instantly on touching, and as the wings are very close to the ground, and the tips protected by cane loops, the machine never showed any tendency to turn over. Furthermore, the low wing position appears to give a certain amount of "cushioning" effect in landing, while assisting the machine to get off at a very low speed.

When the sluggishness of the directional control has been remedied the Handasyde monoplane should be a very excellent machine, as it certainly rises in quite low winds and appears very steady laterally. That Raynham should have been able, on his fifth flight, to remain up for nearly two hours is a remarkable testimony not only to his skill but also to the general design of the machine. We hope to hear of further flights being made on it as soon as it has finished its "show" at Selfridge's, and the few ribs damaged in transport have been repaired.

LONDON TERMINAL AERODROME

Monday evening, October 30.

Despite bad weather, the air services have been maintained with commendable regularity, the Manchester service being run every day in spite of the fact that it was thought, in many quarters, that the inland mist—combined with the smoke in the industrial centres—would prove a great obstacle to the regular operation of this service. On Thursday and Friday in the early morning there was a thick fog over the aerodrome, and, to some extent, this dislocated the air traffic. The Daimler machine from Manchester started as usual, but, on arriving over Crewe, discovered a thick fog there, and, having received a report by wireless that Croydon was also fog-bound, the pilot decided to return to Manchester. The weather cleared rapidly, however, and he was soon away again, and managed to get right through to Rotterdam before darkness came on.

Friday's fog, though of a more lasting character, was more or less local. Machines started at the ordinary time from Cologne, Amsterdam, and Manchester. The Cologne machine waited at Brussels for the weather to clear, and the machine from Amsterdam got as far as Lympne, and there alighted for weather reports. The machine from Manchester landed at Stag Lane, and the passengers for London were sent into town by car from that aerodrome, arriving in London to schedule. This is the great advantage of the Manchester service, because when weather conditions are bad at Croydon, it is often possible to land passengers at one of the numerous aerodromes round London; and, as there are of course no Customs formalities, passengers can reach their destinations quite to schedule.

"Express" from Paris Arrives by Night

On Saturday a Handley Page, W.8, piloted by Mr. MacIntosh, completed its journey from the coast to Croydon after dark. All the usual lights at Croydon were in operation, and shells and rockets were fired at regular intervals. The machine suddenly appeared out of the darkness to the south-west, and made a perfect landing.

The three British firms have agreed to pool their resources in regard to certain mutual operations and expenses. It is understood that advertising will be on a combined basis in future, and that the advertisements will be in the nature of an appeal to the public to travel by British "airways," and will further state to what places British airways run. In addition, certain ground operations at Croydon, which can be combined to mutual advantage, will be made common to all three companies, thus eliminating much of the overlapping which now exists.

Gratifying Figure as to Passengers

The passenger traffic continues to keep up in a surprising manner, considering the period of the year. Handley Page Transport rarely send a machine without an absolutely full load, and the passengers on both the Cologne and Amsterdam routes are, if anything, increasing. Between London and Manchester 40 passengers were carried in the six days last week. On Saturday there was not enough accommodation in the machine for all who wished to travel from Manchester to London. I am informed that at Manchester the business men arrive at the aerodrome carrying bags a few minutes before the machine is due to start, and book their tickets just as they would on the railway. This is, of course, encouraging, but at the same time, with limited accommodation available, it has already led to disappointments on occasion.

Incidentally, it may be mentioned that a machine from London to Manchester made the flight in 1 hr. 39 mins. one day during the week, the actual flying time from Amsterdan to London being, on that occasion, only 4 hrs.

A Napier "Lion" engine, which has just completed 200 hours in the air in one of the Daimler D.H.34's, has now been taken down for overhaul, and it has been discovered that, despite this arduous period of service, the motor shows practically no signs of wear-and-tear, and is, to all intents and purposes, in the same condition today as it was on the day when it first began running.

Today (Monday), despite extremely bad flying weather, the London-Manchester services were completed to schedule in both directions. The London-Amsterdam machines also maintained their services. Between London and Paris very adverse conditions led to services being cancelled.

I hear, as an eleventh-hour piece of news, that most of the seats on the Daimler "air expresses" from Manchester to London are already booked up for days ahead. Manchester business men are, indeed, living up to their reputation of being "live wires," and are quick to see the advantage of a flying "express" which, leaving at a convenient hour in the morning, will rush them up to town in such record time.

Lord Beatty on Armaments

At Leeds on October 18, Lord Beatty, when the freedom of that City and the Hon. Degree of D.L. of Leeds University were conferred upon him, said that one of the lessons of history was that security at sea was vital to our Empire. It was said that the development of aerial warfare would rob, or had robbed, us of some of the advantages of our insular position, and that it would lessen the need for naval defences, but a study of all the problems involved would indicate how utterly fallacious such a doctrine was. The British Empire consisted of something more than the British Isles. The strength of this wide-spread Empire lay in its physical as well as its moral unity, and its physical unity was, and must always be, maintained by sea.

It was recognised that the acceptance by the British Government of the standard laid down at the Washington Conference was unimpeachable evidence of the desire of the British Empire for peace.

The standards of strength adopted by the Great Powers were those which seemed to them, after most patient consideration, to give the best possible prospects of peace. It was an unfortunate fact, however, that in the present state of civilisation the casting aside of proper means of defence did not make for peace, and therefore we could not afford to relax altogether the precautions necessary to maintain our national and imperial interests. We could not rely on the forbearance of friends for our continued existence as a great world Power.

INTERNATIONAL COMMISSION FOR AERIAL NAVIGATION

The first public session of the Commission was held on October 27 at 5, Old Palace Yard, Westminster, Maj.-Gen. Sir W. Sefton Brancker presiding, countries which have ratified the 1919 International Air Convention, which governs civil aviation, being represented, including, Belgium, Bolivia, the British Empire, France, Greece, Japan, Persia, Portugal, the Kingdom of the Serbs, Croats and Slovenes and Siam. A representative of the General Secretariat of the League of Nations was also present, having been appointed to attend in order to convey information to the League. The proceedings were conducted mainly in French.

Age Limits for Pilots.—A report from the Medical Sub-Committee on the fixing of rules, mentioned in Annexe E of the Convention for the medical examination of pilots, recommended that no pilot should be engaged before attaining the age of 19 or after attaining the age of 45, and that medical re-examination should take place after six months or after a pilot had flown 250 hours, whichever occurred first.

The recommendation was adopted.

The Use of Wireless.—The Commission next considered the report of a Sub-Committee on the use of wireless apparatus on aircraft, and agreed, as a general principle, that all aircraft engaged in public transport must carry wireless apparatus. At present this provision is applied only to aircraft able to carry ten or more persons. Aircraft carrying fewer than ten persons, and flying more than 100 miles over land without landing, or more than 15 miles over sea, must carry wireless apparatus within two years.

Votes of the Contracting States.—With regard to Article 34, which relates to the distribution of votes in the International Commission for Air Navigation, a proposal was made by the Belgian delegate to the effect that each contracting State should have one vote only, that any amendment of the annexes to the Convention must be carried by a three-fourths majority, and that no amendment of the annexes should be passed without the consent of at least three of the following States—United States of America, Great Britain, France, Italy and Japan.

In accordance with a suggestion made by the Chairman, this matter was referred for the consideration of each individual Government prior to the holding of the next assembly.

Nationality Letters.—The French Delegation submitted a note in which they emphasised the desirability of the nationality letter being the same for aircraft registration as for wireless calls, and suggested that those countries to which no aircraft registration letter had been allotted under the Air Convention should be requested to adopt now the same letters for aircraft registration as for international wireless calls.

To give effect to this, Lieut.-Col. Blandy, Controller of Communications in the Air Ministry, was appointed Reporter to prepare a list of suggested letters for those countries to which a letter has not already been allotted under the Air Convention. It was also decided to request the League of Nations to help to induce other nations which are members of the League, but not yet parties to the Air Convention, to adopt the letters which would be proposed.

Flights over Foreign Territory.—The Commission decided to amend Article 5 of the Convention so that it would read as follows: "No contracting State shall, except by a special and temporary authorisation, permit the flight above its territory of an aircraft which does not possess the nationality of a contracting State, unless it has concluded a special convention with the State in which the aircraft is registered. The stipulations of such special convention must not infringe the rights of the contracting parties to the present Convention, and must conform to the rules laid down by the said Convention and its annexes. Such special convention shall be communicated to the International Commission for Air Navigation, which will bring it to the knowledge of the other contracting States."

The Chairman remarked that the article in its new form would make it easier for other nations to enter the Convention. It had been proposed that the Article should be signed by some of the States that day. He understood, however, that none of the delegates had yet received the authority of his Government to sign, although it was certain that everyone would sign it. The British Government must consult India and the self-governing Dominions. It was therefore suggested that he, as chairman, and Mr. Roper, as Secretary-General, should sign it as indicating the approval of the Commission to the draft, and that it would then be signed by the representatives of the contracting States as they received authority from their Governments.

This course was adopted.

On the invitation of Col. Van Crombrugge, on behalf of the Belgian Government, it was decided to hold the next session of the Commission at Brussels about February 20.

On October 24 an official dinner by the Government was given to the members of the Commission at Lancaster House (London Museum), when amongst those present were The Duke of Sutherland, His Excellency M. le Comte de Saint-Aulaire, M. P. E. Flandin, Maj.-Gen. the Right Hon. J. E. B. Seely, Baron Gonsuke Hayashi, Maj.-Gen. Sir W. Sefton Brancker, Sir Walter F. Nicholson, Sir Wm. Joynson-Hicks, Bart, M.P., M. Michel Gavrilovic, Sir Edgar Walton, M. Laurent Eynac, Viscount Max Vilain XIV, Sir James Stevenson, Sir H. White-Smith, Lieut.-Col. Mervyn O'Gorman, Maj.-Gen. Sir Frederick H. Sykes, Brig.-Gen. Shizuma, Mr. A. H. Ashbolt, Capitaine de Corvette Sablé, Lieut.-Aviateur Chevalier Willy Coppens, Col. Van Crombrugge, Maj. J. P. C. Sewell, M. A. de Dordolot, Col. E. Gold, Col. J. Saconney, Col. Casse, Col. L. F. Blandy, Col. Prince Pridi, Comdr. F. A. Branco, M. Okuyama, M. George Mélas, F. H. Co'ler, E. E. Beare, M. Jean Youpis, F. G. L. Bertram, M. Albert Roper, M. A. B. Duval, Capt. Ogura, Maj. Peverel, Capt. Kuwahara, Dr. Garsaux, Col. C. B. Heald, M. Pepin, R. L. Megarry, Capt. Ragoul Vargas, Chief Eng. Sabatier, Capt. R. J. Goodman-Crouch, Lieut. Convents, F. Handley Page, Maj. C. C. Turner, G. Holt Thomas, Maj. T. E. Gullick, F. W. Emmett, C. P. Robertson, etc. etc.

Capt. F. E. Guest, M.P., Secretary of State for Air in the late Government, should have presided, but was prevented by other political duties, and his place was taken by Mr. Cecil Harmsworth, M.P., who was Under-Secretary of State for Foreign Affairs.

The Chairman, in proposing the toast of "Our Guests," explained that Capt. Guest had been carried away by the political gale, and, having a large share of the management of the party to which they both belonged, he had been compelled to go to the country, and greatly regretted that he was unable to be with them. Capt. Guest had written him a letter in which he said he hoped the work of the Commission, whose province was the world and the whole heavens falling within their jurisdiction, would be carried on with the same mutual goodwill which had existed up to the present, and would complete the tasks it had before it with every success. Proceeding, Mr. Harmsworth said that in the very early days of aviation, with his friend, Gen. Seely, he was a member of a House of Commons Committee established for the express purpose of keeping its eye on the Government and keeping it up to the scratch in the matter of the provision of aircraft. That was the second session of that most important Convention. The first was inaugurated in Paris by M. Poincaré under the most brilliant auspices, and he trusted that their second session would not be less successful. He personally attached great value to international conferences, although he was well aware that they were not now so popular as they used to be. But such conferences brought together in intimate relationship representatives of different countries, and assisted in removing predilections and prejudices. He was also glad that they were working under the ægis of the League of Nations, for he had unbounded confidence in the future of that body. Their task of laying down rules to govern aviation was no easy one, but it had great possibilities. Anyone contemplating the possibilities of warfare must conclude that unless some means of restraining international passions could be found there was no security for mankind. Aviation, the newest and most progressive of the arts, was capable of being of the greatest benefit to mankind in the way of establishing communications between the nations, assisting trade and commerce and improving the relations between the different peoples.

Responses were made in French by M. P. E. Flandin, chief French delegate, and M. Laurent Eynac, Under-Secretary for Air in France.

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Annual Dinner of No. 6 Wing, R.N.A.S.

The Annual Dinner of No. 6 Wing, R.N.A.S., Otranto, Italy, will be held at 7 p.m. on Saturday, December 9, at the Connaught Rooms, Kingsway. Officers who have not received invitations should apply to the Secretary, Mr. A. Lloyd-Taylor, "Compton," Highfield Road, Purley.

ROYAL AERO CLUB CELEBRATION DINNER

AT the Savoy Hotel on October 26, the dinner given by the Royal Aero Club to celebrate the British victory of the Supermarine-Napier flying boat in the Jacques Schneider Seaplane Race and the holding of the Circuit of Britain Air Race for the King's Cup was well supported in spite of General Election activities. Lieut.-Col. J. T. C. Moore-Brabazon, Chairman of the Club, presided, the company including

Princess Ludwig Lowenstein-Wertheim, Lady Llangattock, Mrs. Moore-Brabazon, M. P. E. Flandin, Maj.-Gen. Sir W. S. Brancker, K.C.B., Lieut.-Col. W. A. Bristow, Capt. S. Cockerell, A.F.C., Flight-Lieut. L. H. Cockey, Lieut.-Col. M. O. Darby and Mrs. Darby, Sir Walter De Frece, M.P., Lieut.-Col. Spenser D. A. Grey, D.S.O., Brigstocke Hitchings (Chairman, Bristol Liberal Club), Capt. H. B. Hooper (Vice-Chairman, General Steam Navigation Co.), Sir Samuel Instone, Sir Henry White-Smith, K.B.E., Lieut.-Col. F. K. McClean, A.F.C. (Vice-Chairman, Royal Aero Club) and Mrs. F. K. McClean, Douglas Vickers, M.P., J.P., F. Handley Page, Thomas Paxton (Lord Provost, Glasgow), H. Scott-Paine, Commander James Bird, W. N. Tribe (President, Bristol Stock Exchange), H. T. Vane, Capt. F. L. Barnard, Capt. H. C. Biard, A. J. A. Wallace Barr, R. Blackburn, Lieut.-Col. L. F. Blandy, D.S.O., Comm. F. A. Branco, Capt. J. C. Brooke, Lieut.-Col. Casse, A. J. Cobham, Capt. R. J. Goodman Crouch, Lieut.-Col. I. B. Davson, F. G. T. Dawson, Mrs. Dawson, Maj. Gilbert Dennison, A. R. Dresser, A. Duval, Maj. C. Graziani, C. G. Grey and Mrs. Grey, Flying Officer Leslie Hamilton, D.F.C., R.A.F., Comm. G. Hara, I.J.N., B. Hinkler, F. H. Jones, W. Kayley, R. W. Kenworthy, H. O. Lewis, Flight-Lieut. W. H. Longton, D.F.C., A.F.C., and Mrs. Longton, J. Lord, Flight-Lieut. F. L. Luxmoore, R.A.F., D. C. MacLachlan, W. O. Manning, Lieut.-Col. W. Lockwood Marsh, Lieut.-Col. V. Nicholl, D.S.O., M. Okuyama, Squadron-Leader H. J. Payn, R.A.F., H. E. Perrin and Mrs. Perrin, H. H. Perry, M. W. Piercey, H. J. Preston, Col. Prince Pridi, F. P. Raynham, G. T. Richards, C. P. Robertson, Flight-Lieut. V. A. H. Robeson, M.C., A. V. Roe, M. Sabatier, Comm. Sablé, Lieut.-Col. J. G. L. Searight, T. P. Searight, Squadron-Leader J. P. C. Sewell, R.A.F., Maj.-Gen. Shizuma, J. D. Siddeley, S. Sparkes, Mr. and Mrs. Spooner, B. Stevenson, Lieut.-Col. J. E. Tennant, D.S.O., M.C., G. Holt Thomas, Maj. C. C. Turner, Col. A. E. H. Van Crombrugge, Viscount Max. Vilain XIV, Featherstone Witty, J.P., etc.

The Chairman proposed the toast of "The King's Cup Air Race," and expressed his regret that the Duke of Atholl was unable to fill the chair owing to his absence in Scotland. He extended a welcome to the members of the International Commission on Aerial Navigation now present in London. He wished to draw attention to the fact that the Royal Aero Club, which had been in existence for over 21 years, started with lighter-than-air projects, and had become concerned with heavier-than-air projects, but it was not a necessary corollary of that policy that their speeches should become heavier also. The Chairman referred to the gliding contests that have taken place, and paid a warm tribute to the energy of their secretary, Mr. Perrin, who, he thought, was a real dynamic force, and who within two months found a site, got an organisation going, secured a representative entry, and through the Aero Club the gliding record was beaten. The presentation of the King's Cup immediately called to mind the name of Maj.-Gen. Brancker, who led a double life, for he was not only Director of Civil Aviation, but also chairman of the racing committee. The Chairman expressed his thanks to many others who had been responsible for the success of the race, and said that the handicapping was one of the most extraordinary features of the event, as was seen by the arrival of the machines. He paid a tribute to the gentlemen who entered the race as private individuals, mentioning especially Mr. F. P. Raynham, to whom he wished success next time.

The Chairman then presented the King's Cup to Sir Samuel Instone and a cup to Capt. F. L. Barnard, the pilot, who also received a number of prizes offered by newspaper owners and corporations for the pilot who made the best performance to their particular towns. Prizes were also handed to the pilots who finished the course.

Sir Samuel Instone expressed his thanks to His Majesty for presenting the Cup, to Gen. Brancker for originating the race and to the Aero Club for the excellent arrangements. He was certain that the race had given a new lease of life to aviation. It had inspired the country with confidence, and it was impressed with the fact that no special freak machines had been built for this race. The machines had been used in some cases for years without a single accident. The public confidence was shown by the fact that in civil aviation now there was scarcely a vacant seat in the machines, and that the passengers travelling were not people who were touring, but business men and women. A business community had realised that travelling by air was safe, and he thought they might claim that the race had done much to establish this confidence in the public mind.

Capt. F. L. Barnard, the pilot of the De Havilland machine, in also responding, expressed himself whole-heartedly in regard to the valuable aid and work put in by all who were associated with the active part of the race. Without them he considered he would have stood but a poor chance.

Mr. F. P. Raynham, the runner-up, who was greeted vociferously and who was awarded a silver cup, also briefly replied.

Maj.-Gen. Sir W. S. Brancker then proposed the toast of the winner of the Jacques Schneider International Seaplane Race. "We are a nation of sailors," said the General, "and we hope to be a nation of airmen; and our achievements within the last few years in flying justify the hope that we are going to be a nation of airmen. We should therefore be pre-eminent in the operations of aircraft, the principal aim of which is to fly across the sea." It was consequently satisfactory to know, continued the General, that the International Cup had been won this year by a British Supermarine flying boat, piloted by Capt. H. C. Biard. Our mastery of the air was due not only to the great qualities of our race, but to our remarkable geographical position and our vast overseas trade. Our position seemed to him to be both bad and good: bad, as it must be many years before the air traffic of the world crosses Great Britain; and good, because our Dominions must inevitably demand navigation of the air by British aircraft from every quarter of the globe. In the future flying boats must play a great part. In the few efforts that had been made they had not had a chance; but as the overseas demand increased, the flying boat must come into its own, and he hoped to see Supermarine boats of many horse-power flying all over the world.

Capt. H. C. Biard, who flew the Supermarine flying boat to victory, was then presented with a piece of plate.

Mr. Scott-Paine, managing director of the Supermarine Aviation Co., in responding, mentioned some of the difficulties and problems which they had to face before it was possible for them to get to Naples, including the transport question, which was so generously solved by the General Steam Navigation Co., who not only sailed out of their course to pick up the seaplane, but were content to receive payment in the glory of assisting a British machine to bring back the Trophy to these shores.

Mr. H. T. Vane, managing director of Messrs. D. Napier and Son, who also helpfully supplied one of their splendid engines, in also acknowledging the toast, strongly urged that a little solid encouragement should be accorded by the Government to the makers of engines and machines in contests of this character, to enter and build craft which would help to secure British supremacy in the air. This was done by other nations, notably France, by not only subsidy, but by the purchase of the successful machines and the placing of orders for replicas—a practical method of ensuring progress with every chance of obtaining the best that brains could devise.

The toast of "The Guests" was humorously put by Lieut.-Col. Frank McClean, M. P. E. Flandin responding in French. A vote of thanks to the Chairman concluded a very pleasant evening.

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The American Duration World's Record

IT appears that the splendid performance put up by Lieut. J. A. MacReady and Oakley Kelly on October 5-6 last, when they remained "upstairs" for 35 hrs. 18 mins. 30 secs., was accomplished on a Fokker F.4 commercial monoplane (400 h.p. Liberty). This machine is officially known as the Army Transport T.2, and in order to equip it for long-distance flights, the following modifications were made: A tank holding 750 gals. or 4,500 lbs. of fuel was installed in the cabin, leaving sufficient room for the "spare" pilot. A door was cut in the forward wall of the cabin to enable the pilots to change places, and an extra control was installed in the cabin, from which the machine was controlled while the pilot left his cockpit.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

SCRAP THE LOT

[**2062**] I read with interest Prof. Bairstow's lecture on Prof. Langley's work, and am glad to see he has brought forward the case against the British administrative system of scientific control. I trust the matter will be pressed home until research workers get justice and fair play. When one has had experience of the system operating, it is easily understood why Britain lags behind in advanced design. Why should men who have specialised on a particular branch of research work be left to the tender mercies of some officials whose knowledge in many cases is only superficial, and limited to a subject which is common property. At the present stage of agitation for reform, and as far as some twenty years' experience with official experts is concerned, I think the following may be interesting to some Flight readers.

In 1902 I patented the first heavier-than-air machine fitted with slotted planes, the angle of incidence of which could be varied by the aviator in flight for fast or slow flying. This design won the first prize presented by the President of the Aeronautical Society, but was turned down by the official experts. In 1907 I designed, built and flew the first two all-metal aeroplanes at the *Daily Mail* Competition at the Alexandra Palace. The machines had no struts or wire bracing, embodied the tractor propeller hemispherical entry, enclosed streamline body with non-lifting tail and hinged elevating flaps. (Bleriot, at a much later date, flew with a lifting tail, which was afterwards found to be wrong in practice.) The late Hon. Charles Rolls, in describing machines in the *Daily Mail* at that date, said my system of construction would be extensively used in the future. The Farnborough experts thought otherwise, and turned it down, preferring to play about with bamboo poles, bits of string and canvas. Prof. Junker developed the idea in 1918, followed by Short Brothers in 1920.

This year I submitted to the Research Department of the Air Ministry a new type of multo-ported oscillating split ring valve gear for aero engines, the chief feature of which is that the ports in the valve register alternately with the inlet and exhaust passages, and the design of the cylinder head is such that paraffin can be effectively vaporised without heating the induction pipes. The back face of the valve is both water and air cooled. The interior of the valve is wholly swept by the cool gases on the induction stroke; this means that the valve and combustion chamber can be kept moderately cool, and introduces the possibility of higher compression with increased efficiency without fear of pre-ignition. It has large free ports, and is positively operated by standard practice cam gear, has few working parts, light, simple, silent and accessible. The Air Ministry's engine experts graciously admitted that many of my claims were justified, but said they had no money for this type of experiment. What is more important in an aero engine than safety from fire, and a reliable valve which once it is installed like a sleeve valve, requires no further adjustment or grinding. They concluded their remarks by judging the merits of the design from the performance of a poppet valve aero engine (presumably because they had had no experience with any other type of valve gears), overlooking the fact that the working conditions are entirely different, and turned the design down on the following objections:—

Heat and lubrication, and pressure on the valve. (1) Heat, because they find the oil gets burnt in an aero engine by the hot piston, which is neither water nor air cooled on its driving face. They concluded the oil behind my valve must also get burnt, although it is wholly water and air cooled on its back face, and wholly cooled internally at each suction stroke. (2) At the point of exhaust opening the pressure in the combustion chamber would be nearly 50 lbs. per square inch. It would be realised, therefore, that the friction against which the valve has to be moved would be very large and the danger of seizure ever present. Answer: I do not intend to open or move the valve when there is a pressure of 50 lbs. per square inch in the combustion chamber. This to my mind is a wicked waste of energy, and can be avoided with this valve gear. I know it is done in high-speed aero engines, but why? Because with spring-returned valves the actual closing is unknown, and the valve heads have a baffling effect on the gases. In my long-stroke, high-compression positively operated large free port engine I can afford to keep the valve stationary, opening late when the pressure drops below 20 lbs. which it will do in my engine, because of higher compression ratio and long stroke; also keep the inlet valve open late, because I know definitely when the exhaust and inlet ports are closed. Oil grooves are cut in the back face of the valve; the suction and pressure strokes insure that there will always be a film of oil pulsating between the valve and cylinder head.

In conclusion, is it fair to compare an engine with a positive timing against one with a partially theoretical one? Can a valve which is perfectly cooled get as hot as a piston, which is only cooled where there is the least heat? Can a valve which is split and perfectly lubricated seize in its bearing? I leave it to Flight readers to judge. I don't blame the gentlemen of Kingsway for the attitude they take up. It is not their fault; it is the system operating. They are not sure of their ground off the beaten track, so in order that they should make no mistakes, they turn advanced ideas down, fervently hoping that nothing more will be heard of them while they are in office.

William Cochrane

PILOT BALLOONS AND GLIDING

[**2063**] Whilst investigating the structure of the atmosphere by observing the rate of ascent of pilot balloons at Pyrton Hill in 1910-11, Mr. J. S. Dines observed a peculiarity in the movement of the balloons which might possibly be of great assistance to motorless aviators.

It was found that a balloon when released from the ground always ascended at a greater velocity than that determined from its physical properties for its ascent in still air. The excess velocity was found to decrease as the balloon gained height. These facts have also been noted by independent observers in France and Germany.

The explanation offered by Mr. Dines was that the balloons when near the ground naturally find their way into ascending currents, since these must be continually fed from below.

Use can be made of this in gliding experiments by releasing a number of balloons from such a place that they will drift towards the pilot's starting-point.

By gliding towards any balloon the pilot would greatly increase his chance of finding a region of ascending air.

To obtain the best results it would be necessary to use balloons with a negligible rate of ascent in still air.

The chief difficulty of course, would be in spotting the balloons, but out of a large number it should be possible to see two or three.

Alan Smith

SOARING FLIGHT.

[**2064**] On October 16 I saw the fulfilment of an old, old dream. Twelve years ago, while convalescing at St. Leonards, the seagulls gave a gliding exhibition for my special benefit, and I described the flight of those gulls and how they could be copied by men on gliders if they had the necessary skill. I had not realised how soaring could be carried on for miles along a range of hills until those gulls supplied the key. The following extract from *The Field* of January 15, 1910, may be of interest at the present time:—

". . . . The seagulls at St. Leonards-on-Sea have since enlightened me by demonstrating without question the possibility of soaring flight under certain conditions of wind, when a glider once launched might be flown for perhaps 10 miles in one direction and back again to the starting point. There was a south wind blowing directly on to the sea front and in order to pass this barrier the wind had to rise in a huge wave over the houses and the hills behind. In similar conditions I have often seen these birds sitting on the wave with their heads towards the wind, but on this occasion a number (perhaps a hundred) of gulls were soaring without moving their wings and yet travelling from east to west. The birds flew in detachments of ten to fifteen, and this in somewhat open order, so that they were spread over a considerable portion of the wave. It was very noticeable that those which flew lowest were most affected by eddies, whilst those soaring at about 300 ft. had fewer difficulties in advancing. Instead of the birds being head to wind as they would be if floating only, they were turned to an angle of about 45° to the west, thus pointing to the fact that half the supporting power of the wave was being used by them to travel from east to west, the remaining margin being sufficient for their support at a constant altitude. I watched these birds travelling to the west until they arrived at the end of the sea front, where both houses and hills terminate, and then these living gliders simply turned their tails and heads to an angle of 45° in the opposite direction, and came sailing back over my head towards Hastings. Now, none of these birds did anything that an expert on a glider could not do, viz., balance and steer, and I can therefore see no reason why a man with this duplex skill should not have spent the morning on a glider over the esplanade, instead of employing the usual bath-chair method of locomotion. It would, of course, be necessary to be launched on to the wind wave; but this could be done at the top of the hill, although possibly not without danger at St. Leonards. But there are hundreds of other ranges of hills in England where the wind rises in the wave-like form, and where the launching could be effected with comparative safety. It is quite conceivable for gliding matches to take place in the near future, the greatest skill being shown by the aviator who utilises the maximum of the wind wave for travel and the minimum for support. I fear, however, I am looking too far into the future; travelling by gliders can only come after expert manipulation of motor-driven aeroplanes, and that art is at present still in its infancy.

"GRIFFITH BREWER."

The time has now come when soaring on gliders is possible, because aircraft pilots have acquired in the past ten years, mainly during the War, that expert manipulation of motor-driven aeroplanes which was necessary as a prelude to successful gliding and soaring on the air.

The glider which made the most impressive flight on Oct. 16 did more than fulfil the forecast of twelve years ago. Its design carried the sport back twenty years, to the time when Wilbur and Orville Wright were learning to fly on their glider at Kitty Hawk. The glider was a biplane, with warping wings and skids instead of landing wheels, similar in principle to those made by the Wrights, who first controlled their flights so as to make it possible to fly again a hundred times and live to tell the tale. We have to thank our Continental neighbours for reviving the art by introducing gliding as a popular sport, because no doubt if it had been revived by Englishmen or Americans, it would not have been greeted with the enthusiasm which we see today.

It is interesting also to recall that Orville Wright, with Col. Alec Ogilvie, the giver of a prize in the present contests, set up a record of ten minutes' soaring flight eleven years ago, and this remained a world's record for ten years.

GRIFFITH BREWER

Personals

Married

HERBERT DENNY PATTERSON (late Hampshire Regt., and R.F.C.), fourth son of Mr. John Patterson, of Aldershot, was married on October 23, at Holy Trinity, Margate, to MARGARET CECILLE, second daughter of the late Mr. CECIL WATT SUTHERLAND and Mrs. Sutherland, of "Lalsden," Cornwall Gardens, Cliftonville, Margate.

The marriage between A. E. LIONEL SKINNER, M.C., late Capt., R.A.F., son of Mr. and Mrs. Skinner, of 15, Norfolk Crescent, W. 2, and ELSIE, daughter of Dr. and Mrs. STURRIDGE, of 127, Dartmouth Road, N.W. 2, took place at St. James's Church, Spanish Place, on October 25.

NICHOLAS WYNDHAM WADHAM, Flight-Lieut. R.A.F., eldest son of Mr. and Mrs. John Charles Wadham, of Shanklin, Isle of Wight, was married on October 21, at St. John's Church, Smith's Square, Westminster, to AGNES MOIRA, elder daughter of the late WILLIAM TILLIE and Mrs. Tillie, of Elstow, Londonderry.

To be Married

The marriage of EDWARD MORTON DRUMMOND, Black Watch, attached R.A.F., and DAPHNE TAYLOR will take place very quietly at the Chapel Royal, Savoy, on Friday, November 10, at half-past eleven o'clock, from her aunt's house, 39, Curzon Street.

The engagement is announced between ALLAN L. A. PERRY-KEENE, of the R.A.F., eldest son of Mr. L. H. A. Perry-Keene, of Rednal, Birmingham, and KATRINE LUCY, only daughter of Mr. C. A. SILBERRAD, I.C.S. (retired), and Mrs. Silberrad, of Park House, Combe Martin, N. Devon.

Items

The will of the late Mr. JOSEPH DONALD SAGAR, of Heath Villas, Halifax, Yorks, a director of J. Sagar and Co., Ltd., saw-mill engineers, Canal Works, who was killed in an aeroplane disaster in France, has been proved at £38,034.

EDWIN CLEARY, of the Savage Club, John Street, Adelphi, W.C., actor, inventor and journalist, who was at one time manager for Paulhan, the French airman, and who died suddenly at Euston Station on August 3, aged 64, left no will, his property being valued at £100.

The will of the late PERCY JAMES EVANS, of Dale House, Russell Road, Moseley, and John Bright Street, Birmingham, motor agent, who was killed in an aeroplane accident at Saverne, Alsace, on July 16, has been proved at £41,219 gross.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN OCTOBER 22 AND OCTOBER 28, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	23	100	5	19	22	3 2	H.P.W.8B G-EBBG (2h. 34m.)	B. (5), G. (10), H.P.W.8B (3).
Paris–Croydon	24	92	5	22	21	3 7	Breguet F-CMAG (2h. 24m.)	B. (5), G. (10), H.P.W.8B (3).
Croydon–Brussels–Cologne	6	43	1	—	6	4 41	D.H. 34 G-EBBT (4h. 23m.)	D.H. 18 (1), D.H. 34 (3).
Cologne–Brussels–Croydon	7	48	4	—	7	4 13	D.H. 34 G-EBBR (3h. 45m.)	D.H. 34 (3).
Croydon–Rotterdam ...	6	3	6	6	6	2 55	Fokker H-NABQ (2h. 35m.)	F. (5).
Rotterdam–Croydon ...	6	5	6	6	6	2 18	Fokker H-NABS (2h. 2m.)	F. (5).
Manchester–Croydon–Amsterdam	6	45	3	2	6	6 20	D.H. 34 G-EBBQ (5h. 42m.)	D.H. 34 (3).
Amsterdam–Croydon–Manchester	6	30	6	—	6	5 15	D.H. 34 G-EBBQ (4h. 43m.)	D.H. 34 (3).
Total for week ...	84	366	36	55	80			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ Including certain diverted journeys.

Av. = Avro. B = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad.
Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijke Luchtvaart Maatschappij; Messageries Aériennes.

AIRISMS FROM THE FOUR WINDS

How some people are misunderstood in their public utterances; or is it that present-day tabloid reporting at times summarises twenty lines into three or so, with the quite conceivable results of mutilation of a statement as originally uttered? In this respect Lord Robert Cecil appears to have been a very much maligned victim. Speaking the other day at a League of Nations demonstration, he said he was supposed to have advocated the possession by the League of a great fleet of aeroplanes, which should go and bomb the cities of any State supposed to be a wrong-doer until its cities were rendered uninhabitable. A more wild travesty, Lord Robert explained, of any observation he had made could not be imagined. He did say that in the next war, so far as he could see, there was nothing to prevent the bombing of cities so that they would be uninhabitable, but that, on the contrary, the advances of science had made such an operation not only practicable, but almost easy, that the greatest bomb dropped in London was a hundred times smaller than the bombs already invented, and that the threat to civilisation of an air attack in the future was something which anyone who realised it might well tremble at and fear lest it should be repeated. He did say that, but he never suggested that the League, of all institutions in the world, should take the lead in such a barbarous thing as that.

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THOSE who know Lord Robert could hardly have accepted as his words the mis-statement when originally made. But it is just as well to record the actual sense of his words.

IT is to be hoped the *expose* of Mr. Claude Grahame-White of the slackness of Post Office officials to the actualities of air-post services may bring about its due reward. It is little use the P.M.G. putting forth his strength in encouraging the air mail if the horde of minor officials are too bored to absorb particulars of the regulations. Nailing down the actual post offices at fault, as Mr. Grahame-White does, is a welcome departure which can only lead to future alertness.

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SIR JOHN NORTON-GRIFFITHS, Unionist M.P. for Central Wandsworth, has always been a keen believer in aviation. Therefore, his characteristic cablegram from South America, "Keep the home fires burning. Propose to fly home overland from Lisbon and save two days," immediately upon his hearing of the general election, was just what might have been expected from him. Here's to his success, with the meanwhile active campaigning on his behalf of Lady Norton-Griffiths.

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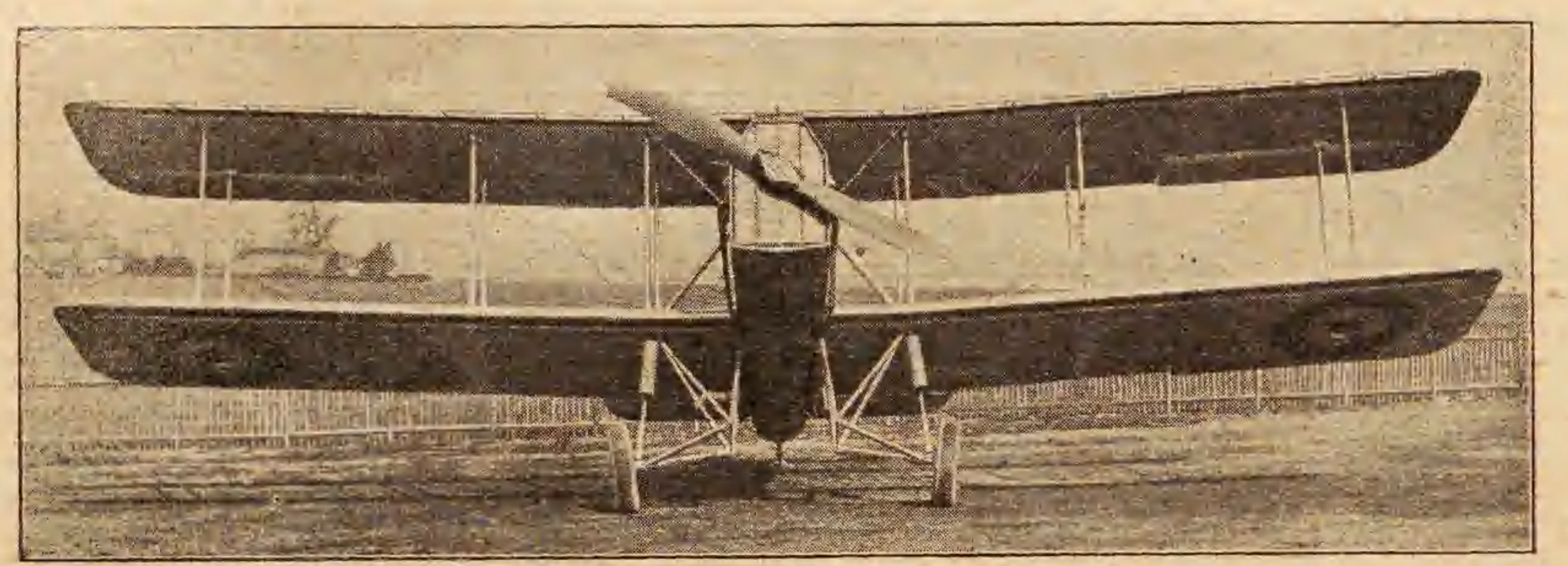
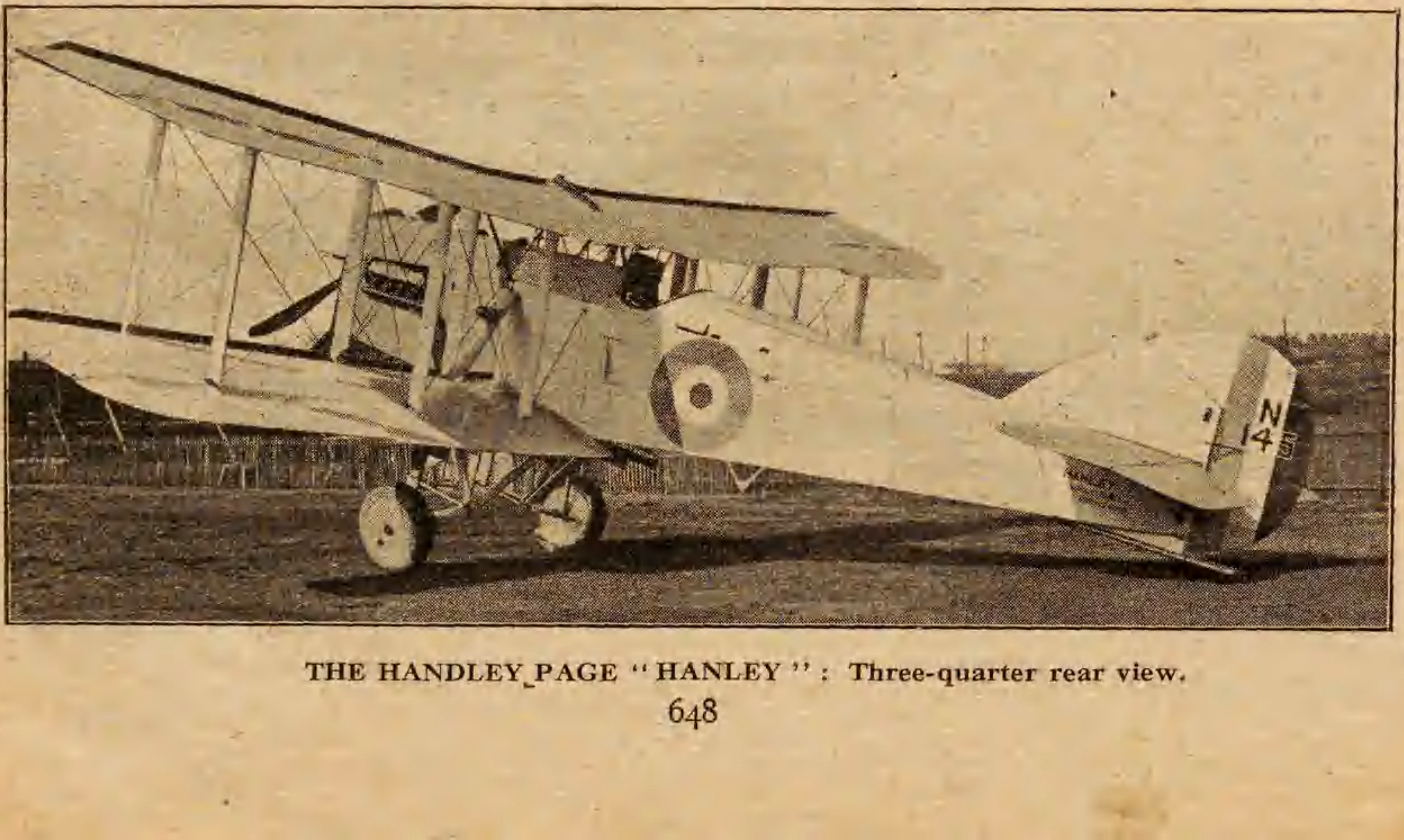
WITH the re-opening of the London–Brussels–Cologne air-mail announced by the G.P.O., we would once again ask, When, oh, when are those air-mail stamps going to arrive? It is just a little fillip of this nature that often inspires participation in supporting directly the early private enterprise which has been the means of building up the great British Empire. Aerial stamps are a silent but very practical form of advocacy.



THE HANDLEY PAGE "HANLEY" TORPEDO 'PLANE : The front view gives a very good idea of the divided undercarriage which gives accommodation for the torpedo. The machine is fitted with slotted planes, and has slotted ailerons, which are found to be effective right up to the stalling angle.



THE HANDLEY PAGE "HANLEY" : Three-quarter rear view.

THE CASE FOR METAL CONSTRUCTION

By **JOHN D. NORTH, F.R.Ae.S.**

(*Continued from last week.*)

AN attack on this problem of local instability by rigid analytical methods is outside the scope of mathematical processes today, at least so far as the complex forms demanded for engineering reasons and indicated by experimental results are concerned. At the same time the elastic properties of those materials (*e.g.*, cold worked steels and hardened and tempered alloy steels) which are most suitable, are far removed from the simple proportionality necessarily assumed in elasticity problems. In spite of this we can obtain valuable guidance by reference to two simple cases for which mathematical solutions have been obtained. I do not mean that because the cases are relatively simple compared with those of the actual structural members which we are discussing that the problems are simple ones. Anyone can disabuse his mind of this idea by looking up the references.

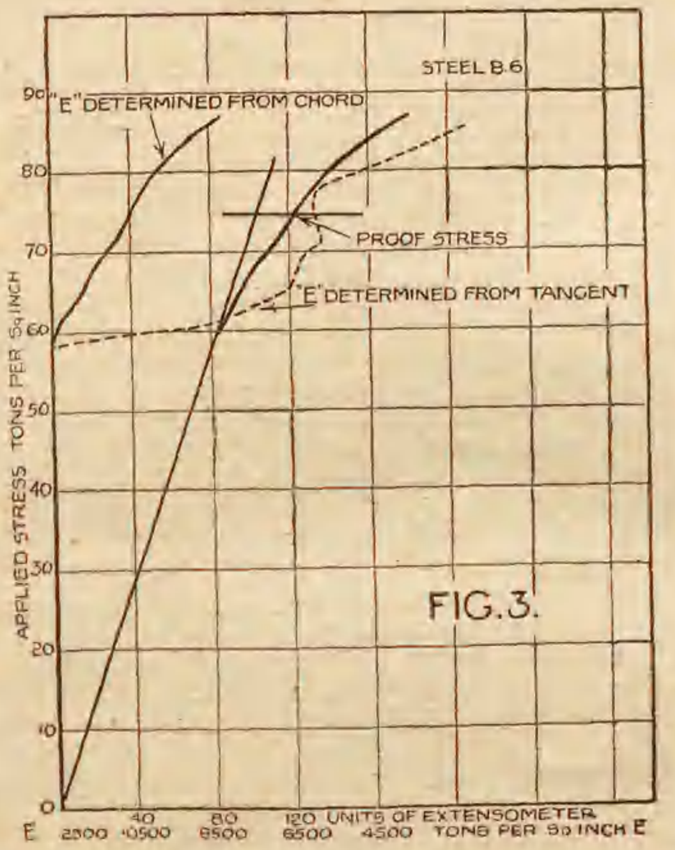


FIG.3.

Case (*a*).—A flat rectangular plate loaded uniformly in its plane and supported at its edges.

Case (*b*).—A uniformly loaded circular tube.

(*a*) A method of obtaining this result, first discovered by Prof. G. H. Brian, is given in "The Mathematical Theory of Elasticity," by Prof. A. E. H. Love, on p. 540 of the third edition. A flat rectangular plate of thickness $2h$, and of sides $2a$ and $2b$, is assumed supported freely at its edges against motion perpendicular to its plane, and subject to uniform compressive loads P_1 and P_2 per unit length of edge.

Assuming perfect elasticity, in a state of neutral equilibrium the plate can distort by displacements perpendicular to its plane into a series of double sine waves, provided the following relationship holds :—

$$P_1\,(m^2/a^2) + P_2\,(n^2/b^2) = 1/4\; D\pi^2\,(m^2/a^2 + n^2/b^2)^2$$

In the above m and n are integers expressing the number of half waves into which the lengths $2a$ and $2b$ are divided respectively, and are those which give the lowest values for P_1 and P_2. D is the "flexural rigidity" of the plate, and is equal to $2Eh^3/3\,(1-\sigma^2)$, where E is Young's modulus and σ is Poisson's ratio for the material.

Critical Stress in Outer Compression Fibres of Strut or Beam.

Material.	Identification composition.	Critical stress.	Specific gravity.	Critical stress. / Specific gravity.
Spruce	Spec. 2 VI ..	2·01	0·45	4·47
Hard rolled al. strip.	L. 4—A.L. 98%	8	2·6	3·08
Al. alloy strip .. Duralumin ..	*Spec.* 2 *L.* 3. Cu. 4·0% Mn. 0·5% Mg. 0·5%	13·5	2·85	4·74
H.T. Alum. alloy	L. 29	19	3·15	6
Mild steel ..	*Spec. S.* 3. C. 0·2% normalised.	18	7·8	2·31
Plain carbon ..	C. 0·1%, cold rolled	28	7·8	3·59
	blued	24	7·8	3·08
B. and P. test results.	*Spec. S.* 44. C. 0·4%, blued	35	7·8	4·49
Alloy steel strip	*Spec. S.* 43. C. 0·2% Mn. 0·4% Ni. 3·5% Cr. 1·0% Va. 0·1%	40	7·8	5·13
Hardened and tempered.	*Spec. S.* 40. C. 0·3% Mn. 0·4% Ni. 4·25% Cr. 1·0% Va. 0·1%	65	7·8	8·33

Note.—Except where otherwise stated the figures are for B.E.S.A. specification.

For our purpose we consider an infinite flat strip of thickness t, and of breadth B, freely supported along its edges and loaded parallel to its length only by a uniform compressive stress of intensity p.

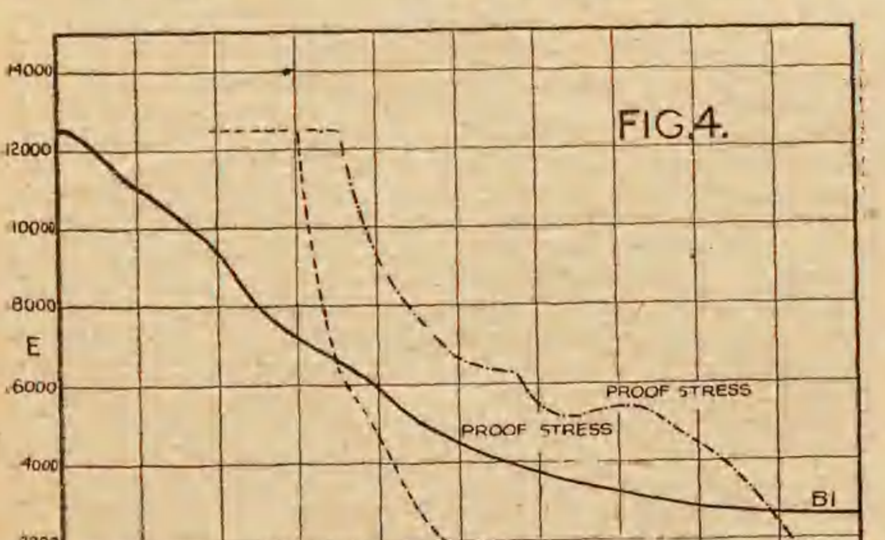


FIG.4.

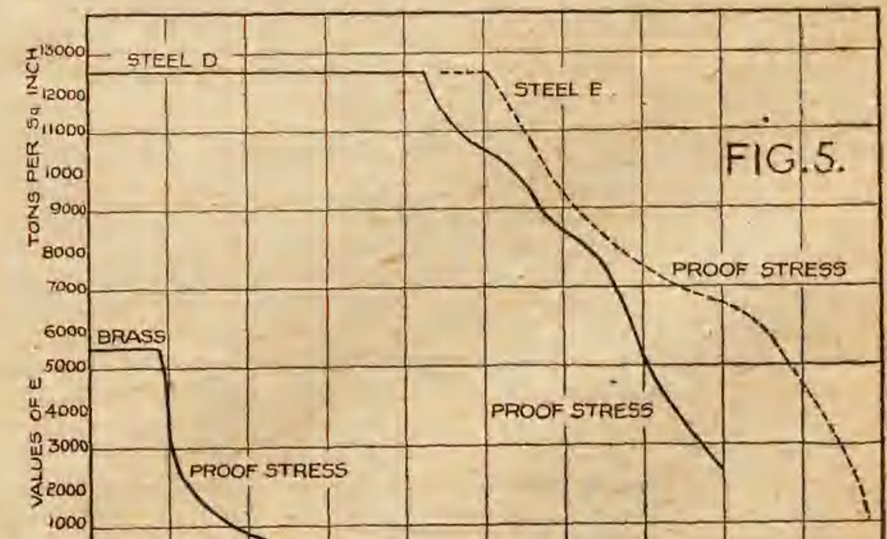


FIG.5.

Let the half wave-length in the longitudinal direction be l. Then in the above equation:—

$$\begin{aligned} 2a/m &= l \\ 2b &= \mathrm{B} \\ \mathrm{P}_1 &= pl \\ \mathrm{P}_2 &= \mathrm{O} \\ 2h &= \mathrm{Y} \\ \mathrm{D} &= \mathrm{EY}^3/12\,(1-\sigma^2) \end{aligned}$$

and $$pl \times 4/l^2 = \frac{\mathrm{E}t^3\pi^2}{48(1-6^2)} \times \left(\frac{4}{l^2} + \frac{4n^2}{\mathrm{B}^2}\right)^2$$

For a minimum $n = 1$ and $l = \mathrm{B}$ giving $p = \dfrac{\pi^2}{3(1-6^2)} \times \dfrac{\mathrm{E}t^2}{\mathrm{B}^2}$

The constant term in this expression is of limited practical value, but the result is important as indicating the manner in which the variables involved are to be taken into account.

(*b*) This case is examined fully by Mr. R. V. Southwell in his paper on "The General Theory of Elastic Stability" (*Phil. Trans. Roy. Soc.*, Ser. A., Vol. 213). It is sufficient for our purpose to note that the critical stress in a tube of radius R for all forms of failure is proportional to E t/R.

These results and a consideration of the general theory of thin shells indicate the factors governing the intensity of stress at which instability will occur.

Firstly this stress is proportional to the value of E. In those classes of steels where there is a well-defined yield point shortly after the limit of proportionality is reached the meaning of this is very simple. At the yield point E "collapses" and so does the shell. Provided thickness/radius of curvature is above a certain figure its value has practically no influence on the stress at which instability occurs. But with cold worked and hardened and tempered materials the case is different. The limit of proportionality may be very low, and the rate of change of curvature of the stress strain curve is very slow. An endeavour has been made to define some structurally important stress to meet this difficulty, and the result of these efforts is incorporated in the B.E.S.A. specifications S40 and S43 under the term "proof" stress, which is defined as follows.

The proof stress is the greatest load per square inch which, when applied to the test piece for 15 seconds and removed, produces a permanent extension of not more than 0·1 per cent. of the gauge length. The proof stress shall be determined upon a test piece having a gauge length of exactly 4 ins. When a stress of 40 tons per square inch is applied to the specimen, and maintained, the total temporary extension of the gauge length must not be greater than 0·017 in., and when a stress of 50 tons per square inch is applied to the specimen and maintained, the total extension of the gauge length while under load must not be less than 0·020 in.

It has been customary for some time to identify this stress with the maximum realisable in a thin walled structure, however small the curvature might be with respect to the thickness of the shell and the "free" length of the arc. From considerations already indicated this is not correct, and indeed "proof" stress can only have a significant bearing on the stress at which failure by crinkling will occur if the slope of the stress-strain curve of a given material is always constant at the proof stress. This opens up what is, I believe, a new method of examining the structural properties of a material, namely, by a consideration of its elastic properties over the whole of its stress range. The term "elastic" is used here in the same loose sense that "E" has been used for the slope of the stress-strain curve beyond the limits of proportionality and into the region of plastic deformation. So far as the immediate problem is concerned, although it is of some importance whether the extension is elastic or plastic, there are good grounds for believing that the limit of proportionality is not, in all classes of steel, necessarily the dividing line between these two states. The alternative to the loose use of these terms is either unnecessary verbosity or a "specially invented terminology," and I feel that laxity is the least of the three evils, and that there is little danger of being misunderstood.

I suggest that the physical properties of a material, *so far as the "critical" stress in a thin-walled member is concerned*, are best represented by the first differential of the stress strain curve with respect to stress. Fig. 3 shows such a curve, together with the stress-strain curve from which it is derived, for a nickel-chrome steel hardened and tempered at 300 C. There are obvious difficulties in preparing such a curve where the mechanical errors of graphical differential are superimposed on the inevitable inaccuracies of strain measurement, but the broad significance of such a method of presentation may be appreciated by a reference to Fig. 4, where the "elasticity-stress" curves are given on a more convenient scale for three nickel-chrome steel specimens (A) fully hardened, (B) hardened and tempered at 300 C., (C) hardened and tempered at 500 C. (B) is taken from Fig. 3.

Fig. 5 gives the same curves for the following material:—

Steel D—Cold-worked steel blued at 100° C.
Steel E—Cold-worked stainless iron (not blued).
Brass—Muntz metal (cold-drawn).

Proof Stress.

		Tons per Sq. In.			Tons per Sq. In.
Steel B.9	..	65·75	E.	...	1,300
,, B.6	..	76·5	E.	..	5,400
,, B.1	..	66·25	E.	..	4,300
,, E.	..	48·5	E.	..	3,600
,, D.	..	40·75	E.	..	2,900
Brass	..	14·75	E.	..	100

From this it will be seen that there is no simply defined critical stress, and that by varying the curvature to the thickness and the *free* arc length we can push further along the curve with lower values of E and higher "critical stress."

It is clear that there would be serious difficulties in verifying commercially these elastic properties of a metal, but this is an aspect of the case to which I will return later, when discussing inspection and testing.

As regards the influence of the form of the wall or shell on the critical stress, the significant features are the curvature of the arc, its *free* length and the thickness. Experimental results within my experience indicate that other things being equal (including the value of E), the critical stress is proportional to the thickness as foreshadowed by a general consideration of the theory of thin shells, but in dealing with the question of form, the difficulty lies in the *free* length of the arc. The problem is analogous to that of a redundant structure in which the members are not pin-jointed, and is hopelessly complicated by sectional deformations and the variations of E.

Apart from these difficulties we have those relating the fibre stresses to the external forces on the member. It is convenient to represent the fibre stresses, as deduced from experimental evidence of load and deflection, as—

$$\mathrm{P/A} + \mathrm{P}d/\mathrm{Z} \text{ for direct compression loads,}$$

and as $\mathrm{P/A} + \dfrac{\mathrm{P}d}{\mathrm{Z}} + \dfrac{\mathrm{BM}}{\mathrm{Z}}$ where there are external shear loads;

where P = end load
A = area
BM = bending moment
Z = section modulus
d = deflection

The usefulness of these expressions in ordinary engineering should not blind us to the limitations imposed by the assumptions on which they are based, all of which are violated in the structures we are considering. It is perhaps not too much to say that they have no *real* meaning, and that the "stress" calculated can only justifiably be used for estimating the loads which members of similar form will sustain within limits of the ratio of shear to end load permitted by the extent of the experimental evidence. To interpret this stress as representing the *actual conditions* governing the local failure of the shell is dangerous and misleading.

In determining the deflection, and in consequence the stress, in a laterally loaded strut in which the stress induced is beyond the limit of proportionality, the variation of "E" must be considered differently. In this case the actual stress for an assumed given strain instead of the increase of stress for a hypothetical small increase of strain, is required, and therefore E is determined by the slope of the chord from the zero of the stress strain diagram to the appropriate point of the curve instead of by that of the tangent at the appropriate point. In the calculation a trial and error method must be used with an assumed value of E, and a further uncertainty is introduced by the fact that all points of the member are not equally stressed. Experiment has verified the obvious conclusion that the effective E for calculating the deflection lies somewhere between the "chord" value for the maximum stress and the maximum value, but it is not possible at present to give any more definite information, since the experimental "mean" value of E deduced from measurements of deflection is influenced by distortions not taken account of by the simple beam theory. The "chord" value of E for the steel B.6 is plotted against stress in Fig. 3.

All this may seem rather hopeless, from the scientific point of view perhaps it is, but let us consider the whole process by which a structural member of an aeroplane is designed.

Firstly, the conditions of flight for which the aeroplane is to be designed. These are fixed by an Order in Council, and are interpreted by a series of good round numbers delivered after much labour by a committee. Over the manner of arriving at these numbers a decent veil is cast which it would be unwise to disturb. But the Committee seems to know its job in so far as the aircraft are not abnormally heavy, nor do they collapse in the air. These numbers are converted to external forces in a particular manner founded on precedent, supported by very doubtful aerodynamic data and also fortified by the same Order in Council. The loads in the members are then estimated by ignoring those members to take account of whose presence would seriously complicate the calculations and by making what are often the wildest assumptions as to the nature of the joints between the members. This brings us to that very data which we were regretting our inability to interpret in an accurate scientific manner. But the whole process works after a fashion because aeroplanes are not designed by science, but by art in spite of some pretence and humbug to the contrary. I do not mean to suggest for one moment that engineering can do without science—on the contrary, it stands on scientific foundations—but there is a big gap between scientific research and the engineering product which has to be bridged by the art of the engineer.

Nevertheless, the technique of the design of thin metal members is progressing rapidly. To arrive analytically by measuring the frictional coefficient of the cloth, the resilience of the balls and cushions, at the precise way to play a complicated stroke at billiards is practically hopeless, but practice and a knowledge of principles deduced from scientific analysis of simple cases will produce surprising results. So it is that, over a wide range, light metal members can be designed with every confidence that they will fulfil their designer's expectations and realise the advantages in weight economy foreshadowed by the properties of the materials.

Inspection and Manufacture

It would be perhaps too much to say of light metal construction that the material is half the battle, but there would be a strong element of truth in such an assertion. I am not suggesting that there is one particular class of steel or light alloy which will be found to be ideal for all purposes. On the contrary, I believe that the types of material used in a single metal aeroplane will increase as time goes on. What we require are materials that can be produced with the necessary degree of uniformity both as regards their elastic properties in the sense these have already been discussed, and as regards their plasticity, both absolute as ductility, and in relation to the *true* elastic properties. This last is required to be reasonably uniform in the state in which the strip is to be worked (sections formed from strip and riveted together are the most characteristic forms of light metal construction). The strip in forming through rolls or dies springs back from the profile of the tool by an amount dependent on its resilience. Reasonable limits are thus required if tools are to produce a satisfactorily uniform article. Control at present is limited to an upper and lower " proof " stress and a bend test. These tests, comparatively simple as they appear, seem somewhat to strain the capacities of commercial testing and inspection without giving as much information as is required.

What is wanted is a stress/strain diagram from which the properties of the materials can be deduced, and it is unfortunate that there is no machine capable of producing them commercially and reliably. For that matter there is not even a standard extensometer which is commercially practical. It is possible that this class of testing apparatus may be improved in the near future. There is also the alternative that research may show a connection between these elastic properties and some more easily measured feature of the material. It is a matter well worth the attention of metallurgists, testing engineers and physicists generally.

A further mechanical uniformity in strip is required in thickness, flatness and straightness. The tolerances laid down in the B.E.S.A. specifications seem satisfactory, and more than a slight departure from them often leads to manufacturing troubles.

The problem of manufacture from the strip onwards has two phases which are novel and of special importance. Firstly, forming the strip. Secondly, riveting it.

There is a simple formula for designing tools for forming strip. It is " live and learn." Direct attack on the resilience problem is probably hopeless, but one soon arrives at a few general principles of design, though when marked departure from experience comes along it often brings rude shocks in its train. There are broadly three methods of forming strip—rolling, drawing and pressing—and all have their uses and limitations; but whatever method is used (all are really required), it is necessary in order to get the best results, to have machines of special design, and my own experience is that it is most satisfactory to design and make them on the spot.

The commonest process in aircraft work is to form the strip in its final state of treatment, but although this has great advantages in assisting production by eliminating heat treatment processes, I believe that a certain amount of soft forming with subsequent heat treatment or even hot forming will be in regular use, by reason of the wider scope of materials and forms opened up. With satisfactory tools and uniform material the production of formed sections makes little demand on skilled labour and can easily be brought to a large production standard.

Riveting is a problem less easily tackled, it is so indefinite. The number of rivets in a steel aeroplane runs into many tens of thousands. The cost of riveting and all it implies is probably the critical factor in the cost of production, and the profit and loss scale will be turned by the drawing office and the planning department. This phase of technique is being slowly and painfully developed, and it is here to a large extent that the high cost of development appears. Metal construction is not inherently expensive. All our experience of the manufacture of details where the technique is in an advanced state confirms this. Money is spent on mistakes and errors of judgment, trial and error, the foundation stones of experience.

(*To be concluded.*)

THE ROYAL AIR FORCE

London Gazette, October 20, 1922

General Duties Branch

J. M. Darroch is granted short-service commn. as Pilot Offr. on probation, with effect from, and with seny. of, Sept. 2.

Memorandum

The permission granted to Sec. Lieut. E. S. Smyth to retain his rank is withdrawn on his joining the Army.

London Gazette, October 24, 1922

General Duties Branch

Flt. Cdt. C. Guppy, having successfully passed through the R.A.F. (Cdt.) Coll., is granted a permanent commn. as Pilot Offr., with effect from, and seny. of, Oct. 6. Flying Offr. G. H. Martingell, A.F.C., is granted a permanent commn., retaining his present substantive rank and seny.; Oct. 24, 1919 (*Gazette*, Oct. 24, 1919, appointing him to a short service commn. is cancelled). The seny. of Pilot Offr. E. A. Hodgson is antedated to Aug. 16, 1921. The follg. are granted short service commns. as Flying Offrs., with effect from, and seny. of, the dates indicated:—M. R. Banks; Oct. 16. A. E. Evans, D.F.C.; Oct. 12. C. Sutton; Oct. 16.

The follg. officers are granted temp. commns. in ranks stated, on seconding for four years' duty with R.A.F.; Oct. 16:—

Flying Offrs. (Hon. Flight Lieuts.).—Capt. E. L. O. Baddeley, Middlesex R. Capt. L. F. Marson, M.C., 4th Dragoon Gds.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

Squadron-Leaders: A. H. S. Steele-Perkins, O.B.E., from Record Office (Inland Area) to Aircraft Depot, Egypt (Middle East Area). 13.10.22. O. T. Boyd, O.B.E., M.C., A.F.C., from Air Ministry (Director of Operations and Intelligence) to command No. 24 Squadron (Inland Area). 23.10.22. E. P. Punch, from Aeroplane Experimental Establishment (Coastal Area) to No. 7 Group Headquarters (Inland Area). 26.10.22.

Flight Lieutenants: N. P. Dixon, A.F.C., from R.A.F. Cadet College (Flying Wing) (Cranwell) to Boys' Wing (Cranwell). 9.10.22. V. A. Albrecht, O.B.E., M.C., from Army (Manchester Regiment) to No. 4 Flying Training School (Middle East); on appointment to Temporary Commission in the Royal Air Force on being seconded from the Army. 25.9.22. R. G. J. McCullagh, to Research Laboratory and Medical Officers' School of Instruction; on appointment to Short Service Commission. 4.10.22. J. J. Boyle, to Headquarters, R.A.F., Iraq, on appointment to Temporary Commission in the Royal Air Force on attachment for 4 years from the Army Dental Corps. 1.10.22. O. R. Gayford from No. 1 Flying Training School (Inland Area) to Headquarters, Constantinople. For duty as Adjutant. 28.9.22. E. A. Fawcus, from No. 1 School of Technical Training (Boys) (Halton) to School of Photography. (Supernumerary.) 25.9.22. G. Bowen, from Iraq Group Headquarters (Middle East Area) to Aircraft Park (Middle East Area). 11.1.22. F. E. Johnson, to Research Laboratory and Medical Officers' School of Instruction (Coastal Area); *on appointment* to Short Service Commission. 30.9.22. F. W. Trott, O.B.E., M.C., from No. 24 Squadron (Inland Area) to Headquarters, Constantinople Wing. 28.9.22. E. V. Longinotto, A.F.C., from Air Ministry (Director of Personnel) from R.A.F. Depot (Inland Area). (Supernumerary.) 9.10.22. A. W. Turner, from R.A.F. Depot (Inland Area), from Headquarters, Constantinople Wing. 28.9.22. H. G. Crowe, M.C., from No. 39 Squadron (Inland Area) to School of Photography (Inland Area) (Supernumerary). 19.10.22. E. W. Longden, from Armament and Gunnery School (Inland Area) to R.A.F. Depot (Inland Area). 19.10.22. C. Y. Roberts, from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to Aeroplane Experimental Establishment (Coastal Area). 23.10.22. C. P. O. Bartlett, D.S.C., from No. 30 Squadron (Iraq) to R.A.F. Depot (Inland Area) (Supernumerary). 20.8.22. J. S. Goggin, from R.A.F. Base, Gosport (Coastal Area), to Palestine Wing Headquarters (Middle East Area). 23.10.22. B. F. Beatson, D.T.M., from Indian Medical Service to Research Laboratory and Medical Officers' School of Instruction (Coastal Area); on appointment to Temporary Commission in the Royal Air Force on being seconded for two years from the Indian Medical Service. 13.10.22. J. Duminy: the notification which appeared in Royal Air Force Intelligence No. 82, dated 19.10.22, wherein this officer was posted from R.A.F. Depot to Headquarters, Coastal Area, with effect from 16.10.22, is hereby cancelled.

INSTITUTION OF AERONAUTICAL ENGINEERS

The first lecture of the session was given on October 13 at the Engineers' Club, Coventry Street, when Mr. C. W. Tinson, A.F.R.Ae.S., M.I.Ae.E., read the first section of a paper on "Constructional Design of Aeroplanes." The second section of this paper was read on October 27, and the third and last section will be read on Friday, December 1, at 6.30 p.m., at the Engineers' Club.

The first section of Mr. Tinson's paper dealt with fuselage design, parallel bracing wires, unbraced bays, etc. The lecturer then continued to give hints on finding the centre of gravity of the fuselage, on using the "Ellipse of Inertia" for obtaining a comparison of manœuvrability. The last part of this section dealt with the design of controls.

In his second section Mr. Tinson continued the subject of controls, referring to the question of gearing and balancing of control surfaces. The lecturer also made a short reference to the "differential" type of aileron control. Finally Mr. Tinson returned to the subject of fuselage design, dividing a fuselage into three main portions, and dealing with the design of each portion in some detail, concluding with a few remarks on the design of tail adjustment gear.

As already mentioned, the third and last section of Mr. Tinson's paper will be read on December 1, at 6.30, at the Engineers' Club, Coventry Street.

Fixtures for 1922-23.

November 17, 6.30 p.m.—Paper, "Oleo Undercarriage Design," read by Mr. G. H. Dowty, Member. Engineers' Club, Coventry Street, W. 1.

December 1, 6.30 p.m.—Third and last section of paper by Mr. C. W. Tinson. Engineers' Club, Coventry Street, W. 1.

December 15, 6.30 p.m.—Paper, "Experimental Data without Wind Channel," read by Mr. O. T. Gnosspelius, A.C.G.I., A.F.R.Ae.S., Member. Engineers' Club, Coventry Street, W. 1.

1923. January 12, 6.30 p.m.—Paper, "The Seaplane for Commercial Duties," read by Major D. C. M. Hume, A.M.I.E.E., A.F.R.Ae.S., Member. Engineers' Club, Coventry Street, W. 1.

January 26, 6.30 p.m.—Paper, "Wind Tunnel Work at the N.P.L.," read by Mr. W. L. Cowley, A.R.C.S., D.I.C., Wh. Sc., Member. Engineers' Club, Coventry Street, W. 1.

February 9, 6.30 p.m.—Paper, "Seaplane Design," read by Mr. W. O. Manning, A.F.R.Ae.S., Member. Engineers' Club, Coventry Street, W. 1.

February 23, 6.30 p.m.—Paper, "Aerofoils," read by Dr. A. P. Thurston, Member. Engineers' Club, Coventry Street, W. 1.

March (date to be announced).—General Meeting, followed by a paper on "Aerial Photography," by Lt.-Col. J. T. C. Moore-Brabazon, M.C.M.P. (President). Engineers' Club, Coventry Street, W. 1.

March 28, 2.30 p.m.—Visit to the Aerodynamics Department of the National Physical Laboratory, Teddington.

April 12, 6.30 p.m.—Paper, "Some Controversial Points in Aircraft Detail Design," read by Mr. F. T. Hill, Wh. Ex., A.F.R.Ae.S., Member. Engineers' Club, Coventry Street, W. 1.

April 25, 3 p.m.—Visit to the Works of the Standard Insulator Co., Ltd., Kilburn, by courtesy of Mr. F. R. Simms, M.I.Mech.E., M.I.A.E., Member.

May 11, 6.30 p.m.—Paper, "Experimental Flying with over 200 Different Types of Planes," read by Major M. E. A. Wright, A.F.C., R.A.F. Engineers' Club, Coventry Street, W. 1.

May 26, 3 p.m.—Visit to the Instone Air Line, Croydon.

L. HOWARD FLANDERS,
Secretary

* * *

SIDE-WIND

ROLLS-ROYCE, LTD. (consequent on a certain public announcement which has come to their notice), desire to make it known that they are not selling, and never have sold, any of their "Hawk" aero engines for the purpose of motor-cars, and that any purchase or use of those engines would not be consequent on their advice or recommendation, but would be solely on the responsibility of the parties so using them.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

(London Aero-Models Association)

MEMBERS are specially requested to attend at Parliament Hill on Sunday morning next with both a model glider and model aeroplane, for the purpose of giving a demonstration. Meetings are held at Headquarters (20, Great Windmill Street, Piccadilly Circus, W. 1), every Friday evening, at 7.30 p.m. Full particulars of the Society can be obtained from the Hon. Secretary, A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

* * *

IMPORTS AND EXPORTS, 1921-1922

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
Mar. ...	14	1,471	118,199	166,607	1,565	100
April...	1,370	3,846	138,983	139,995	450	5,880
May ...	3,350	2,416	59,624	167,999	1,818	4,254
June...	5,181	816	79,713	129,137	—	14,530
July ...	540	1,039	530,628	24,405	860	—
August	343	198	111,595	88,910	—	685
Sept. ...	620	3,043	145,755	71,508	—	44
	18,256	18,548	1,331,454	934,242	6,997	26,616

* * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations**:** cyl. = cylinder; I.C. = internal combustion; m. = motor.

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published October 26, 1922

14,434. N. SCHREIBER. Aeroplane suitable as toy or for sport. (186,374.)
17,729. A. MORRIS. Clinometers, etc. (186,427.)
18,031. D. A. PAVELY. Compressed air power plant for model aeroplanes, etc. (186,438.)
19,095. C. BROADWICK. Parachutes. (186,460.)
19,357. VICKERS, LTD., and SIR J. MCKECHNIE. Reciprocating engines. (186,464.)

Published November 2, 1922

17,893. A. OVERBEEK. Helicopters with two propellers rotatable in opposite directions. (186,688.)

APPLIED FOR IN 1922

Published October 26, 1922

17,943. F. W. BALDWIN. Propeller driving-gear. (186,566.)
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(*Continued from* p. xiv.)

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Fraser's Flying School, Kingsbury, N.W. 9.

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British Aluminium Co., Ltd., The 109, Queen Victoria St., London.
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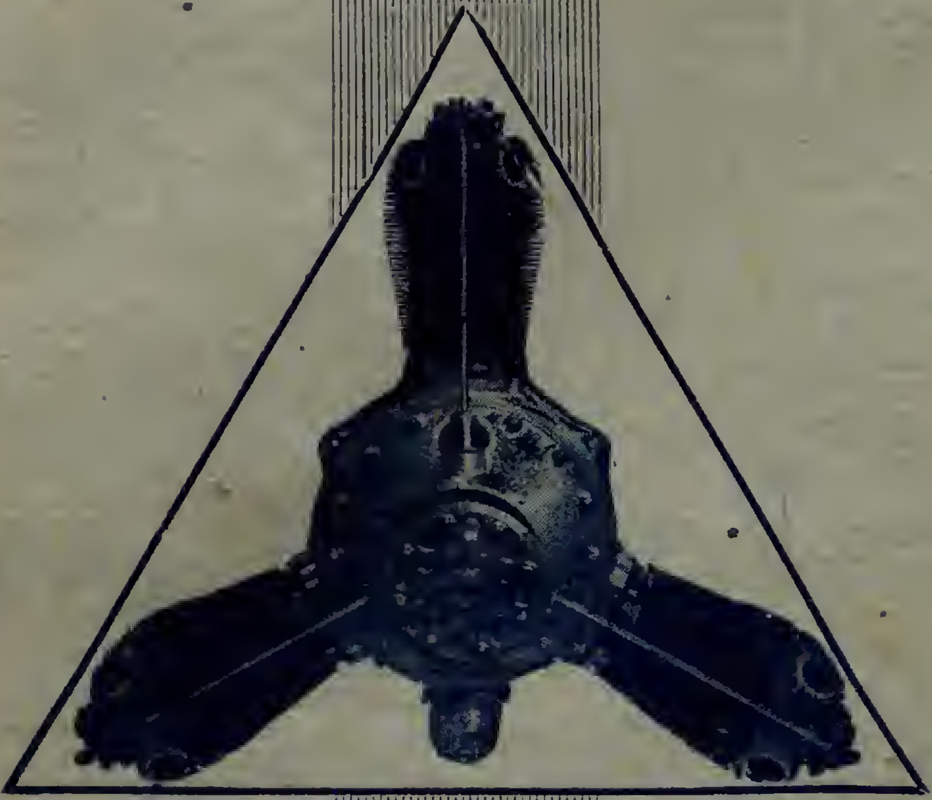

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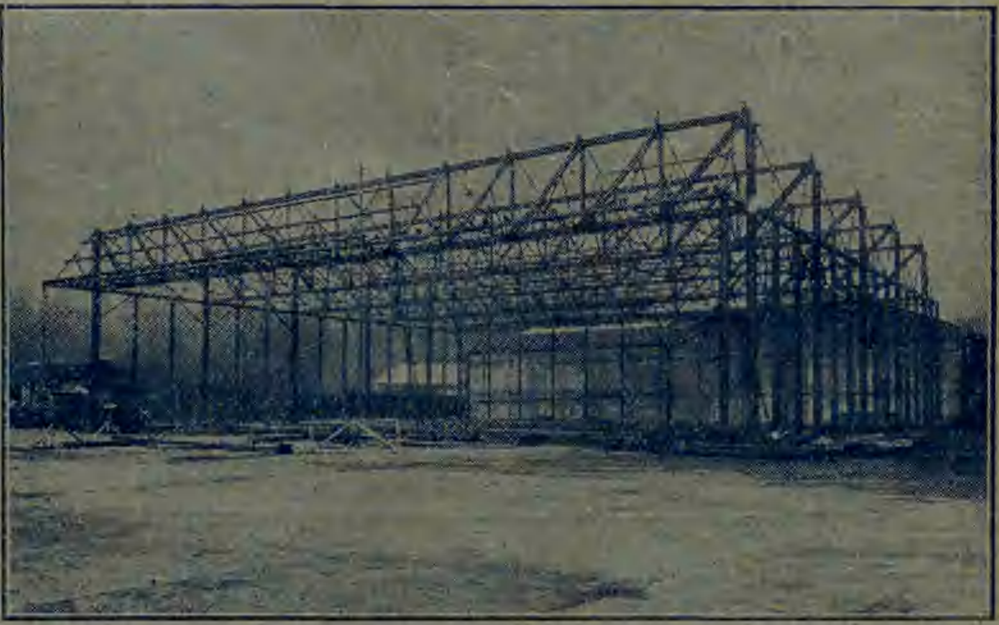

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.
Nov. 16 .... Lecture, "The Co-relation of Model and Full-scale Work," by R. McKinnon Wood, before R.Ae.S.
Nov. 17 .... Lecture, "Oleo Undercarriage Design," by G. H. Dowty, before I. of Ae.E.
Nov. 30 .... Closing date for FLIGHT Glider Designing Competition
Dec. 1 .... Lecture, "Constructional Design of Aeroplanes," by C. W. Tinson, before I.Ae.E.
Dec. 15–Jan. 2 Paris Aero Exhibition

1923.
June .... International Air Congress, London
Dec. 1 .... Entries close for French Aero Engine Competition

1924.
Mar. 1 .... French Aero Engine Competition
Mar. 15 .... Entries close for Dutch Height Indicator Competition

EDITORIAL COMMENT.

The R.A.F. in Iraq

As far as can be gathered, the report on the bombing operations by the Royal Air Force on the northern frontier of Iraq is highly satisfactory. Sir John Salmond's policy of restoring the original frontiers in the Mosul and Kirkuk districts by intense bombardment appears to have resulted in the retirement of the Turks, as the villagers refused to assist in maintaining the frontiers, and altogether it is now considered that aircraft have proved themselves capable of suppressing raiding parties in countries of this nature. Thus it would appear that already the taking over by the R.A.F. of the policing of Iraq is promising extremely well, and it is, perhaps, permissible to hope that the policy may be extended to other areas. It has probably never been seriously disputed that, if the R.A.F. can do this work at all, it can do it more efficiently and cheaply than can any other service. It is too early, perhaps, to claim that the Royal Air Force has definitely proved all that it can do, but at any rate a very good start has been made, and, personally, we have not the slightest doubt that as time goes on the R.A.F. will justify those who decided to place the maintenance of peace and order in their charge. But, as we have previously pointed out, the authorities at home must do their share, and see to it that the R.A.F. in Iraq is supplied with the best and most up-to-date material available. Otherwise we may see a repetition of the Indian scandal, caused by cheese-paring methods begotten of a mistaken idea of "economy."

* * *

Aviation in Russia

The definite report that Russia is building a huge fleet of 5,000 aeroplanes, ostensibly Russian, but in reality designed, built and operated by Germans, must cause misgivings among all thinking people. Accepting the report at its face value, the possession by any nation of such a fleet may easily constitute a serious menace, and when, as in this instance, the nation concerned is one which is at present not in association at the councils of other nations, the menace becomes even greater. Even allowing for a good margin of exaggeration, and cutting down the 5,000 aeroplanes to 500, the situation is one which must assuredly bear watching carefully. Germany's handicap within her borders makes it hardly to be wondered at that she has, as was always predicted by us, evolved other means of development. The real menace lies in the fact that there does not appear to be any way of preventing this sort of thing.

It is, of course, quite possible that Germany has engineered this scheme simply to be used as a lever against the Allies, in the hope of being able, by promising to build no more machines in Russia, to secure her release from the irksome restrictions now imposed. When the scheme, now in the making, was negotiated there was no knowing when the restrictions would be removed, and we should not be surprised if some such motive was behind the Russian affair.

Now the restrictions are likely to be modified, but apparently Germany is still to be allowed to go on with her schemes abroad. Perhaps "allowed" is scarcely the correct word, as there does not appear to be any way of preventing it, but one remedy at any rate remains, that of being prepared ourselves. The hundreds of aircraft which were to be ordered, according to Lloyd George's glowing promises, do not seem to have materialised; at any rate, we have not noticed that any of our aircraft constructors or engine firms are being swamped with orders. The new types that are being developed do not go into production in any quantities worth mentioning, and no firm yet was able to exist on a few experimental machines per year. The subject is one which the new Air Minister would do well to study very carefully, and which we recommend for his immediate attention. The British aircraft industry has existed mainly on promises much longer than it could reasonably be expected to do. It cannot continue for ever on promises. In fact, there *are* signs of a debacle which it would be well to neutralise before too late.

◆ ◆ ◆

"L'Escadrille Roland Garros"

The formation, in France, of a propaganda squadron, comprising some of the most famous aviators in the world, sets an example which might well be followed at home. The new squadron, *L'Escadrille Roland Garros*, is being officially recognised by the French Under-Secretary of State for Air, M. Laurent Eynac, and, furthermore, it is to receive a Government subsidy. The extent and manner of allocating this subsidy is not yet known, but we gather that it is the intention of M. Eynac to use the squadron for propaganda purposes, by sending it to various centres to give demonstrations, by letting it take part in all important aviation events, and by making extensive public use of it generally.

There is little doubt that such a squadron will do an immense amount towards keeping alive public interest in flying, and if a similar squadron were formed in this country, recruiting for the R.A.F. Territorial Force would doubtless benefit greatly thereby. Furthermore, such a squadron could be used for "showing the flag" abroad. At the forthcoming aircraft exhibition in Sweden it is, we believe, intended to invite aviators of foreign air services to participate, and the sending of a squadron of picked aviators could not fail to do much to maintain British prestige abroad. The cost should not necessarily be prohibitive, and even regarded from a purely commercial point of view should be well worth while.

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Is the "Moto-Aviette" Coming?

The recent success of the gliding competition at Itford may be assumed to have established on a sound footing gliding as a sport and as a possible method of full-scale research at insignificant cost. The week spent on the South Downs taught most of us a great deal, and, not least of all, how much there still is that we do not know. At the same time, it must be clear that gliding, as a means of locomotion, can have no very great future before it. To our way of thinking, gliding may be compared with sailing and yachting. A man may—and a very great number do—get an immense amount of pleasure out of sailing his boat or yacht week ends and holidays. But he does not use his boat for getting about in the ordinary course of business, where a reasonable time-table has to be kept. So with gliding. As a sport, it will, we are sure, become extremely popular, providing as it does an exhilarating pastime at trifling cost. While this is all to the good, we should not lose sight of the fact that experience with gliders may pave the way for the low-power aeroplane of the near future.

It is perfectly well known that a small single-seater can be built which will fly horizontally with a power expenditure of about 5 h.p. Another 5 h.p. in reserve should provide sufficient margin for getting-off and climbing, and thus we arrive at a rough estimate of a small single-seater using but 10 or 12 h.p., and doing about 50 miles per gallon of petrol. Such a machine should be produced for £150 to £200, or little more than a motor-cycle and side-car outfit. The mileage would be about the same, and the machine should have a maximum speed of at least 45 m.p.h., with a landing speed of certainly below 30 m.p.h. Such a machine could be landed almost anywhere, and should appeal to hundreds. Personally we confess we are inclined to think that the tandem arrangement, as exemplified in the Peyret glider, lends itself more readily to making a "fool-proof" machine than does the ordinary form of aeroplane. Most small aeroplanes are somewhat tricky to handle, whereas it would appear that the tandem monoplane can be made very stable, and yet be manœuvrable to a high degree. The view obtained is unsurpassed; especially is this so in connection with small light engines, which in the normal type necessitate shifting the pilot forward, over, under, or between the wings, unless, of course, the machine is a "pusher."

As regards efficiency, we know that the tandem monoplane arrangement is not very efficient, but experiments carried out several years ago by Eiffel indicated that there is little to choose between the ordinary non-staggered biplane and the tandem monoplane. If, therefore, the tandem arrangement does, as we expect, prove the more "fool-proof," the price paid in the way of rather low efficiency should not be too high to be worth while.

For the power plant we are in favour of a two-cylinder two-stroke air-cooled engine, placed with its crankshaft vertical, and driving the tractor airscrew through bevel reduction gearing. The cylinder heads would point forward and, being in line with the most effective portion of the propeller blades, would receive a maximum of cooling.

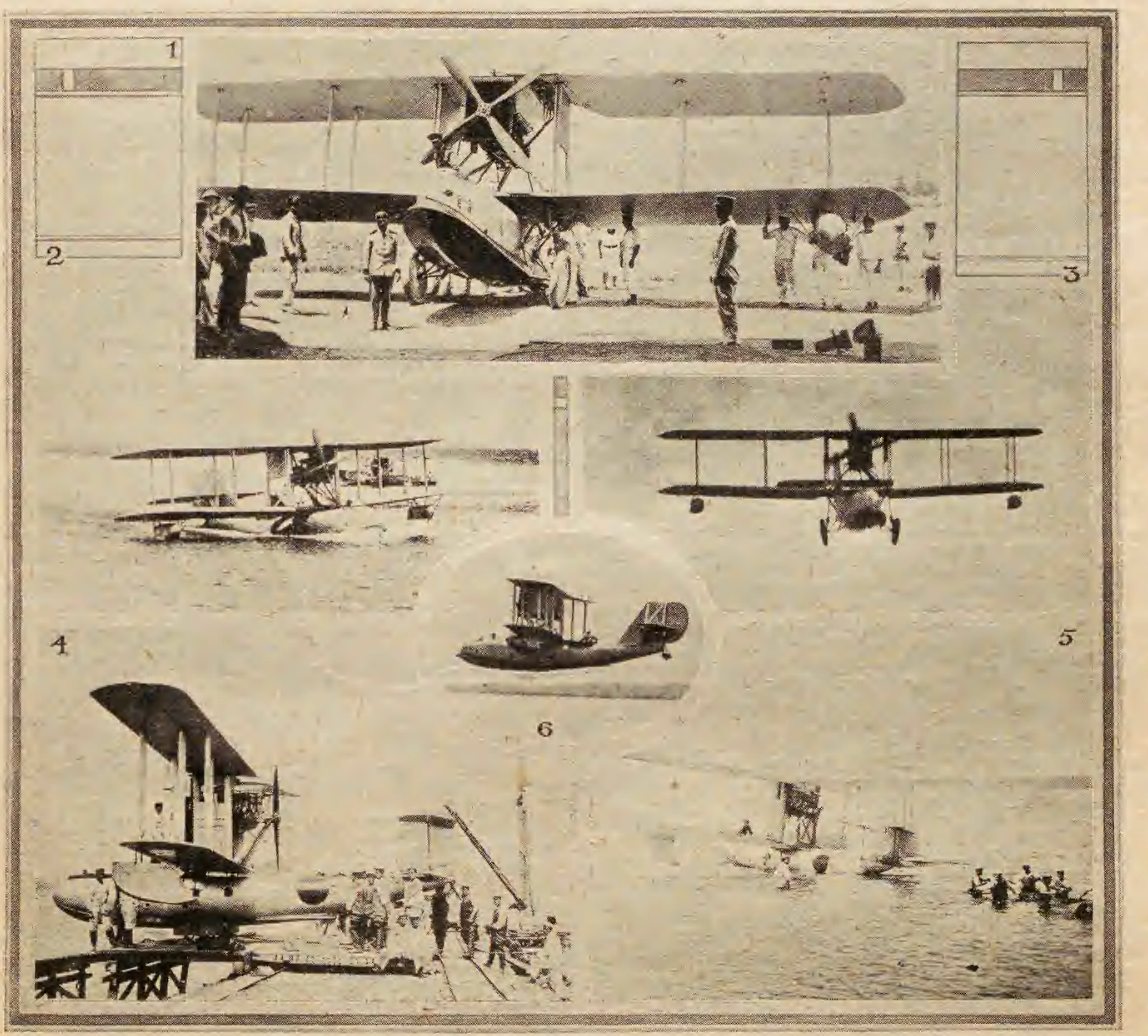
SUPERMARINES ABROAD

FROM the time the Supermarine Aviation Works of Southampton first commenced operations (in 1912, we believe) their history has been one of steady progress. That this has been less rapid than many could have wished is in no way the fault of the firm, but is due to the very scant encouragement which this country has always given to marine type of aircraft. Nevertheless, the firm has stuck to its guns, and today it ranks among the foremost seaplane works of the world. One cannot help admiring the determination with which Mr. Scott-Paine and Commander Bird have carried on in the face of the greatest difficulties, and lately the firm has begun to reap, if but in somewhat small measure, the reward of its foresight. If those at home have failed to recognise the possibilities of seaplanes, many foreign Governments have shown more imagination, with the result that orders have been received from, and executed for, a number of countries.

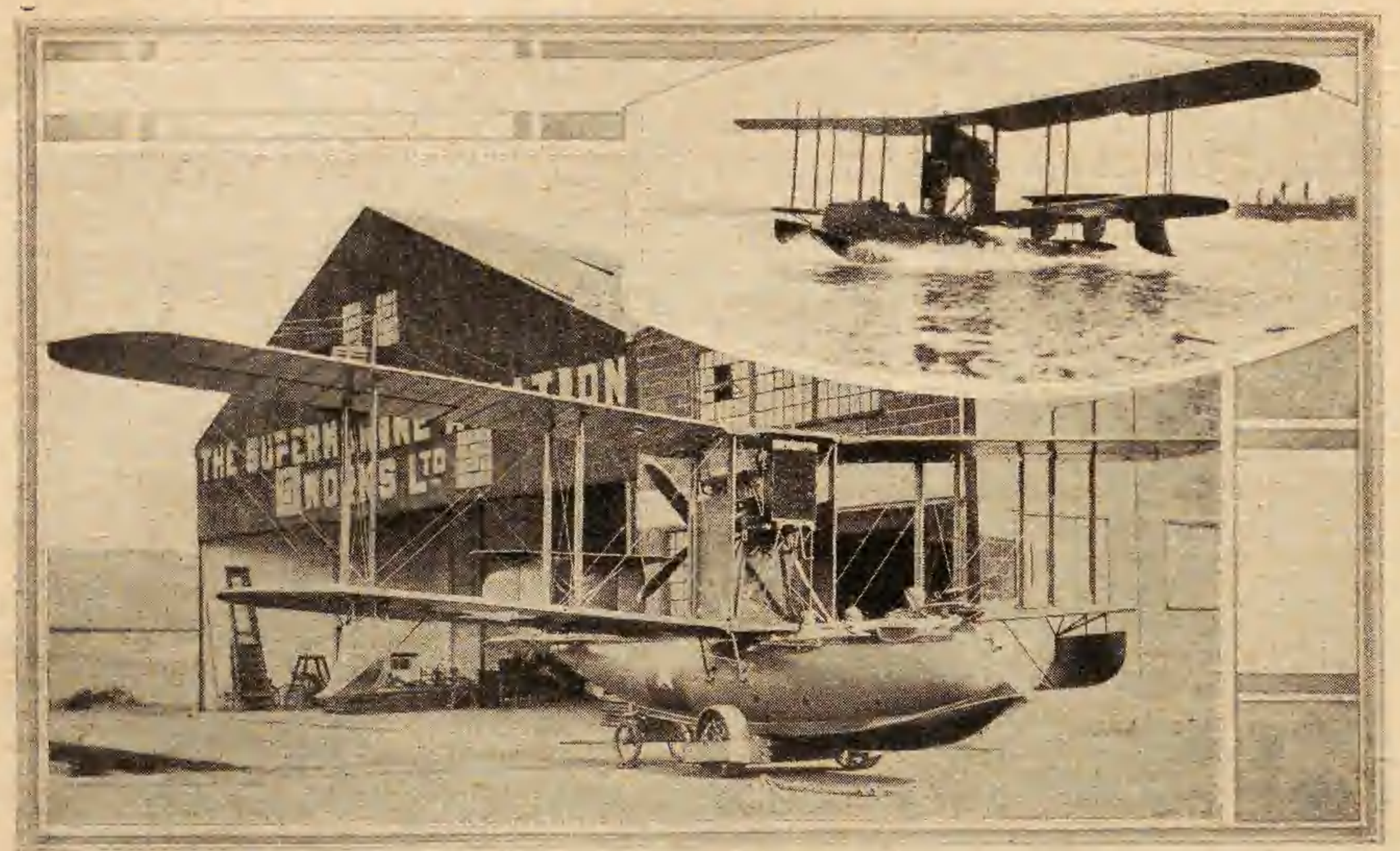
Among these is Japan, who, being an island nation, has not been slow in recognising how great is the potential value of the seaplane. We have been fortunate enough to secure the following photographs of various types of Supermarines in use by the Japanese Government, and it is gratifying to learn that all have come up to the expectations which one naturally associates with the products of this firm.

The "Channel type" naval training boat is fitted with a 240 h.p. Siddeley "Puma" engine, and as it is intended for school work it is, of course, fitted with dual controls. The type has done a great deal of useful work at home, and by way of indicating its efficiency it may be mentioned that an earlier model was fitted with an engine of 160 h.p. only (a fairly heavy one at that) and yet carried three passengers comfortably. With the higher-powered and lighter "Puma" the performance is naturally considerably better, and the hull has been proved over and over again to be exceptionally strong and seaworthy.

A latter model, the "Channel type, Mark II," also fitted with Siddeley "Puma," has had its front step re-designed, with the result that she is now very much "cleaner" on the water, as will be seen from one of our photographs showing this machine taxying. It may here be mentioned that the Mark II has been sold to the Chilian Government, and is now doing good work there. The machine is fitted with dual controls, the latest and most up-to-date wireless telegraphy and telephony sets, bomb-dropping gear for practice with



SUPERMARINES IN JAPAN: 1. A "Seagull" amphibian flying boat with Napier "Lion" engine. 2. The "Seagull" taxying. 3. The "Seagull" flying over land. Note the lowered undercarriage. 4. A "Channel type" training machine with Siddeley "Puma" on the slipway. 5. The machine on the water. 6. The "Seagull" in flight. Note the gunner's cockpit aft of the planes.



SUPERMARINES IN CHILE : A "Channel type, Mark II," with Siddeley "Puma" engine. Inset, the machine taxying. Note the "cleanness" of the machine after having its front step re-designed.

dummy bombs, and a machine gun mounted in the nose, so that it is possible to give instruction in gunnery also.

The Supermarine "Seagull" amphibian flying boat is fitted with a 450 h.p. Napier "Lion" engine, and consequently has a much better performance than the school machine. From the photographs it will be noticed that this machine is a tractor type, and that as a result of the absence of an airscrew behind the wings it has been possible to place a gunner's cockpit aft of the wings. As a gun can also be placed in the nose of the hull, the "Seagull" should be well capable of looking after herself for purposes of defence, while the amphibian gear gives the advantage that the machine can alight on and get off from either land or water. Although the weight of the land gear is considerable, the added possibilities which its use confers make it well worth while fitting.

While it is gratifying to know that foreign orders are enabling the Supermarine Aviation Works to carry on, we should naturally prefer to see them fully occupied on home orders, and we trust that in due course the home market will be such as to avoid the necessity of sending such fine machines abroad.

◆ ◆ ◆ ◆

American Non-Stop Flight

Some time ago, it will be remembered, the American aviators Lieuts. MacReady and Oakley Kelley established what is at present claimed to be the world's duration record by remaining up for 35 hrs. 18 mins. When starting on that flight the two aviators had intended to fly across America from the Pacific to the Atlantic. Owing to unfavourable weather, however, they had to abandon the project, and flew instead over a closed circuit for the length of time stated. On November 3 the same two pilots, in the same machine (a Fokker F.IV, Liberty engine), started from San Diego on a second attempt, but this also failed, owing to a leaky water-jacket, it is stated. The machine landed near Indianapolis, having covered a distance of over 2,000 miles. This performance is claimed as a record for long-distance, non-stop flying.

German Flight over Alps

From Berlin it is reported that a German aeroplane (Junkers monoplane), with pilot, mechanic and four passengers, has flown across two of the highest peaks of the Tyrolese and Venetian Alps, the Gross Glockner and the Gross Venediger. The former rises to a height of 12,400 ft. and the latter to 12,000 ft. The machine was probably equipped with one of the 185 h.p. B.M.W. high-compression engines, which keep their power up to considerable altitudes.

Aeroplanes Policing Iraq

The Basra correspondent of *The Times*, on November 1, reported that the bombing operations of the R.A.F. on the northern frontier of Iraq had had satisfactory results. An intense bombardment was carried out in pursuance of Sir John Salmond's policy of restoring the original frontiers in the Mosul and Kirkuk districts, and it is considered that the operations have proved the aeroplane's capability of suppressing raiding and propaganda parties, provided the air base is protected. The importance of this in relation to the future internal defence of Iraq, India and Egypt is obvious.

Aviation in Brazil

Mr. J. T. Cole (late R.A.F.) writes us from "Caixa 1013," Rio de Janeiro, Brazil :—

"Here, in Brazil, aviation is showing a go-ahead tendency, and should prove a good market for British machines. Although the French Aviation Mission to the Brazilian Government has sold French machines, I understand that an English company has also been successful in disposing of a number of machines.

"A 'joy-ride' service has been instituted by Mr. Orton Hoover, of Sao Paulo (which has proved quite successful), with six flying boats, two of which fly regularly with two passengers at Rs. 75,000 per flip each.

"A French aviatrix has also commenced a 'cross bay' service with a Caudron, and is now building a large hangar at Nichteroy for her Rio-Nichteroy service, a distance of about 6½ miles.

"Should any readers of Flight be interested in either the sale of machines or anticipate commencing a service from Rio-Santos or Rio-Sao Paulo, I shall be pleased to give them my assistance and all the available information at my disposal, or to act as agent to any aircraft company wishing to establish in Brazil."

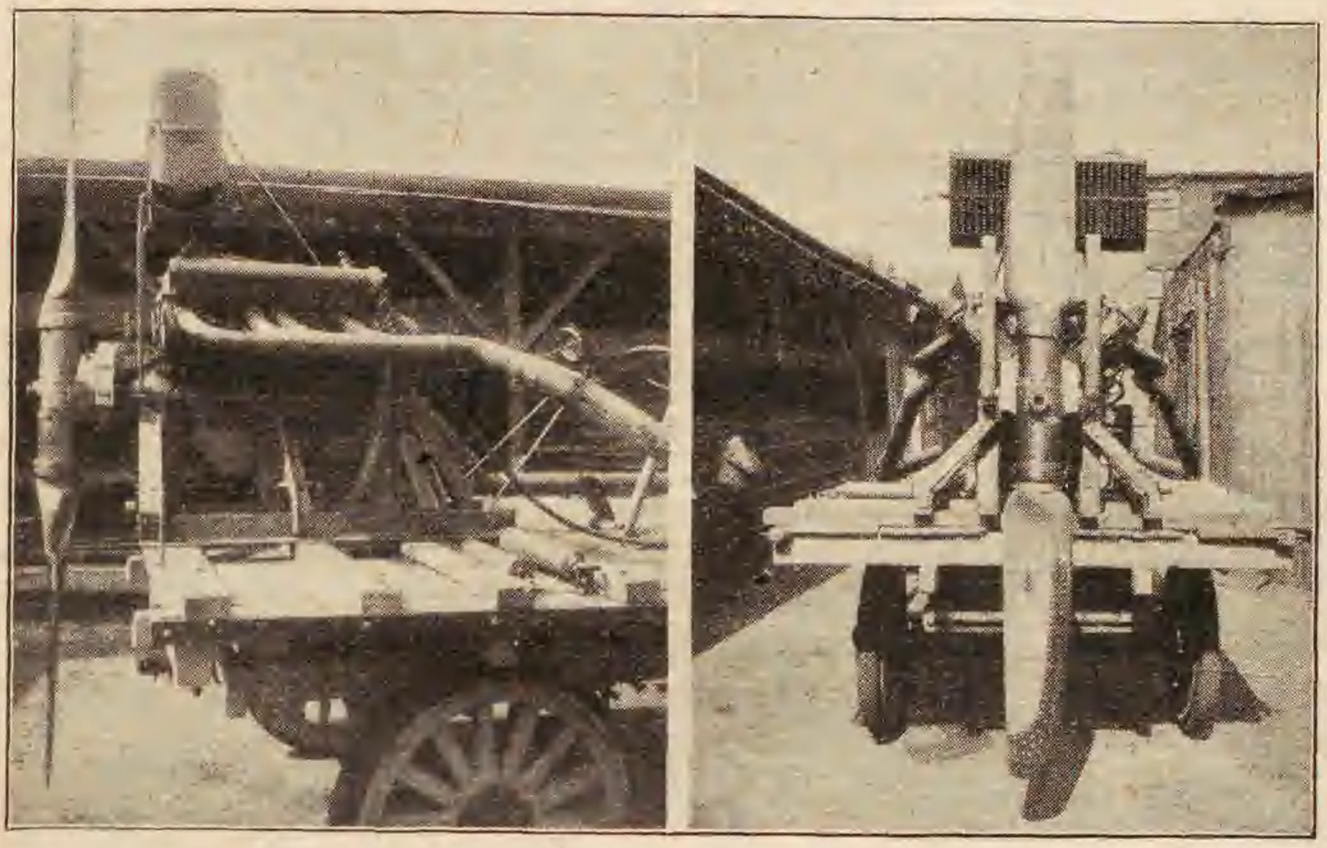
Two Spanish Records

Two Spanish flying records were established recently. Lieut. Spencer, flying a Hispano-Spad, reached an altitude of 8,100 metres (26,400 ft.), and Lieut. Gallara set up a new distance record for Spain by covering the route Guadalajara–Madrid–Tetouan–Larache, a distance of 900 km. (560 miles), non-stop.

THE PARAGON ADJUSTABLE AND REVERSIBLE AIRSCREW

MANY attempts have been made by aeronautical inventors to produce a variable-pitch and reversible airscrew. The practical value of such a device cannot be denied, especially when the pitch of the blades can be varied during flight. If this were possible, by adjusting the pitch to a less than normal angle, the engine would be able to pick up speed and deliver its maximum power, and take off with a heavier load than the same machine could otherwise normally carry. Again, upon reaching the desired altitude, by increasing the pitch the necessary amount the engine could be run at its most economical speed for that altitude, still with the possibility of increased speed range should occasion demand. On a long-distance flight, also, the pitch could be increased as the load is lessened by the consumption of fuel. It would, in other words, be the equivalent to a change-speed gear-box on a motor-car. Used in conjunction with the super-charged engine, altitudes far higher than at present obtain could be maintained.

An airscrew for which it is claimed the above achievements may be attained, has been produced by Spencer Heath, founder of one of the first airscrew making firms in America (the American Propeller and Mfg. Co.), now known as Paragon Engineers, Inc., of Baltimore, Md. It comprises a system of special blades, and a mechanism for varying the pitch of same from zero to 360°—whilst in flight or otherwise—so the pitch is not only variable for forward flight, but the airscrew is reversible as well.

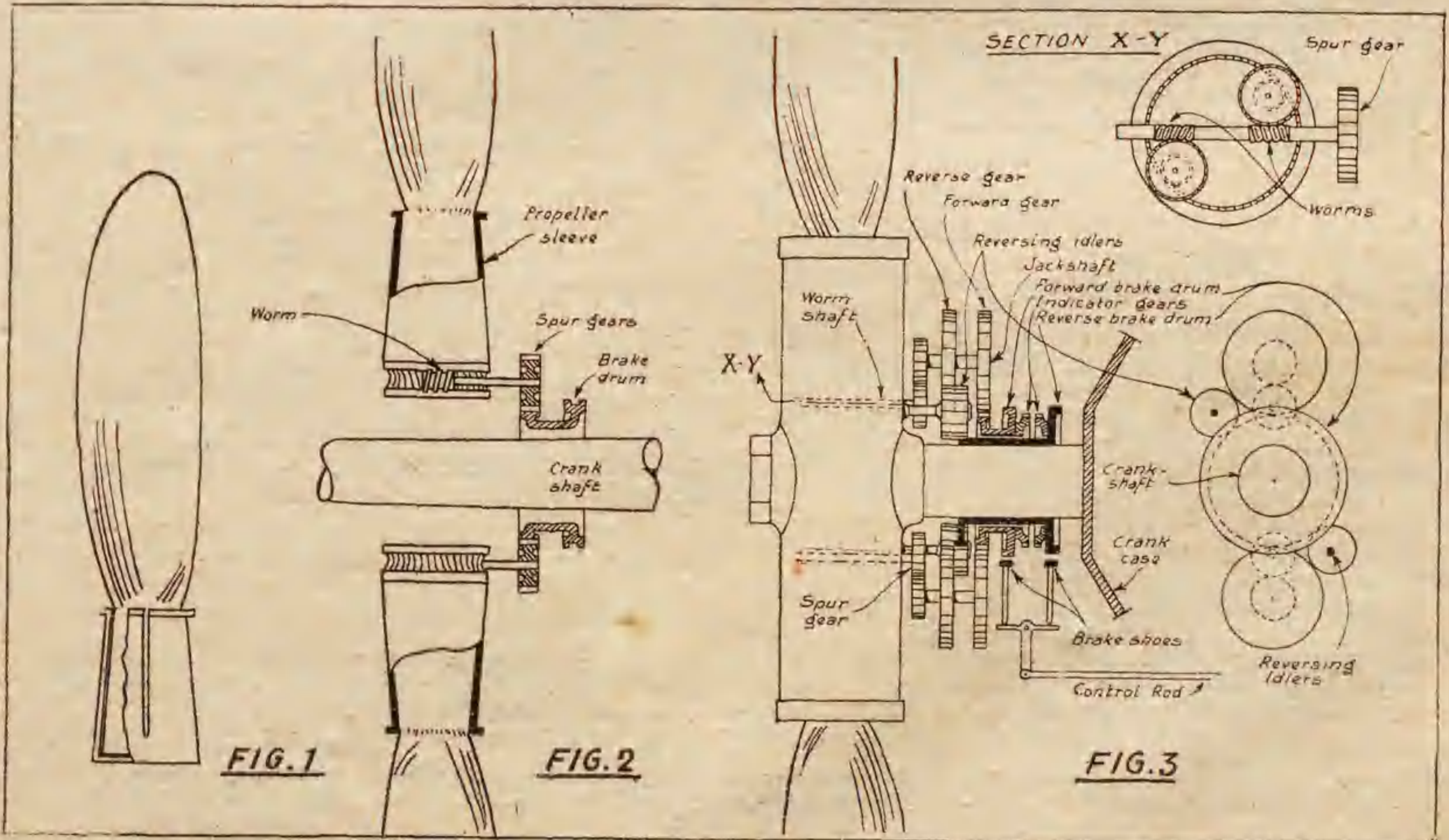


The Paragon Adjustable and Reversible Airscrew. This is seen here, fitted to a 150 h.p. Hispano engine, mounted on a trailer-truck, which it propelled forward and backward during a demonstration. The blades are shown in the neutral position.

Thus in landing, the pitch of the screw may be changed to any degree in the opposite direction, or "reversed" in about 3 seconds, just before the instant of contact with the ground and the plane brought to rest in the very shortest space.

This is a feature of considerable value in naval aeronautics, where the shortest run after landing is a prime necessity owing to the confined space which may be available on a ship's deck or even on that of an aeroplane carrier ship.

For the airship the same advantages of economy are



THE PARAGON ADJUSTABLE AND REVERSIBLE AIRSCREW: Fig. 1. Split steel sleeve holding blade. Fig. 2. The principle of operation shown diagrammatically, and, Fig. 3, in greater detail.

apparent, while the reversible attribute exactly doubles manœuvrability in docking, whether shed or mooring mast is employed.

The following advantages are claimed for the Heath, or "Paragon" airscrew :—

(*a*) Elimination of continuously running gears, collars or bearings in the pitch control mechanism.

(*b*) The use in flight of engine power in place of manual labour in changing the blade angle.

(*c*) The absence of any structural limitation to the range of blade angles available as well as the limiting of the blade travel between any two predetermined extreme positions.

(*d*) Continuous indication on the instrument-board of the blade position.

(*e*) Automatic throttling of the engine while the propeller is passing through the position of neutral pitch.

An official demonstration of the "Paragon" airscrew was given early in October at the Army flying field at Washington. The airscrew was fitted to a 150 h.p. Hispano engine, mounted on a motor-car truck trailer, which was propelled forward, backward and about the field, by means of the airscrew, at the will of the operator. Unfortunately, we have no further details of the results of this demonstration, nor any figures relating to thrust, weights, etc. Two of our illustrations, showing the airscrew thus mounted on the truck, give an idea of its general appearance, whilst the accompanying diagrams, together with the following brief description, should enable our readers to follow the principle on which the "Paragon" functions.

The two wooden or steel blades are fastened into steel sleeves which in turn are held in a steel hub, the centrifugal forces being taken on ball thrusts and torsional and axial forces on plain bearings.

The method of fixing the wooden blades into the steel sleeves is noteworthy. The butt end of each blade is tapered outwardly at a small angle as shown in Fig. 1, and the surrounding collar is split so that it may be first sprung over the butt and then compressed upon the taper.

The pitch changing mechanism is operated through the application of a braking force to either one of a pair of small brake drums surrounding the engine crankshaft and normally rotating with it. The elementary principle is shown by diagram in Fig. 2, which represents a brake drum connected through a gear train to the individual blades of the propeller. It is apparent that if the drum is allowed to revolve at crankshaft speed, all the gears will be stationary relative to the propeller, and that the pitch angle will remain constant. If, on the contrary, the brake drum is held stationary, the gear train will be set into action, and the pitch angle of the blade will undergo a continuous change until the brake drum is released.

In order to change the blade angle in the reverse direction a second brake drum is used, connecting to the worm shaft through an idler which serves to reverse the direction of rotation of the worm shaft.

It should be noted that during normal flying none of these gears are operative, and that the blades are locked in position by the non-reversible features of the worm and the friction of the connected parts.

The actual construction of the pitch-changing mechanism is more fully indicated in Fig. 3. The brakes are applied through leather-faced shoes operated from the pilot's seat by a light push-and-pull knob attaching to a brake lever mounted on the drum housing. A small hand crank is provided by which the pitch can be changed when the engine is not running.

The angular setting of the propeller blades at any instant is a function of the relative motion which has taken place between the two brake drums. The pitch indicating mechanism is, therefore, operated by gearing from the two brake drums, which conveys differential motion to the pointer of the indicator. This gearing also actuates the throttling and pitch limiting cams. As long as the two brake drums revolve both at crankshaft speed, the indicating hand remains stationary, but if either of them is retarded, an angular motion is shown on the indicator equal to that experienced by the blades themselves.

In the pitch limiting mechanism the control knob normally connects to the brake levers direct, a push increasing and a pull decreasing the pitch. If the control button is held in either operating position until the limiting position of the propeller blade is reached, the cam trips a latch plate and renders the control inoperative in that direction while leaving it ready for use in reversing the direction of propeller blade motion.

The mechanical throttle is provided with springs in both directions, so that the pilot can at any time, by applying a force on the throttle greater than the initial tension in the springs, substitute manual for automatic control.

With the engine turning at 1,500 r.p.m., the angular change from full speed ahead to full speed astern is accomplished in about 3½ seconds.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN OCTOBER 29 AND NOVEMBER 4, INCLUSIVE

Route (including certain diverted journeys)	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	14	58	4	12	11	2 25	H.P.W.8B G-EBBH (2h. 3m.)	D.H. 9 (1), B. (3), G. (6), H.P.W.8B (3).
Paris–Croydon	12	55	3	12	8	3 54	H-P.W8B G-EBBI (3h. 10m.)	B. (3), G. (6), H.P.W.8B (3).
Croydon–Brussels–Cologne	5	16	3	1	5	4 12	D.H. 34 G-EBBR (4h. 3m.)	D.H. 34 (3).
Cologne–Brussels–Croydon	4	18	3	—	4‡	—	—	D.H. 34 (3).
Croydon–Rotterdam ...	6	4	4	6	6	2 49	Fokker H-NABM (2h. 6m.)	F. (4).
Rotterdam–Croydon ...	6	10	6	6	6	2 44	Fokker H-NABQ (2h. 24m.)	F. (4).
Manchester–Croydon–Amsterdam	8	46	1	—	7§	—	—	D.H. 9 (1), D.H. 34 (3).
Amsterdam–Croydon–Manchester	8	7	2	—	5‖	—	—	D.H. 34 (3).
Total for week ...	63	214	26	37	52			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ 2 Colgn.–Brus., 1 Colgn.–Lympne. § Man.–Croy. 5; Man.–A'dam. 1; Croy.–A'dam. 2.

‖ A'dam.–Man. 1; A'dam.–Croy. 2; Croy.–Man. 5.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = **Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad. Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.**

The following is a list of firms running services between London and Paris, Brussels, etc., etc. :—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

THE time limit for FLIGHT glider-designing competition (for a prize of £25, and a consolation prize of £10) is, we would remind readers, November 30. The competition is open to all, and a competitor may send more than one design. Stress calculations and aerodynamic estimates must accompany the designs.

* * *

ALTHOUGH fairly full drawings are required, it is not necessary to send in a working drawing of every detail of the design, so long as the general construction is fairly clearly indicated. The inclusion of very complete drawings will, however, count in the judging of the designs.

* * *

CHEAPNESS of production should be aimed at, but in so doing competitors should bear in mind that this cheapness may be of two distinct forms. One design might lend itself admirably to quantity production by an aircraft firm, and this would certainly be a recommendation. On the other hand, another design might be practically useless for production in large quantities, but might lend itself particularly to construction by amateurs, owing to the materials chosen being cheap and the form of construction one which would entail but little skill and necessitate a minimum of tools. For amateur construction the "wages" item of the cost could be more or less disregarded, and the other features of the construction would be of major importance. Both types of design would stand an equal chance.

* * *

FULL particulars of the conditions governing the competition were published in our issue of August 31, 1922, to which we would refer readers requiring further particulars of the competition.

* * *

THE announcement that Mr. Gordon Selfridge has offered a prize of 1,000 guineas for the first flight of 50 miles to be made by a British pilot on a British-built glider, will be received with the greatest satisfaction. The prize, the regulations for which are now being drawn up by the Royal Aero Club, will remain open for one year, and in the event of it not being won, Selfridges will give 500 guineas to the pilot who has covered the longest distance (over 25 miles) during the year. The distance to be flown will be measured in a straight line from the point of departure.

* * *

IT has not yet been decided whether all flights for this prize are to start from one official starting point, or whether competitors may choose their own point of departure. In order to facilitate the work of the official observers it would appear to be an advantage to confine the starts to one particular point, but, on the other hand, this arrangement might seriously restrict competitors as regards the number of days in the year suitable for making a start. No one hill can be suitable for all wind directions and velocities, and it is conceivable that days otherwise favourable for an attempt might be lost through the particular point of starting being confined to one hill.

* * *

PERSONALLY we are inclined to think that the district should be definitely decided upon (*i.e.*, either the South Downs or the North Downs), but that competitors should be allowed to choose their starting point anywhere, due notice being, of course, given to the Royal Aero Club officials. It might happen that in this way we should discover some particularly favourable spot whose existence would otherwise have remained unsuspected.

* * *

As regards the possibility of winning the prize, the distance stipulated is certainly a long one. Fifty miles without an engine will not be easily accomplished, but we should not like to say that it cannot be done. Before the *Daily Mail* competition there were very many who doubted that anyone would succeed in attaining the minimum duration of 30 mins. Yet this figure was exceeded on the very first day of the competition. On the second day Raynham remained up for very nearly four times the stipulated minimum, while Maneyrol reached a duration of close on seven times the minimum.

THUS it may be expected that, although at the moment 50 miles may sound a lot, by the time pilots have had some experience in flying along ridges the distance may sound less unattainable. A good glider should have a gliding angle of about 1 in 18 or 1 in 20. In a good strong following wind this figure might be increased to 1 in 30, or even more. Thus a pilot might succeed in flying along a ridge for some 30 or 40 miles, finishing up over a fairly high hill, from which the country slopes down gently for several miles. In a strong wind he might be expected to be able to reach a height of 1,000 ft. above sea level, and if gliding down wind, at a gliding angle of 1 in 30, he would be able to reach a point 30,000 ft. from where he started his glide. Should there be smaller hills *en route* from which he could gain a certain amount of lift, his distance would be increased.

* * *

THAT is one way in which the problem may be attacked, and is probably the one that will be chosen. The simplest way would, of course, be flying along a ridge of the required length, but it may be doubtful if such a ridge exists, at any rate, in sufficiently unbroken form to make that possible. On the other hand, conditions might allow of gliding from the end of one ridge until the up-currents from the next were picked up. At any rate, the mere trying should teach us quite a lot about air currents around hills, quite apart from the, as yet untouched, problem of real "gust-flying," in which sudden changes in velocity of the wind itself are made use of. About the latter practically nothing is known, even the Germans admitting that, with all their experience, they have not yet done other than soar in winds with an upward trend. It is, of course, the gust-flying which is really fascinating, and which, if we can succeed in discovering the secret, will open up quite new possibilities.

* * *

INCIDENTALLY, it is of interest to speculate upon the possibility of the new competition showing that the machines which failed to do much in the *Daily Mail* competition may be the best for the distance competition. The Peyret glider scored heavily, owing to its controllability. It may be doubted whether, regarded purely as a glider, it is as efficient as some of the orthodox designs. It appears probable that in the distance competition fine gliding angle, low rate of descent and the capacity to fly and remain up in relatively light winds will be of more use than they proved in "sitting" on the top of a jet of air, and that, on the other hand, very great manœuvrability may not be so imperative.

* * *

IN this connection it should be remembered that we have not yet seen how the machines would have behaved over the southern slopes of the ridge from Itford to Firle beacon. It is at any rate conceivable that here machines with low flying speed might do better than on the northern slopes, where, it will be remembered, the wind actually proved too strong on certain occasions, machines being blown backwards over the top of the hill. Some of them might feel quite at home in a fairly moderate south or south-west wind over the more gentle southern slopes. In this respect gliding and soaring seem to form a very good modern parallel to boat sailing, some boats being at their best in a strong wind, others in a gentle breeze. And, incidentally, this is all to the good of the sport, as it will tend towards a greater variety of types.

* * *

M. LOUIS PEYRET did us the honour of calling at our office the other day, having just finished crating his machine at Selfridges preparatory to taking it back to France. We naturally took the opportunity to have a chat with him about his now famous glider, from which certain items may not be without interest to readers of this journal.

* * *

WE had some doubts as to the effectiveness of the rudder on the Peyret, and learned that, as originally designed, it had a smaller rudder. During a few short flights in calm air at Combegrasse the original rudder proved rather insufficient, and the addition seen at Itford was made. During Maneyrol's flight it was discovered that, contrary to expectations, the machine could be steered quite well with the rudder only, the *ailerons* being held central. During the first quarter of an hour or so of his great flight, Maneyrol used the *ailerons*, but after that he did nearly all his controlling with the rudder, finding that the machine automatically took its correct bank in response to the rudder movement. The flaps were used occasionally for elevating, but M. Maneyrol found that the machine was quite stable laterally a good balance having, evidently, been struck between c.g. position, dihedral and side area.

* * *

IT is of interest to note that last year M. Peyret won first prize in a competition for model gliders, his model being practically an exact scale model of the present Peyret-Maneyrol glider. It would thus appear that quite a good deal may be learned about gliders from experiments with models.

* * *

ASKED whether he had thought of putting a small engine in his glider, M. Peyret answered that quite likely he will do so later on. A preliminary estimate indicates that the machine will fly level on approximately 5 b.h.p., so that if an engine of about 10 b.h.p. were fitted there should be ample reserve for getting off. Such a machine should be extremely economical to run, as it would probably do about 50 miles to the gallon of petrol.

* * *

IT would also appear that the tandem monoplane, although somewhat inefficient, might be more easily made "foolproof" than the more orthodox types. Usually the very small machine is sensitive on its controls, and is somewhat tricky to handle. It seems likely that the tandem type might possess certain advantages in this respect, and if that should prove to be so, the slight loss in efficiency which attends the tandem arrangement would not be a high price to pay for a machine which even the novice could soon learn to handle with confidence. At any rate, the subject is one worthy of consideration.

* * *

WHILE on the subject of the Peyret-Maneyrol glider, we wish to point out two errors in our issue of October 26. In the full-page scale drawings on p. 622 the scale in the lower right-hand corner is wrong. The dimensions on the drawings, and the drawings themselves, are correct, but by mistake the scale of feet put on the sheet afterwards was too small. The second error occurs in the control diagram on p. 623. Here the control cables to the rear wing flaps should cross, *i.e.*, the cables from the port levers in the cockpit should cross over laterally to the cranks of the starboard rear flaps, and *vice versa*. As shown, the action would be correct for elevator control, but when used as *ailerons* the flaps on the rear wing would move in the wrong direction.

* * *

MR. J. F. LEEMING, of 38, Albert Road, Hale, Cheshire, would like to get in touch with anyone in the Altrincham district interested in gliding, with the object of forming a gliding club and carrying out experimental work. Mr. Leeming has already built four gliders, and is at present at work on a fifth, a monoplane of 36 ft. span.

* * *

As a result of several enquiries from readers, we publish below a table giving the position of the centre of pressure (expressed as percentage of chord) for various angles of incidence of the Göttingen No. 441 wing section. It will be seen that the c.p. is unusually far back, the most forward position reached (at 16° incidence) being 37 per cent. of the chord, from the leading edge. At −3° the c.p. is 61 per cent. of the chord from the leading edge.

A. of I.	C.P.	A. of I.	C.P.
−3	61	8	40
−2	57	10	38
0	51	12	37
2	46	14	37
4	43	16	37
6	41		

NOTICES TO AIRMEN

Charges for Accommodation, etc., for Civil Aircraft at Government Civil Aerodromes, R.A.F. Aerodromes, and Seaplane Stations.

1. With reference to Article 7 (5) of the Air Navigation Order, 1922, the dues to be charged at Government Civil Aerodromes R.A.F. Aerodromes and Seaplane Stations are as follows :—

A. Accommodation.

The charge for accommodation will be based on the floor space occupied, *i.e.*, the product of span and overall length. With folder aircraft the span will be taken as the overall width when folded. Charges will be as follows :—

	8 hrs. or less.			Up to 24 hrs.		
	£	*s.*	*d.*	£	*s.*	*d.*
Class A.—Small type, less than 900 sq. ft.	0	2	6	0	5	0
Class B.—Medium type over 900 sq. ft., but not exceeding 1,800 sq. ft. ..	0	5	0	0	10	0
Class C.—Large type, over 1,800 sq. ft., but not exceeding 3,600 sq. ft. ..	1	0	0	1	0	0
Class D.—Large type, over 3,600 sq. ft.	1	10	0	1	10	0

Monthly Rates.—Accommodation for monthly periods will be at rates of £5, £10, £20 and £30 respectively for the above classses of aircraft. Any accommodation so reserved, but not made use of, will be available for hire to other aircraft. No refund will be made to the monthly lessee, unless he is prevented by the re-allocation of the reserved accommodation from obtaining accommodation, in which case such proportionate refund will be made as in the opinion of the Secretary of State appears reasonable.

Payment for accommodation at monthly rates must be made in advance. The hire of premises under special agreement may be arranged upon terms which will be decided by the Air Ministry.

The provision of accommodation at R.A.F. Aerodromes and Seaplane Stations will be subject to the exigencies of the Service.

B. *Landing Fees.*

These will be in respect of the cost of maintenance of the aerodromes, use of landing lights and beacons and supply of navigational information.

The charges will include ordinary attendance, *e.g.* guiding machines, starting propellers, re-fuelling, etc. (For pushing machines with stopped engines any considerable distance, charges will be made in accordance with 3(*a*) below.) At aerodromes where no attendance is available the charges will remain the same.

The charges for single landing will be :—

Class A.—Small type, 2*s.* 6*d.* Class B.—Medium type, 5*s.* Classes C and D.—Large type, 10*s.* Aircraft with more than two engines, 15*s.*

No extra landing fee will be charged in respect of test flights before departure.

2. The Air Ministry, its servants or agents, will not be liable for loss or damage by accident, fire, flood, tempest, explosion or other cause to aircraft, or to pilots, engineers or other personnel thereof, or to any passengers, goods or mails carried therein landing at or accommodated in any Government Civil Aerodrome, R.A.F. Aerodrome or Seaplane Station from whatever cause arising, even if such loss or damage arises through negligence of the Air Ministry's servants or agents.

3.—(*a*) Attendance on civil aircraft by personnel of the R.A.F. or of Government Civil Aerodromes, other than the ordinary attendance included in the landing fees, will be charged for on the basis of labour and time. Such personnel will be available to assist civil aircraft only to a limited extent, and at certain aerodromes to be specified by the Secretary of State.

(*b*) Stores, such as fuel, oil, tyres, etc., and any standard spares that may be available, will be supplied to civil aircraft by the R.A.F. wherever possible, to meet emergency demands, and when no other source of supply is available. Such supplies will be charged for at the current retail prices.

(*c*) Subject to Service exigencies, repairs may be carried out by personnel of the R.A.F. or of Government Civil aerodromes for civil aircraft in emergency when no other arrangements can be made. Repairs will be confined to such work as will enable the aircraft to proceed by air within a short period. No repair which will exceed a cost of £10, exclusive of the cost of stores and spares supplied, will be undertaken before an estimate has been made and submitted to the owner of the aircraft.

Repairs carried out by personnel of the R.A.F. or of Government Civil Aerodromes will be carried out to the satisfaction of the responsible inspecting officer, but no responsibility as to the airworthiness of the aircraft shall rest on the R.A.F. or on the Government Civil Aerodrome staff or on the Air Ministry.

(*d*) Where R.A.F. workshops are available but no R.A.F. personnel can be spared, arrangements will be made, subject to Service exigencies, to permit the use of the workshops by civilian firms on appropriate terms.

(e) Subject to the exigencies of the Service, salvage of aircraft will be undertaken by the R.A.F. inside R.A.F. aerodromes, and as far as possible outside R.A.F. aerodromes. In both cases charges will be made according to the cost involved.

(f) Mechanical transport will be placed at the service of civil firms in emergencies and when circumstances permit. The rates to be charged will be those in force for the time being for the use of R.A.F. motor vehicles, on repayment. Such charges will include the driver, and no vehicle will be hired without an R.A.F. driver.

(g) Arrangements will be made for the use of telephone, telegraph and Post Office facilities at Government Civil Aerodromes, R.A.F. Aerodromes and Seaplane Stations by civil firms using the aerodromes.

4. Arrangements may be made for the use of aerodromes for purposes of tuition, exhibition or sporting contests. The charges to be made in such circumstances will be such as may be specially arranged between the Air Ministry and the person or firm using the aerodrome.

(No. 118 of 1922.)

Thames Estuary Searchlights

(1) *Searchlight Positions.*—Searchlights for anti-aircraft practice will be operated at different points along the Thames Estuary in accordance with the following schedule :—

(a) *Sheerness.*—35,000 c.p. searchlight, operated between the hours of dusk and midnight fortnightly as from Wednesday, October 25.

(b) *Gillingham Pier.*—35,000 c.p. searchlight, operated normally from 1900 to 2100 hours on Tuesdays and Fridays during the winter.

(c) *Gravesend.*—35,000 c.p. searchlight, operated normally from 1900 to 2100 hours on Mondays and Thursdays during the winter.

(d) *Area Sheerness, Gillingham, Gravesend.*—Two 25,000 c.p. searchlights, operated in this area from 1900 to 2100 hours on Mondays, Tuesdays, Thursdays and Fridays.

(2) *Warning.*—Pilots are warned not to mistake these searchlights for lights operated from aerodromes. The times given above are normal, but the lights may occasionally be operated at other times.

(3) *Previous Notices.*—See sketch map published with Notice to Airmen No. 51 of 1922.

(No. 119 of 1922.)

Napier " Lion " Engines : Engine Bearer Clearances

SEVERAL engines have recently been discovered in which the metal on the inside of the bearer feet has been filed away at the radius, in order to provide clearance for the engine bearers of the machine.

Such removal of metal is undesirable, but, if essential to effect necessary clearance, is not detrimental, provided the extent is small and care is taken to leave the maximum possible radius for the blending of the bearer foot into the crank-case wall.

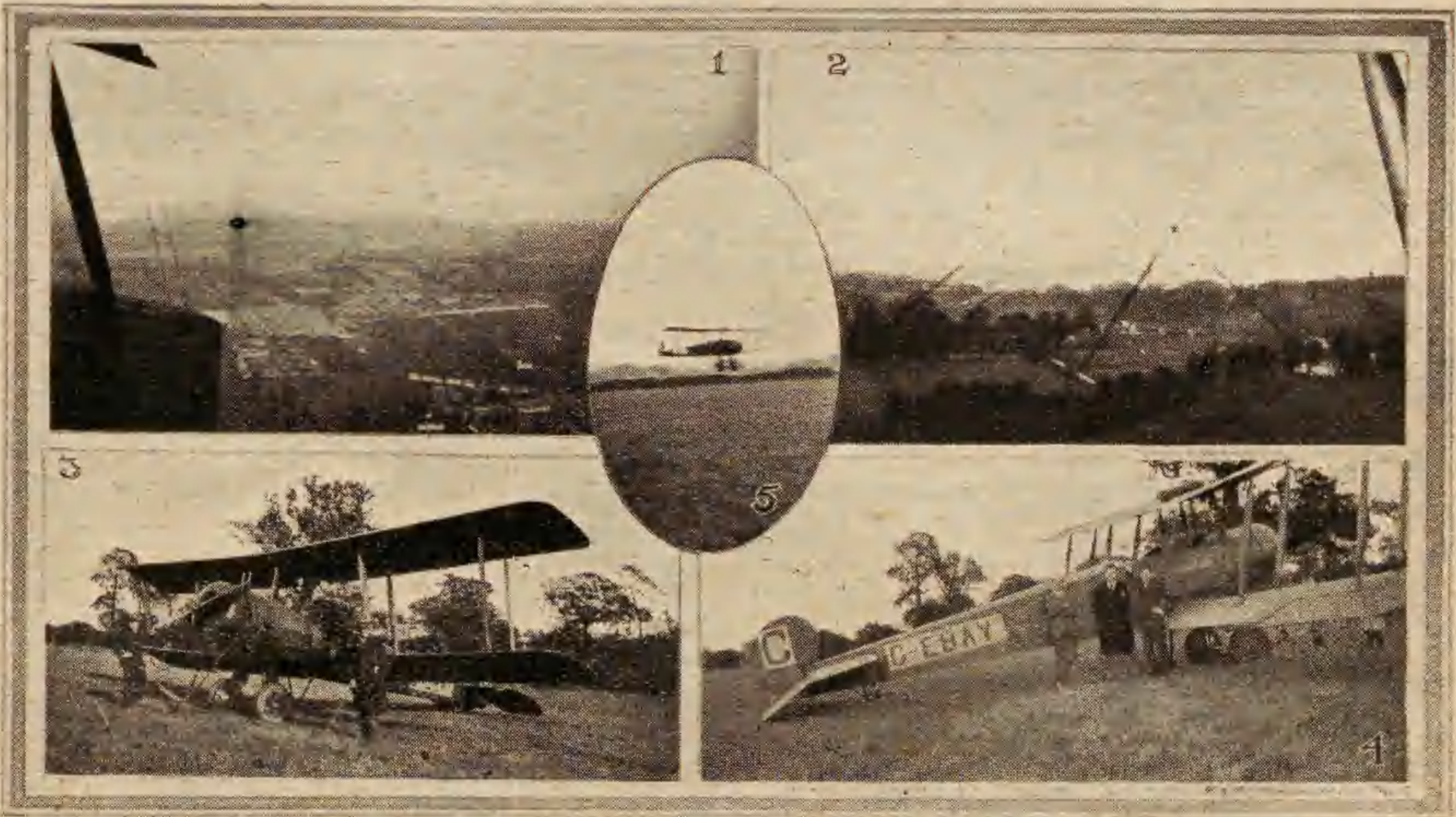
It is dangerous, however, merely to file the metal so as to leave a sharp radius, in that cracks will inevitably start at the corner.

(No. 10 of 1922.)

THE ATLANTIC CRUISE OF H.M. AIRSHIP "R. 34"

UNDER this title Mr. E. E. Turner, who was one of the engineers on board "R.34" on her historical cruise to America and back, read a paper before the Society of Engineers on November 6. Mr. Turner dealt briefly with the construction of the airship, and at considerable length with the design and installation of the five Sunbeam "Maori" engines which formed the power plant. As both the ship and her engines will be well known to readers of this journal, it is unnecessary to refer to this section of Mr. Turner's paper in detail, except to state that the fundamental principles of the design were very ably, although briefly, explained by the lecturer. The "three-wire" system of mooring, both on land and, to a degree, over the sea was explained and illustrated, and the general arrangement of the ship itself was also well illustrated by lantern slides from drawings, diagrams and photographs.

The latter part of the paper took the form of a very brief log of the outward and homeward voyages, and although in the very limited space available Mr. Turner could not, naturally, give such a complete picture of that adventurous journey as did the late Commodore Maitland in his book, he nevertheless succeeded in conveying to his audience an excellent sketch of life on board. The lecturer had nothing but praise for the Sunbeam engines, and it is of interest to quote from his log the passage dealing with the breakdown of the forward engine in the aft car. "This breakdown," the lecturer said, "was due in no way to the constructors, but the engineer, owing to a roll of the ship, slipped and fell against the clutch lever, disconnecting the engine from the propeller. The engine, being on full load, immediately raced up, and the resulting stresses caused the fracture. The governor gear had previously been disconnected."



WITH FRASER'S FLYING SCHOOL AT KINGSBURY : 1. View of the late Airco Works, taken from one of the school Avros. 2. Leaving the aerodrome. 3. Getting ready for a "flip" in an Avro. 4. A. Fraser, J. P. C. Phillips and W. Mitchell pose for the camera beside one of the school Avros. 5. Just landing on Kingsbury Aerodrome.

THE CASE FOR METAL CONSTRUCTION

By **JOHN D. NORTH, F.R.Ae.S.**

(*Concluded from page* 651.)

CORROSION

THE question "What about corrosion?" is such a common one that I may perhaps be excused if I introduce a little *résumé* of present-day opinions on corrosion generally. I hope to show that the susceptibilities of steel aeroplane parts to corrosion are due to faulty shop practice rather than any other cause, and to suggest that with proper precautions there is little to fear from oxidation. Further, the aeroplane which is virtually incorrodible is at last a practical proposition, and will make its appearance in the near future. A survey of the large volume of experimental data which has been accumulated on the subject of the corrosion of iron and steel leads us, at an early point in the enquiry, to the conclusion that the chemical reactions involved are by no means simple. Something more than a direct oxidation of iron atoms is involved. This is not in the least surprising. Of almost any apparently simple chemical reaction it can be said that the more closely we look into the mechanism of such change the more complex it grows.

It will not be disputed that the more that is known of the onset and course of development of a disease the greater hope there is, not only of effecting a cure, but of preventing a recrudescence.

Three theories which have been put forward to account for the corrosion of iron and steel will be noticed briefly :—

1. The acid theory.
2. The electro-chemical theory.
3. The recent colloid theory of Dr. Friend.

It may be said at once that no one of the above will suffice to explain all the well-established experimental facts.

1. **The Acid Theory.**—This requires the necessary presence of some acid in the water in contact with the metal before iron will rust at all. The carbonic acid present in water in all ordinary cases suffices. It is probably not a fact that iron will not rust in the absence of an acid. Be that as it may, in all cases that interest us the acid, carbonic, is inevitably present, and the presence of any acid, even so weak a one as carbonic, undoubtedly accelerates the corrosion of iron.

2. **The Electro-Chemical Theory,** in its broadest interpretation, includes the acid theory. This theory requires that, for corrosion, the iron shall be in contact with an electrolyte and oxygen. It is impossible and, for our purposes, unnecessary to say whether chemically pure water is an electrolyte; impossible because it is inconceivable that chemical methods have reached the ultimate in refinement, the chemically purest water yet prepared has a definitely measurable electrical conductivity and is an electrolyte in consequence; unnecessary, because the only water that interests us, that which condenses when the temperature falls below the dew point, that which falls as rain, is an undoubted electrolyte, and contains a measurable, though small, concentration of hydrogen and hydroxyl ions. The chemist associates what he calls acid properties with the presence, in large or small concentration, of the hydrogen ion. So water is an acid, a weak acid, perhaps the weakest known.

We have, in materials like iron and steel, which are neither pure nor homogeneous, a very fertile field for the establishment, in contact with an electrolyte, of local voltaic couples, and if the iron, as must sometimes occur, be anodic in such a couple, into solution it will tend to go as the iron ion, with a driving electromotive force behind it, which depends on the nature of the electrolyte in contact with it and on the nature of the cathode. Now this state of affairs, with iron the anode in a voltaic couple, will be found only in places on the surface of any given specimen. Corrosion due to this cause will then only develop at certain well-marked points of attack, accounting thus for the familiar phenomenon of pitting.

But this voltaic action, due to the heterogeneous character of the material and resulting in pitting, is not all. There has to be considered, in addition, the action between the metal itself and the electrolyte with which it is in contact. A metal in contact with a liquid ionises to some extent, with a definite electromotive force which can be measured tending to ionise it. In the absence of disturbing factors a state of equilibrium is set up when further ionisation ceases and a definite difference of potential between metal and solvent exists. This is the ionic theory of solutions universally accepted by physical chemists as giving the best expression yet to the whole of their knowledge of the mechanism of solution. The disturbing factor that matters to us is the presence of other ions in the liquid, hydrogen ions. The electro-chemical theory of corrosion then attributes the corrosion of the metal to two causes, operating together or singly.

(1) Local voltaic actions.

(2) Straightforward solution of the metal.

The non-corrodible steel will be of such a character that neither of these causes can operate.

Dealing with local voltaic actions first. The presence or absence of the conditions necessary for setting up such actions will depend upon :—

First and foremost, the presence of impurities or, what is equally harmful, local segregations. As an example, it has been established that in the presence of black scale the iron becomes anodic and consequently passes into solution.

(2) *The micro-structure* of the material and anything which has happened to the material in its life history which is known to affect the micro-structure—*e.g.*, heat treatment—is very important.

(3) *Chemical composition.*

(4) *The physical condition of the material,* due to heat treatment or mechanical working. Strained and unstrained portions of a homogeneous material constitute an active voltaic couple.

There is nothing here that proper care in the selection, manufacture and handling of the material cannot successfully deal with.

Straightforward Solution of the Metal.—Whether or not a metal goes into solution in a liquid, it has been said above, depends upon what potential difference exists in the particular case under investigation. All these quantities are susceptible of accurate measurement. Hadfield and Newberry, working on these lines, in acid solutions, have show that before solution of a given metal can take place the following condition must be satisfied :—

Electrode potential of the metal + the over-voltage must be greater than the hydrogen potential for the solvent.

The electrode potential or solution pressure is a matter of chemical composition; and it should not be impossible to produce an alloy to fulfil this condition, in which corrosion by straightforward solution would be impossible.

Of the two causes of corrosion, according to the electro-chemical theory, the localised formation of voltaic couples, resulting in pitting, appears to be responsible for most of the damage. Recent experiments carried out at the United States Bureau of Standards on the corrosion of high chromium steels by air and water have shown that the rusting of such steels was always local—a surface film of rust was not observed in any instance.

Having regard to both causes of the corrosion of steels, it is clear that a non-corrodible steel is not a mere figment of the imagination, and practical knowledge of the properties of 12-15 per cent. chromium steels and irons indicates the material has already arrived.

3. **The Colloid Theory.**—There remains to be noticed the recent colloidal theory of Dr. Friend. This theory claims that ferrous hydroxide in a colloidal form appears at an early stage in the course of corrosion; this is oxidised to ferric hydroxide, still in a colloidal form, as oxygen from the air gains access. And this colloidal ferric hydroxide catalytically accelerates the corrosion of further iron, undergoing alternate reduction by new metal and re-oxidation by fresh oxygen. In other words, the colloidal ferric hydroxide acts as a catalytic carrier of oxygen from air to metal, a type of catalytic action which is perhaps better understood of chemists than any other.

It would appear that this theory would serve to supplement rather than supplant the electro-chemical theory. The iron is brought into an attackable condition by electro-chemical forces, and the course it then follows to its ultimate destination, more or less hydrated ferric oxide, may very well be ***via*** the colloidal processes of Dr. Friend.

The above only indicates rather sketchily the manner in which the addition of a high percentage of chromium to ferrous metals has gone far to make an end of the corrosion trouble root and branch, but also furnishes the clue to the precautions to be taken with ordinary steels to fight corrosion. Firstly, see that the material is free from black scale. This is best accomplished by electrolytic cleansing. Before painting see that the steel is dry and chemically clean as possible.

Whatever flux is used for soldering in the shops chlorides will be found on all soldered fittings and many unsoldered ones (resin is not a practical flux) and the parts must be properly cleaned, the wash waters being controlled by analysis. If this is carried out effectively and a suitable paint used there is little fear of corrosion where the protecting coating remains undamaged.

It is not only in the protection of steels against corrosion that advances are being made. Recent experiments have shown that the successful treatment of light alloys is practically an accomplished fact.

RELIABILITY.

Apart from this question of corrosion, it is necessary to consider in what other respects an all-metal aeroplane might be structurally unreliable. I think the following will cover the ground :—

(*a*) Material not up to specifications due either to faulty inspection or the failure of the inspection to reveal the quality of the bulk under examination.

(*b*) Subsequent mistreatment either by heat treatment or cold work.

(*c*) Undetected errors of workmanship.

(*d*) Damage to members in assembly, delivery or service.

(*e*) Failure of riveting under service conditions.

(*f*) Failure under alternating stress, *i.e.*, "fatigue."

So far as (*a*) is concerned, I think that there can hardly be any doubt that metal, particularly wrought metal, is at a great advantage compared with timber. The test samples represent materials of the same composition which have gone through the same processes in the mill and the same heat treatment. The production of carbon steel bars has reached such a high standard that this material *as used* is taken as the standard reliability material by the Load Factor Sub-Committee in the section of its report dealing with reliability. In the thin strip ingot, faults, such as segregation, slag inclusion, etc., are generally noticeable, and are in any case revealed in rolling or drawing together with most other material faults should they escape detection before testing. Timber is, however, only representative to the extent indicated by the theory of probability; while its inspection depends on deductions from experience concerning which there is not complete agreement among timber experts.

(*b*) Can be prevented by proper works organisation, and is practically confined to those metal parts common to both metal and composite aeroplanes.

(*c*) Are far more difficult to conceal than in wood, particularly as riveting replaces welding. Contrary to popular opinion, defective riveting in properly designed members has very little influence on their strength, within the extreme limits of error experience has shown as likely to occur.

(*d*) Is also not the weak point one might imagine from the thin materials used. The very qualities which enable the members to develop a high stress render them fairly immune from the effects of rough handling, but this point has to be considered in design. That glaring damage is not fatal to the structure has been shown by reloading members broken in test. The most serious danger is fatigue failure from the repeated application of a blow on a particular point; when, for example, a portion of the shell is repeatedly bumped, say, on the tailboard of a lorry, an alternating stress failure in the form of a crack may appear; it is, however, very obvious and easily repaired, while with similar bad packing a wood member might be irreparably injured.

So far as (*e*) is concerned, I have already mentioned that a certain amount of rivet failure does not seriously deteriorate the structure, and there is with steel at least no evidence of the failure of riveting nor any logical reason why it should fail. In properly designed members the rivets are merely shearing pins expanded to fill the rivet holes while the head prevent any possibility of falling out. The very remote possibility of an alternating shear stress, sufficient to cause a fatigue failure, can be guarded against in design. The rivets are in fact in much the same category as most of the bolts on an aeroplane with the difference that in the case of the rivets individual failure is of negligible importance.

On a larger scale there is extensive experience of riveting in all branches of engineering, and everything in this experience tends to show that riveting is a satisfactory joining process.

(*f*) Considerable strides have been made in the last few years in understanding alternating stress failures, particularly by a better comprehension of stress distribution. Under the auspices of the A.R.C. several notable papers on this subject have been published, a study of which would remove a great deal of misapprehension. An alternating stress failure may occur after a large number of cycles in which the stress has fluctuated over a range in excess of certain values which appear to be associated with the ultimate tensile rather than the elastic properties of the material. That stress fluctuations will take place in prime movers, vehicles and similar machines is obvious from a study of their mechanism, but in a structure such as an aeroplane they are mostly due to fluctuating loads from the engine direct, varying loads on aerofoil surfaces due to the irregular wake velocity of the slipstream or resonant vibrations originating from either of these. The streamline wire is a notable exception since it has an unstable yawing derivative N_v from which the well-known sound-producing oscillation of these wires is derived.

The only direct fluctuating loads from the motor which I have known to produce failure by fatigue are the rotating couples from fixed radial engines, where these have not been allowed for in design. The maximum amplitude of resonant vibrations is generally small and the mean stress fluctuation is small, too; but the difficulty arises in the complex distribution of stress during small deformations in other than simple members. Reference to the work of Taylor, Griffiths Coker and others, will show how complex this is and what a marked influence small but sharp changes of section have on it. Generally speaking, the avoidance of rapid changes of section (*e.g.*, sharp corners) in conjunction with material of adequate ductility, is sufficient insurance against high localised stress; metal construction falls in easily with this requirement. We can hardly go further into the subject, but it is safe to say that fatigue failures, if they occur, must be traced to the drawing office, not to the use of steel as a structural material.

METAL COVERING

The desirability or otherwise of metallic covering seems to me to be largely a matter of policy. I see in the *Journal* that Mr. O. Short puts the weight of metal covering at .2 lbs. per square foot presumably of covering. If this is the case metallic covering means an addition of 5 to 6 per cent. to the gross weight of the aeroplane—an addition which I should imagine could only be tolerated in very exceptional cases. I do not believe that it is imperative that aircraft should be *all metal*, quite a few parts—not structural—are probably better of wood except under special climatical conditions. Fabric covering, especially when it can be re-doped, really gives long service, and re-covering encourages general overhaul.

I believe that anyone who examines the possibilities of metal construction on the lines I have indicated will appreciate the possibilities of reducing the structure weight of aeroplanes by the use of metal construction, and where they are able to supplement their deductions by experience they will be convinced of the great future in front of it. The fact that metal aeroplanes will stand adverse climatical conditions, long storage and, I believe, the wear and tear of everyday use in temperate climates better than aeroplanes largely built of timber and joined with glue is further argument in its favour.

The development of technique will undoubtedly tend more and more to eliminate the necessity for skilled labour in course of construction, and this opinion is fortified by experience. It is probable also that load factors will be able to be lowered without increasing the risk of structural failure or alternatively increase of reliability may be obtained.

I have said nothing so far on the subject of fire risks, though some improvement may be attained in this direction. Those fires in the air, resulting in a large quantity of petrol burning in a comparatively confined space, would hardly be affected if the aeroplane were made of asbestos; but since fires after a crash, probably now more to be feared, are often caused by splinters of wood coming into contact with hot exhaust pipes, this latter class of fire risk should certainly be minimised.

On looking through these notes I cannot feel that I have presented the case for metal construction as completely and convincingly as it deserves to be presented. I have been so closely occupied during the last few years with the thousand and one details of this new development that I have found it somewhat difficult to put this subject before the Society in a general way. If I had once started entering into details I should hardly know where to stop, and details as they arise will be more interesting to those who are taking up this work for themselves.

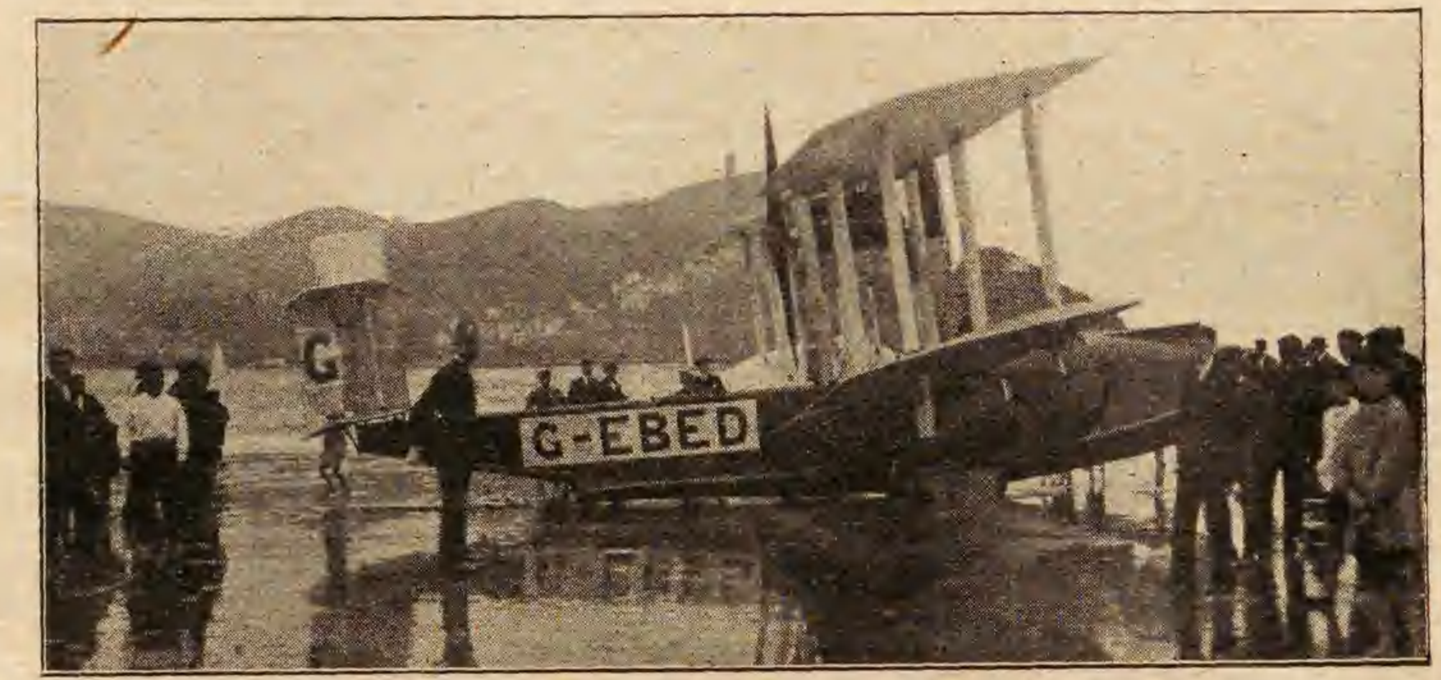
In conclusion, I should like to thank those gentlemen who have assisted me in the preparation of this paper, particularly Dr. Leslie Aitchison, who has rendered invaluable help on metallurgical matters and who kindly supplied the curves illustrating the variations of "E"; also Mr. A. E. Odgers, M.A., for the *résumé* on corrosion, and several other members of my experimental staff. I have also to thank Messrs. Boulton and Paul, Ltd., for permitting me, for the purpose of this paper, to make use of information and experience gained in their aeronautical department.

AIRISMS FROM THE FOUR WINDS

PHEW! What a shock!

From the alert staff of our Press Cutting Agency, which sends us snippings upon matters aviatic, comes an article boldly headed "A Million in Flight," which, needless to say, intrigued us muchly until we realised that it was that number of wretched refugees from Asia Minor trying to find a safe foothold somewhere. But really, now that "flight" is an accomplished everyday fact, it is about time some substitute word should be evolved for shock headlines of this character. For the moment our mind wobbled between the sudden arrival of a million transatlantic flyers and visions of our receiving a bankers' draft for a round half-million on account as a small recompense for FLIGHT's missionary work in the past.

And then we awoke. But in these nervy days it won't do to strike a dud mine like that too often. Phew!

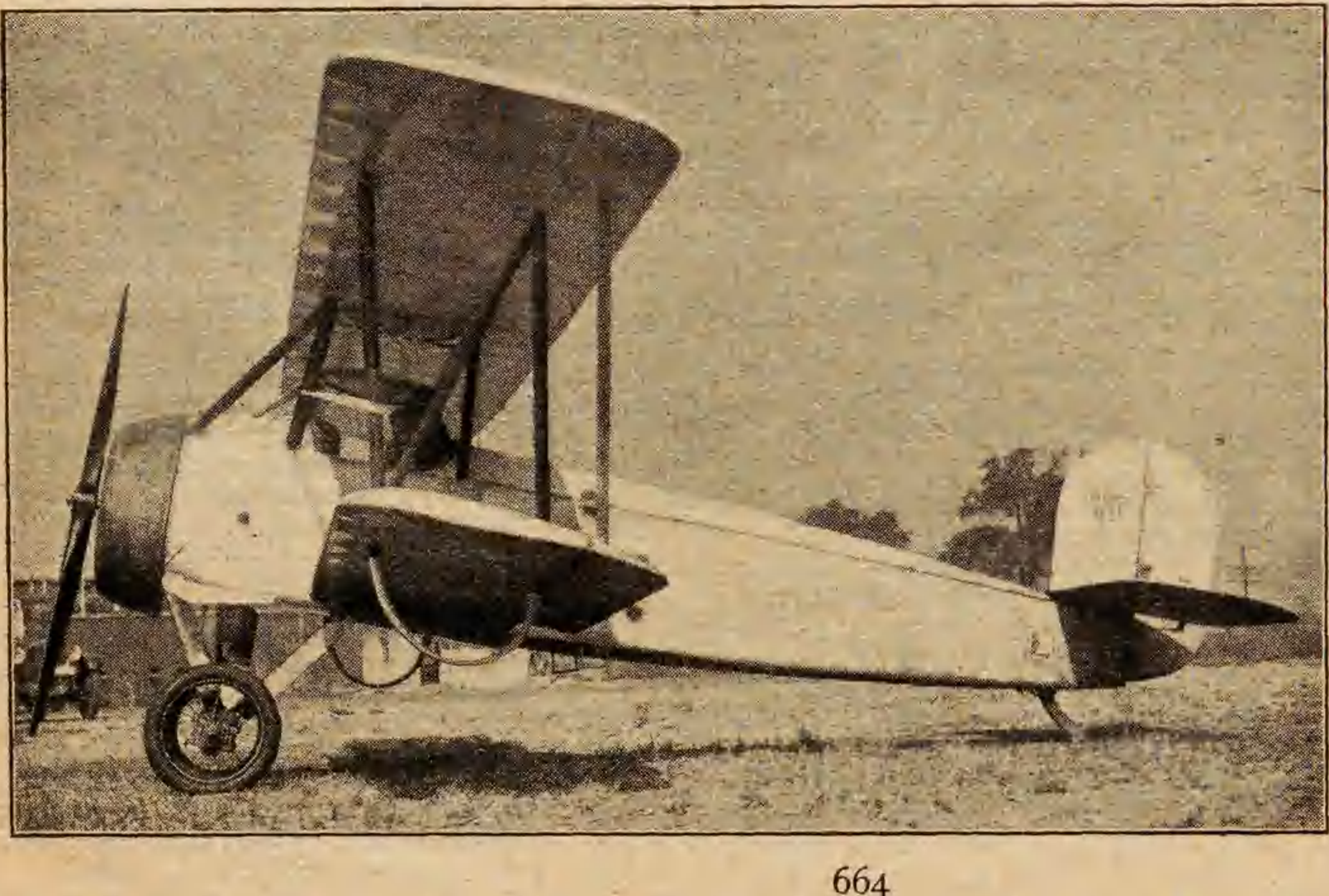


Vickers "Viking," Napier "Lion" engine, in Spain: Our photograph shows the machine at San Sebastian after alighting in the bay on its way to Madrid.

THUS Mr. Edmund Jordan in a letter to the Press:—

"*'Gliders' or 'Aeroscaphes.'*

"Victor Hugo, in his wonderful description of Gilliatt upon the rocks of the Douvres in 'The Toilers of the Sea,' commenting on continuous air currents and winds moving in zones, says:—'Aerial navigation by means of wind boats, to which the passion for Greek terminology has given the name of "aeroscaphes," may one day succeed in utilising the chief of these streams of wind. The regular course of air streams is an incontestable fact. There are both rivers of wind and rivulets of wind, although their branches are exactly the reverse of water currents. . . .' May I suggest that it is an anachronism to consider as novelties 'gliders,' or even aeroplanes, and that the aeroplane is a mechanically propelled aeroscaph?"



The Dayton-Wright "Chummy" Training Biplane: A two-seater side-by-side machine, fitted with a Le Rhone 80 h.p. engine. In September last a student of the Dayton-Wright Co., K. M. Lane, who had never previously touched the controls of a 'plane, started to take instruction on one of these machines early in the morning, and that evening made his first solo flight. His total instruction time was 4 hrs. 26 mins. His instructor was W. E. Lees.

THE ROYAL AIR FORCE

London Gazette, October 24, 1922

General Duties Branch.

Flying Offrs.—Lieut. G. V. Carey, Devonshire R.; Lieut. A. P. Davidson, Highland L.I.; Lieut. C. F. Ellicott, Dorset R.; Lieut. A. S. Godley, R. Scots; Lieut. J. P. Huffam, V.C., Duke of Wellington's R.; Lieut. G. C. Oldham, The Queen's R.; Lieut. E. C. Ridlington, R.G.A.; Lieut. D. Stansby, R.G.A.; Lieut. A. H. Stirling, R. Scots; Sec. Lieut. P. J. Chambers, Border R. The follg. Pilot Offrs. to be Flying Offrs. (Sept. 29):—H. A. C. Atkinson, J. N. Boothman, T. W. S. Brown, P. K. Campbell, D. M. N. Coles, A. B. Cree, E. S. Edwardes, B. E. Embry, A. Findley, C. Gardner, H. E. Greenberry, D. R. Loch, A. Maybaum, E. C. Moon, G. J. Rayner, J. V. Roberts.

The follg. are transferred to Reserve (Oct. 24):—

Class A.—Flight Lieut.—D. A. Stewart, M.C., D.F.C., A.F.C.

Flying Offrs.—W. Bentley, D.F.C., E. A. J. Brown, S. L. Cannon, K. C. L. Gorringe, A. L. Jones, G. Kidd, A. J. H. Taylor, L. E. Vine, H. E. Winch.

Class B.—Squadron-Leader.—H. C. Fuller.

Flight-Lieuts.—J. C. Atkinson, J. L. L. Duffus, A. D. Newbury, H. G. P. Rees, A. Roberts, A. C. Snow, L. Whitworth, A.F.C., W. P. Woodcock.

Flying Offrs.—A. A. W. Barron, R. Ll. Cantle, T. W. Cave, M.C., G. F. Drudge, F. J. Magee, A. J. Packham, H. A. Smith, E. Taylor.

Observer Offrs.—P. J. Bradley, R. Hamilton, M.C., B. J. Paget.

Class C.—Flight Lieuts.—J. E. M. Atherley, L. H. Pakenham-Walsh, D.F.C.

Flying Offrs.—G. Baillie, V. W. Burgess, A. V. Gash, W. Halliwell, J. D. Jackson, L. J. Lipscomb, F. R. Steggall, D.C.M., A. W. S. Wagner.

Observer Offr.—P. A. Cockeram, M.C.

Flying Offr. L. S. Punnett is transferred to the Reserve, Class C; Oct. 12. Flying Offr. J. R. Starck is placed on the ret. list; Oct. 4. Flying Offr. P. Wilson, M.C., relinquishes his short service commn. on acct. of ill-health, and is granted the rank of Capt.; Oct. 25.

Stores Branch

Capt. and Asst. Paymr. W. B. Johnstone, R.A.P.C., is granted temp. commn. for Accountant duties as Flight-Lieut. on seconding for three years' duty with R.A.F., with effect from Oct. 1, and with seny. of April 1, 1918. Flight-Lieut. W. B. Johnstone to be actg. Squadron-Leader; Oct. 1.

Medical Branch

J. M. Maxwell is granted permanent commn. as Quartermaster and Flight-Lieut., with effect from, and seny. of, Oct. 1. Flight-Lieut. H. S. C. Starkey, O.B.E., M.D., is granted permanent commn. in rank stated; July 18, 1921 (since promoted) (*Gazette*, Aug. 2, 1921, appointing him to short service commn. is cancelled). Flight-Lieut. T. M. Walker is granted a short service commn., retaining present substantive rank and seny.; Oct. 25. Capt. B. F. Beatson, D.T.M., I.M.S., is granted temp. commn. as Flight-Lieut. whilst seconded for duty with R.A.F.; Oct. 13.

London Gazette, October 31, 1922

General Duties Branch

Sqdn. Ldr. A. W. C. V. Parr is granted a permanent commission as a Flt. Lt.; Sept. 7. He will be placed at the head of the gradation list of Flt. Lts., but will take seny. in accordance with his relative position with other officers similarly reduced in rank on the grant of permanent or short service commns. G. A. Hadley is granted a short service commn. as a Flying Offr., with effect from, and with seny. of, Oct. 23. Sec. Lt. L. W. Mercer, R.G.A., is granted a temp. commn. as a Flying Offr. on secdg. for four years' duty with the R.A.F.; Oct. 20. The following are transferred to Res. (Nov. 1):—Class A.—Flying Offr. N. W. Hustings. Class B.—Flt. Lt. R. L. Stephenson-Peach, M.B.E.

Flt. Lt. G. Barrett, A.F.C., is placed on the retd. list on account of ill-health contracted in the Service; Nov. 1.

Nursing Service

The following ladies are confirmed in their appts. as Staff Nurses (April 15):—Miss E. L. M. Graham, Miss E. Crozier, Miss M. J. Macdonald.

Memorandum

Sec. Lt. D. W. Giles relinquishes his temp. commn. on enlistment in the T.A.; May 8, 1920.

London Gazette, November 3, 1922

General Duties Branch

Air Commodore C. L. Lambe, C.B., C.M.G., D.S.O., is placed on half-pay, Scale A; Aug. 1. Group Capt. F. V. Holt, C.M.G., D.S.O., ceases to be secd. for duty with the Chinese Government; Sept. 1. Flying Offr. I. G. G. Edgar is transfd. to Res., Class A; Sept. 26 (substituted for *Gazette*, Sept. 12).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Group Captain: P. F. M. Fellowes, D.S.O., from Headquarters, Middle East, to Headquarters, Constantinople Wing (Supernumerary). 22.9.22. For duty as Officer Commanding R.A.F., Constantinople.

Squadron-Leaders: D. Blair, from Headquarters, Inland Area, to Headquarters, R.A.F., Iraq. 20.10.22. W. Sowrey, D.F.C., A.F.C., from R.A.F. Depot (Inland Area) to No. 1 Flying Training School (Inland Area). 1.11.22. F. N. Smartt, M.B., B.A., from R.A.F. Depot (Inland Area) to No. 1 Group Headquarters (Inland Area). 8.11.22. F. C. Jobson, from No. 7 Group Headquarters (Inland Area) to R.A.F. Depot (Inland Area). 19.10.22.

Flight-Lieutenants: E. P. Hardman, D.F.C., from No. 30 Squadron (Iraq) to No. 84 Squadron (Iraq), for duty as Adjutant. 18.5.22. E. E. Deans, D.S.C., from No. 2 Squadron (Detached Flight) (No. 12 Wing, Ireland) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 1.11.22. H. E. P. Wigglesworth, D.S.C., from Irish Flight (No. 12 Wing, Ireland) to No. 2 Squadron (Detached Flight) (No. 12 Wing, Ireland). 23.10.22. J. W. H. Steil, M.B., from Headquarters (Coastal Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 14.10.22. J. S. Holloway, from No. 207 Squadron (Inland Area) to C. and M. Party, Bircham Newton (Inland Area). 25.9.22. W. R. S. Humphreys, A.F.C., from No. 207 Squadron (Inland Area) to C. and M. Party, Bircham Newton (Inland Area) (Supernumerary). 25.9.22. W. R. S. Humphreys, A.F.C., from C. and M. Party, Bircham Newton (Inland Area) to No. 100 Squadron (Supernumerary). 16.10.22. T. C. Luke, M.C., from R.A.F. Depot (Inland Area) to No. 56 Squadron (Inland Area), for duty as Adjutant. 1.11.22. C. McM. Laing, M.C., A.F.C., from No. 25 Squadron (Inland Area) to C. and M. Party, Hawkinge (Inland Area). 25.9.22. C. McM. Laing, M.C., A.F.C., from C. and M. Party, Hawkinge (Inland Area) to No. 56 Squadron (Inland Area). 1.11.22. L. A. K. Butt, from No. 4 Flying Training School (Middle East) to No. 208 Squadron (Middle East) (Supernumerary). 26.9.22. J. P. Coleman, A.F.C., from Aircraft Depot, Egypt (Middle East) to No. 56 Squadron (Detached Flight) (Constantinople Wing). 26.9.22. M. Moore, from Headquarters, Middle East, to Headquarters, Constantinople Wing (Supernumerary). 26.9.22. R. P. M. Whitham, M.C., from Headquarters, Middle East, to Headquarters, Constantinople Wing (Supernumerary). 22.9.22. P. J. Murphy, from Stores Depot, Egypt (Middle East), to No. 208 Squadron (Middle East) (Supernumerary). 26.9.22. M. J. James, M.B.E., from Egyptian Group Headquarters (Middle East) to Headquarters, Constantinople Wing (Supernumerary). 26.9.22. C. T. O'Neill, M.B., from No. 216 Squadron (Middle East) to No. 208 Squadron (Middle East) (Supernumerary). 26.9.22. T. F. N. Gerrard, D.S.C., from Central Flying School (Inland Area) to No. 5 Flying Training School (Inland Area). 21.10.22. H. H. Balfour, M.C., from Central Flying School (Inland Area) to No. 10 Group Headquarters (Coastal Area). 1.11.22. C. A. E. J. Brownlee, M.B., from Air Pilotage School (Cadre) (Inland Area) to No. 2 Squadron (Inland Area). 28.10.22. F. E. Johnson, from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Central Hospital (Coastal Area). 23.10.22. R. G. J. McCullagh, from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to Air Pilotage School (Cadre) (Inland Area). 23.10.22. J. M. Maxwell (Quartermaster Med.), from Army (R.A.M.C.) to Baghdad Combined Hospital (Iraq) on appointment to Permanent Commission as Quartermaster and Flight-Lieutenant (Medical) on transfer from Army; for duty as Quartermaster. 1.10.22. C. E. W. Foster, from No. 5 Flying Training School (Inland Area) to R.A.F. Depot (Inland Area) (Supernumerary). 27.10.22. H. A. Smith, M.C., from School of Naval Co-operation and Aerial Navigation (No. 230 Squadron) (Coastal Area) to No. 39 Squadron (Inland Area). 27.10.22. H. A. Whistler, D.S.O., D.F.C., from No. 2 Flying Training School (Inland Area) to R.A.F. Cadet College (Flying Wing) (Cranwell). 27.10.22. K. B. Lloyd, A.F.C., from No. 2 Flying Training School (Inland Area) to Central Flying School (Inland Area). 27.10.22. J. J. Breen, from M.T. Repair Depot (Inland Area) to Air Ministry (Dept. of A.M.P.) (D.D.O.). 8.11.22. W. Hodgson, O.B.E., from Air Ministry (Dept. of A.M.P.) (D.D.O.) to M.T. Repair Depot (Inland Area). 8.11.22. For duty as adjutant, T. Fawdry, M.B.E., from R.A.F. Depot (Inland Area) to Armament and Gunnery School (Inland Area). 1.11.22. H. E. Flavelle, from R.A.F. Base, Leuchars (Coastal Area), to Electrical and Wireless School (Inland Area). 31.10.22.

Col. Cuthbert Evans, C.B., C.M.G., D.S.O., to command Headquarters, Palestine, on appointment as G.S.O. 1; on attachment to Royal Air Force until 26.6.24. 15.5.22.

Brevet-Lieut.-Col. William Elliott, C.B.E., D.S.O. (R.A.S.C.), to command Headquarters, Palestine; on appointment as Deputy Asst. Director of Supplies and Transport; on attachment to the Royal Air Force for two years. 1.9.22.

Capt. A. H. Cope, D.S.O. (Devon R.), to command Headquarters, Palestine; on appointment as G.S.O. 3; on attachment to the Royal Air Force until 1.4.25. 15.5.22.

* * *

A "Roland Garros" Squadron

FROM Paris it is reported that a number of famous French "Aces" have formed a society to be known as "L'escadrille Roland Garros," and which is to take part in all important aviation meetings and also give exhibition flights. The "Escadrille" is chiefly intended to do propaganda work, and its president is M. Léon Bathiat. The idea originated with M. J. C. Bernard, who will take over the post of Secretary. M. Laurent Eynac, French Under-Secretary of State for Air, has received a deputation consisting of Sadi Lecointe, J. C. Bernard and Haeglen, and has officially sanctioned the formation of the squadron, promising at the same time a Government subsidy towards its expenses. Already the following French pilots have joined the Squadron: Sadi Lecointe, J. C. Bernard, Jean Casale, Haeglen, Fronval and Dominicis. Three Italian aviators, Scaroni, Ferrarin and Brach Papa, have joined, and Belgium is represented on the squadron by the Chevalier Willy Coppens. At the moment we do not know of any British "Ace" who has joined. The Squadron will be officially recognised, and M. Laurent Eynac will make full use of its services for propaganda purposes.

Aviation in Russia

RUMOUR is again busy with great aviation projects in Russia. It has been stated that a great fleet of 5,000 aeroplanes is being constructed in Russia by German designers and engineers, and that this fleet is to be used to establish aerial communications throughout Russian territory. At first it is intended to use German personnel both on the constructional and operational sides, but by degrees it is hoped to train a sufficient number of Russians to take over the entire running of the services. In the meantime, the opening thus provided for German engineers and financiers is thought to be excellent, and, to put it quite bluntly, to provide, at Russian expense, the training and experience which Allied restrictions prevent them from getting at home. The situation is not, however, without its dangers, and should be closely watched from this side. A fleet of 5,000 "red" Russian aeroplanes, even if ostensibly "commercial," is not pleasant to contemplate.

PERSONALS

Married

Flying Officer Bernard Leslie Blofeld, R.A.F., third surviving son of Mr. and Mrs. H. Blofeld, of the Woodlands, Sydenham Hill, was married on November 1 at Holy Trinity Church, Richmond, Surrey, to Dorothy Evelyn Firmin, widow of J. E. R. Firmin, Second Lieut., Wilts. Regt., and elder daughter of Mr. and Mrs. Arthur G. Chifferiel, of Inverleith, Denbigh Gardens, Richmond Hill.

William Wellington Hall, O.B.E. (late Major, R.A.F), youngest son of the late Henry Clifford Hall, of Reading, was married on November 1, at the Parish Church, Pangbourne, Berks., to Zoë Maud Luke, only daughter of the late Col. E. V. Luke, C.B., R.M.L.I., and Mrs. Luke, of Pangbourne.

Flight-Lieut. Ian M. Matheson, R.A.F., of Pollo, Ross-shire, was married on October 31 very quietly at Eastchurch, Kent, to Eileen May, only daughter of the late George Gamble of Winchester.

Killed

Flying Officer Frank S. Harricks, R.A.F., who was killed in action on October 24, at Rania, Iraq, was the son of A. S. and L. Harricks, Eden Glen, Pavilion Road, Bournemouth.

⁂ ⁂ ⁂ ⁂

THE "I.C.S." AND AVIATION

Already before the War the International Correspondence Schools, of International Buildings, Kingsway, W.C. 2, included among the many subjects taught by post that of aviation. Among those early I.C.S. students was, it may be recalled, the late Mr. Robert Slack, who flew a Blériot, and later Morane, monoplane in 1911, 1912 and 1913. Mr. Slack won a prize presented by the I.C.S., if we remember rightly, and his great practical knowledge of his machine and engine proved that the I.C.S. course was sound and practical.

Then came the War, and for some years the aviation course was dropped, owing chiefly to the difficulty of keeping up to date in aviation matters. The course has now been entirely re-written, and has furthermore been extended very considerably. Not only so, but by subdividing the course into several branches, it has been possible to reduce the price for any one section, while those wishing to cover the entire ground can do so by taking the "Complete Aeronautical Engineering" Course.

The "Aeroplane Designer's" Course has been arranged to give instruction in such subjects as come within the scope of draughtsmen and designers in an aircraft office, dealing with aerodynamical as well as structural calculations.

Another course, "Special Pilot's," has been drawn up from information supplied by the Air Ministry to assist intending candidates for examinations for a Class A or Class B pilot's licence. It deals thoroughly with, in addition to the ordinary introductory papers on arithmetic, etc., with engines and aeroplanes, as well as with navigation, meteorology, etc.

The "Complete Aero Fitter's and Rigger's" Course includes both aeroplanes and engines, while the "Aeroplane Fitter's and Rigger's" course deals with machines only, and does not include papers on engines. The "Aero Engine Fitter's and Rigger's" Course deals entirely with engines, and does not touch work in connection with the machine.

Finally the International Correspondence Schools' aviation section includes five different "Ground Engineer's" special courses, drawn up to help those wishing to enter for Air Ministry examinations for ground engineers in Categories A, B, C, D and E.

Altogether the I.C.S. courses appear to include every phase except actual flying, and we would advise those interested to write to International Correspondence Schools, Ltd., International Buildings, Kingsway, W.C. 2.

⁂ ⁂ ⁂ ⁂

Royal Air Force Sports Board

Arrangements for November, 1922

Saturday, November 11.—Fencing (R.A.F. *v.* Cambridge University), Cambridge.

Wednesday, November 15.—Rugby (R.A.F. (Cadet) College *v.* R.M.C.), Cranwell.

Saturday, November 18.—Rugby (1st round of Cup Competition to be completed), Cranwell.

Wednesday, November 22.—Fencing (R.A.F. *v.* Royal Navy), Uxbridge.

Wednesday, November 22.—Association (2nd round of Cup Competition to be completed), Uxbridge.

Saturday, November 25.—Rugby (An Air Force XV *v.* R.A.F. (Cadet) College), Cranwell.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association)

The postponed competition for Mr. D. H. Pilcher's Challenge Cup will be held on Hackney Marshes on Sunday, November 19, at 12 noon. For full particulars see Flight, September 28.

On Sunday, November 26, a Gliding Competition has been arranged on Wimbledon Common. For full particulars see Flight, October 5.

On Saturday last at Sudbury, Messrs. Evans, Green, Johnson, Rippon and Rasmussen put in some good experimental work with their gliders.

On Sunday last members turned up in large numbers at Parliament Hill and gave an excellent display of model aeroplane flying and model gliding, to the delight of all present. Messrs. Pathé Frères' camera-men were also present and took a film. Some excellent new models were flown and made splendid flights.

Last Friday, at Headquarters, many of the members who visited Itford gave their views on the full-sized Gliding Competition, and an interesting discussion followed.

Our many members conveyed a practical and sincere congratulation to Mr. A. E. Jones by presenting him with a silver dish as a wedding gift. Mr. W. E. Evans, in making the presentation, dwelt on the sustained energy and resource shown by Mr. Jones on behalf of the Society, and his remarks were keenly endorsed by all members. Mr. A. E. Jones thanked the members for the good wishes, and said the token presented to him would be a constant reminder of many friends. In joining Mrs. A. E. Jones with his own appreciation, he assured the members their gift would be one of their most valued possessions.

On Friday next, at Headquarters, 20, Great Windmill Street, Piccadilly Circus, at 7.30 p.m., Mr. D. A. Pavely will open a discussion on the subject of "Wing Sections." All interested are invited to attend.

A. B. CLARK,
Technical Secretary.

⁂ ⁂ ⁂ ⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motor.

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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Published November 6, 1922

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19,174. A. A. Holle and Commercial Aeroplane Wing Synd., Ltd. Aerofoils. (187,318.)

22,725. F. J. Coughlin. Parachutes. (187,395.)

23,916. G. M. Forbes. Rotary engines. (187,418.)

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Published November 6, 1922

15,855. R. Meyer. Rotary engines. (181,366.)

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xiv.)

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Nov. 16	**Lecture, "The Co-relation of Model and Full-scale Work," by R. McKinnon Wood, before R.Ae.S.**
Nov. 17	**Lecture, "Oleo Undercarriage Design," by G. H. Dowty, before I. of Ae.E.**
Nov. 30	**Closing date for FLIGHT Glider Designing Competition**
Dec. 1	**Lecture, "Constructional Design of Aeroplanes," by C. W. Tinson, before I.Ae.E.**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
June	**International Air Congress, London**
Dec. 1	**Entries close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**
Mar. 15	**Entries close for Dutch Height Indicator Competition**

EDITORIAL COMMENT.

Britain at "ILUG"

DURING the summer of 1923 an important International Exhibition will be held at Gothenburg, Sweden, to celebrate the 300th anniversary of the foundation of that important Swedish seaport. The exhibition is to open in May, and will not close until the end of September. During part of that period—from July 20 to August 12, to be exact—an International Aircraft Exhibition is to be embodied which will, it is hoped, include representative contributions from the leading nations. Not only is it intended to exhibit aeroplanes, seaplanes, airships, equipment, etc., but it is hoped that it will be possible to arrange for squadrons from the air services of various countries to fly to Gothenburg, and to take part in demonstrations, competitions, etc., there.

In our Editorial Comments in last week's issue we referred to the formation of a propaganda squadron in France, and pointed out that some similar squadron, if formed in this country, could very usefully take part in the Swedish exhibition, and thus help in no small measure in doing useful propaganda work for British aircraft, as well as "showing the flag" in the most modern way, much as the Navy has done in the past. We still think that, under the exceptional position of aviation, the formation of such a squadron would be advisable, but, failing that, why should not the R.A.F. send a Squadron to Gothenburg for the three weeks that the exhibition is open? It is scarcely to be doubted that France will send her newly-formed propaganda squadron, and it will certainly not do for Great Britain to be unrepresented at the meeting.

Apart from the Service section, this country should be strongly represented on the civil aviation side. We know, and the majority of foreign nations know, that British aircraft is second to none in the world. But if we let other countries get ahead of us by sending aircraft, aircraft commissions, etc., all over the world, in many instances the people on the spot will snap up the business, no matter how good our machines may be. It will be a very considerable expense for our aircraft constructors to send machines to Sweden, and although a few of them might manage to do so in spite of the unfavourable times, to be really representative a considerable number of different types should be sent.

This means that it is a matter for the British aviation industry collectively, rather than for individual firms, to tackle, and in this connection it should be up to the Government to render the assistance necessary. We strongly urge the Air Ministry to back up the Director of Civil Aviation with the Treasury. It is more than advisable, it is a necessity, for Great Britain to be well represented at Gothenburg. Elsewhere in this issue we publish a brief account of a gathering of the Swedish representatives of the "ILUG" (*Internationale Luftfarts Utställningen, Göteborg*) and representatives of the British aircraft industry at the Hôtel Métropole, at which the question of British participation was discussed. We sincerely trust that by the combined action of the S.B.A.C. and the Air Ministry the Treasury may be persuaded to grant such a sum towards the expenses incurred, that British aircraft may not be placed at a disadvantage compared with the aircraft of other nations.

◆ ◆ ◆

"Wanted," a Prize for Low-Power Aeroplanes

While the 1,000-guinea Prize, so generously offered by Mr. Gordon Selfridge, will undoubtedly do a great deal towards encouraging the development of gliders and the sport of gliding, and while hoping that several smaller prizes may be forthcoming for competition during next year, we cannot help thinking that, in the enthusiasm for gliding as a sport with great possibilities, owing to its low cost, we should not lose sight of the even greater future which may—we would even venture to say does—lie before the power-driven aeroplane with very small engine.

Let us not forget that A. V. Roe succeeded—12 years ago or more—in flying with an engine of 9 h.p., in spite of the very scant knowledge which we then had of aerodynamics and of aircraft construction. Surely if Roe could do what he did in 1909 or so, we could do very much better today, with the knowledge gained during the intervening years.

As a matter of fact, there is not the slightest reason to doubt that a small, light machine, weighing about 500 to 550 lbs., could be built today which would fly at about 40-45 m.p.h. if fitted with an engine of 12–15 h.p. To keep the "power-required" figure low, the machine would have to be lightly loaded, which would mean that the top speed would not be very high; in fact, it would have to be below the landing speed of a good many modern commercial aeroplanes. But one result of this would be that such a machine could land at 30 m.p.h. or less, could be put down in almost any field, and could, if properly designed, be made practically "fool-proof."

Now, in the present state of hand-to-mouth existence of the majority of our aircraft firms, there is very little money to spend on experiments. What, it seems to us is wanted, is an offer by some wealthy patron of aviation of a prize of £1,000 or so for the machine with a small engine which has the best all-round performance. Probably the best procedure would be to limit the engine cylinder capacity to a certain figure, and then award the prize to the entrant of the machine which did the best performance, awarding points for speed-range, climb, ceiling, cheapness of construction, stability and general "fool-proof" qualities. If a prize were offered on these conditions there is little doubt that a number of engine and aircraft designers would be willing to enter on a "fifty-fifty" basis. At the present moment such a machine does not exist, and what is, perhaps, even more important, no really suitable engine for the purpose exists.

The majority of motor-cycle engines are somewhat inefficient, and are too heavy for the purpose. As it would probably be necessary to gear down the propeller in order to get good efficiency, some form of transmission would have to be incorporated. For such powers as are contemplated, however, probably a simple chain transmission would serve very well, unless an engine were produced somewhat on the lines of the Henry Potez exhibited at one of the Paris Aero shows, in which the cylinders pointed forward, the crankshaft being vertical and driving the airscrew through bevel reduction gearing.

There can be no possible doubt that a machine costing about £200, doing 40–50 miles per gallon of petrol and capable of landing in small fields, would find a ready market both at home and in the colonies, and although a machine of that speed could not always be guaranteed to make headway against strong winds, flying on it should be possible on a very large percentage of days during the year. A prize of £1,000 or so would ensure that several such machines would be produced, and we should then see the beginning of real sporting aviation. Who will come forward?

◆ ◆ ◆

Airworthiness Certificates for Small Machines

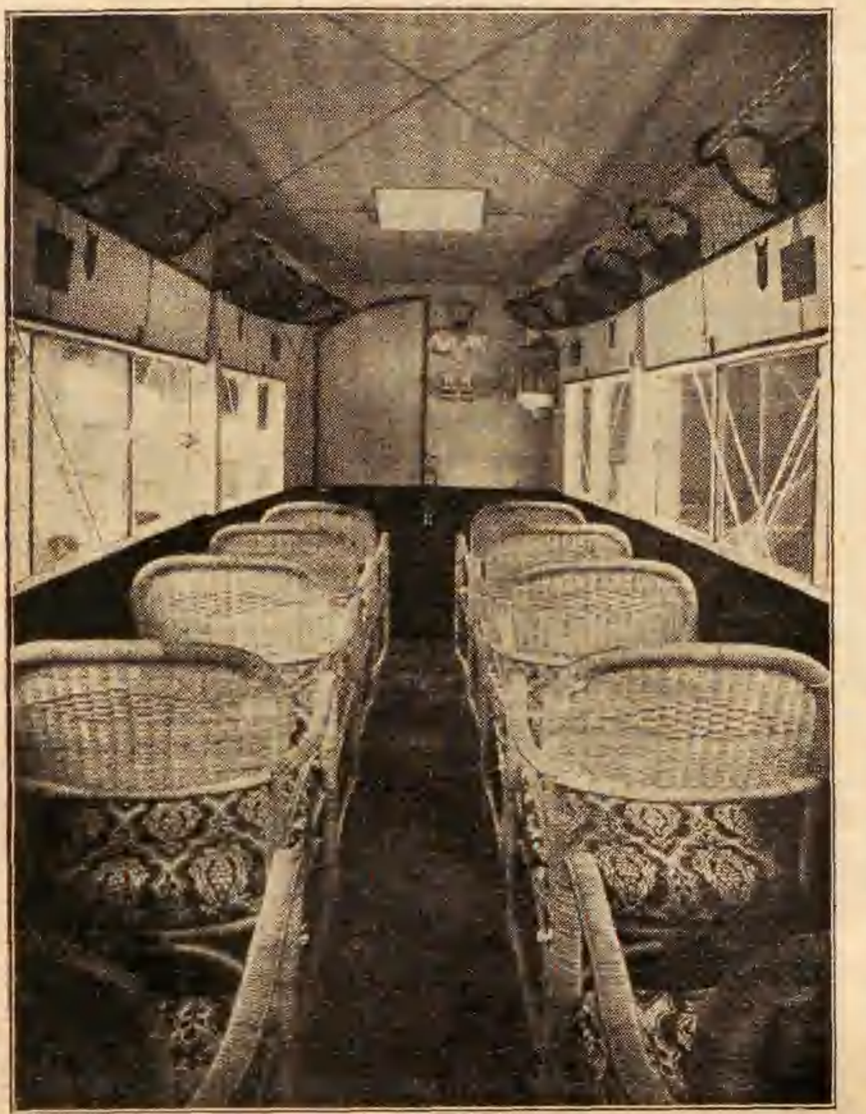
In connection with the low-power sporting aeroplane, a serious handicap to the development of this type exists in the form of heavy fees for airworthiness certificates. The lowest fee charged for such a certificate for a type aircraft is £65. Now it will be obvious that if a machine is to be produced at a cost of £150 to £200, such a fee is out of all proportion. It is conceivable that a goodly number of such machines would be built by amateur enthusiasts, and to hamper development by insisting on the payment of a fee of £65 is ridiculous, especially in view of the fact that the unnecessarily rigid regulations make obtaining the certificate compulsory. That there must be safeguards we readily grant, but in this case we cannot see that the regulation is anything but red tape gone mad.

There are not such a great number of new types being developed at the moment that the "stress-merchant" section at the Air Ministry—which has to be kept on whether or not any new machines are being produced at all—is working overtime. Surely these experts could easily manage to "stress-up" a few sporting aeroplanes at odd moments for a fee of £5 or so.

To make it any larger is merely hindering progress, and the present minimum of £65 is a fee which cannot be justified or tolerated. It is not as if stressing a machine according to stereotyped rules were a highly scientific procedure. Aeroplanes are not, in spite of, as Mr. North said in his paper before the Royal Aeronautical Society, "some pretence and humbug to the contrary," designed by science but by art, and to impose such fees for the checking of a few figures according to routine methods is the height of absurdity.

THE HANDLEY PAGE W 8 C

Two Rolls-Royce "Eagle" Engines

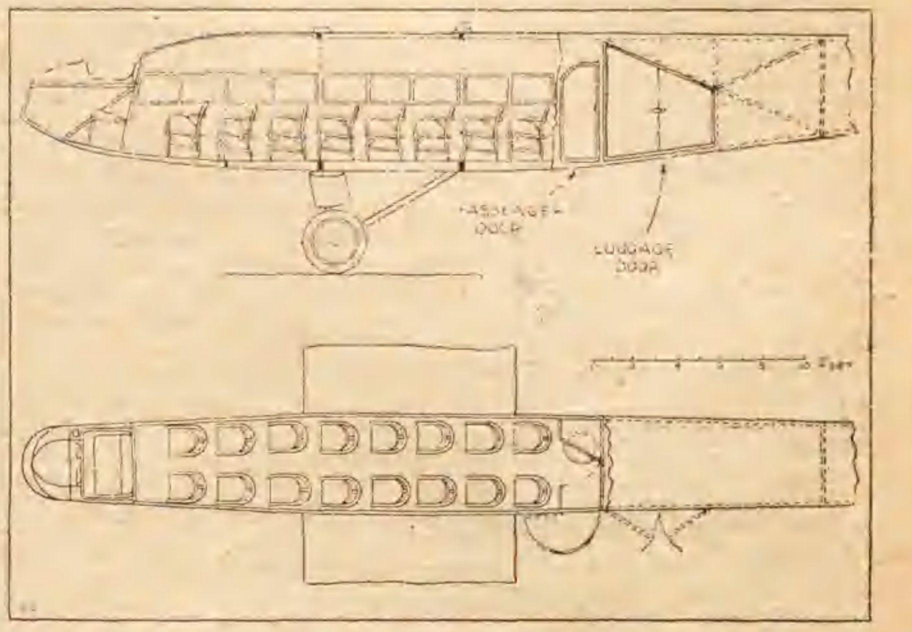


The Handley Page W 8 C : This photograph was taken inside the saloon of one of the W 8 B machines, but the saloon of the new type will look exactly similar, except that there will be 16 seats instead of 12.

Experience having shown, and the new arrangement of the services (whereby Handley Page Transport, Ltd., operate the London-Paris route only) accentuating the fact, that it pays to carry passengers in preference to goods, Handley Page, Ltd., of Cricklewood, have decided to build for next year's services a modified type of twin-engined machine which will have passenger accommodation for 16 passengers instead of the 12 passengers for which the present W 8 B's were designed. The new machines will differ but slightly in outward appearance, and not at all aerodynamically, from the older type, which has proved so successful during the past year.

The W 8 C, as the new model will be called, will have approximately the same total loaded weight as the W 8 B, but the cabin is to be lengthened to give room for four more seats, while the freight carried aft of the cabin will be reduced by an amount equivalent to that of the four extra passengers. The extra length is to be obtained by doing away with the wireless compartment which, in the W 8 B, separates the cabin from the pilot's cockpit.

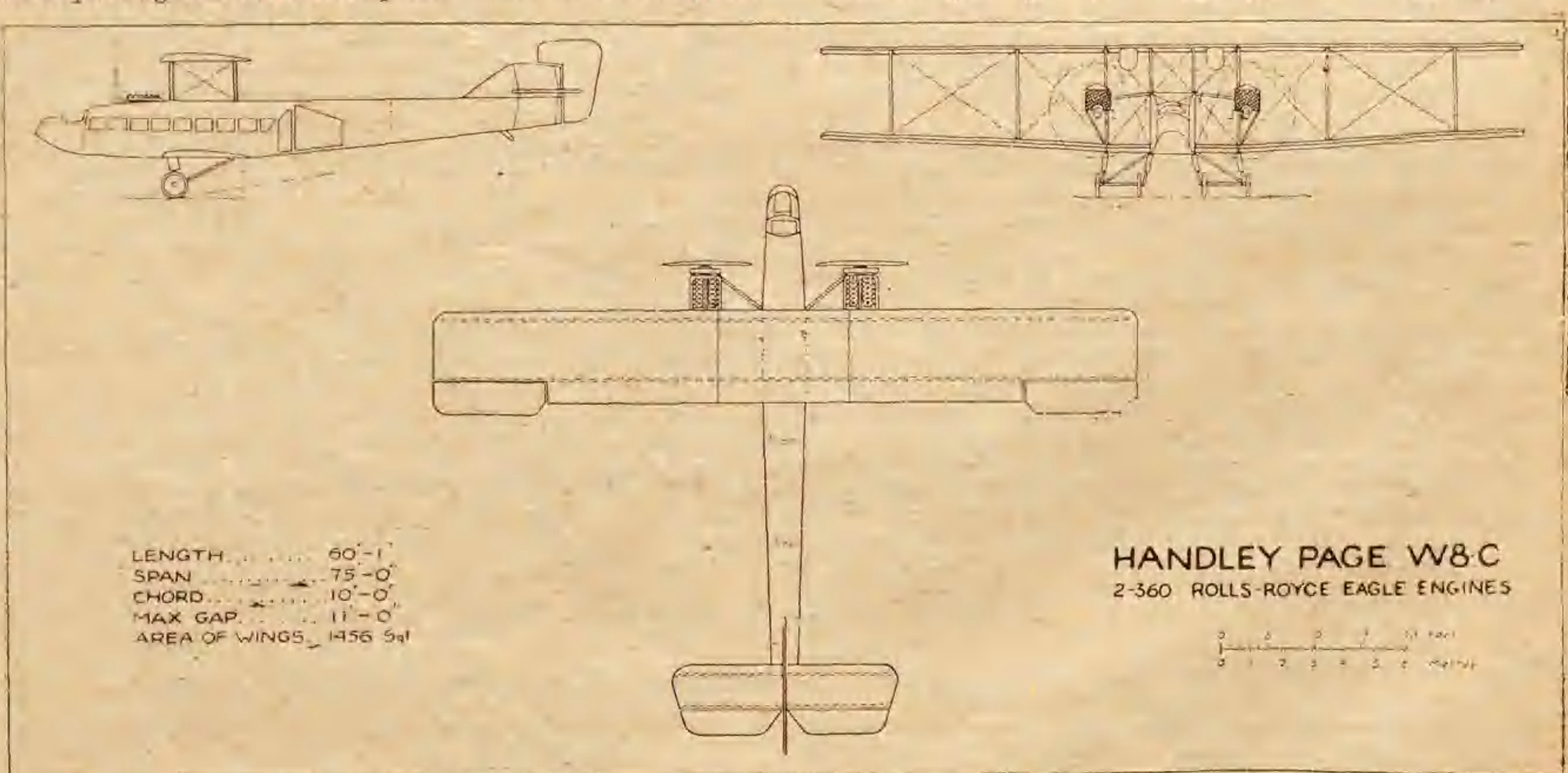
The total loaded weight of 12,500 lbs. of the W 8 C will be composed as follows :—Weight of machine light (but with cooling water), 7,200 lbs. ; pilot, 160 lbs. ; petrol for 3¼ hours (137 gallons), 1,000 lbs. ; oil (10 gallons), 100 lbs. ; 16 passengers (at 180 lbs.), 2,880 lbs. ; freight, 1,160 lbs.



The Handley Page W 8 C : Section and plan of Saloon.

The performance will, of course, depend somewhat upon the load carried ; but it is of interest to compare the performance with full load with that attained when passengers only, and no freight, are carried. These figures, it should be noted, are certified and not estimated figures :—

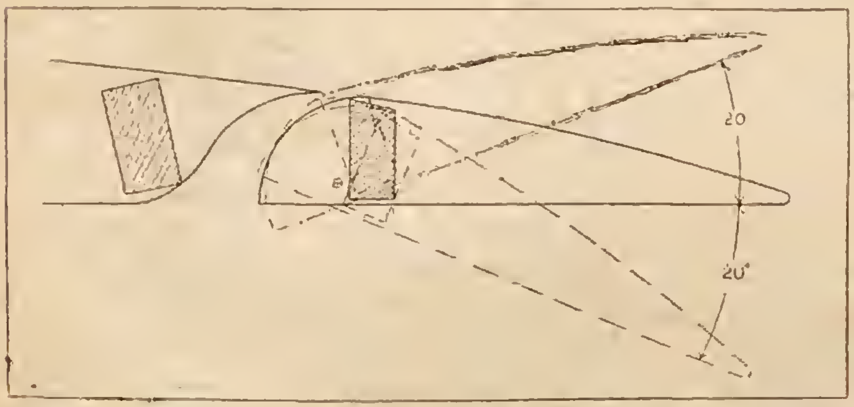
Loaded weight ..	12,500 lbs.	11,500 lbs.
Max. speed at 1,000 ft.	96 m.p.h.	101 m.p.h.
Ground rate of climb	370 ft./min.	425 ft./min.
Service ceiling ..	7,500 ft.	8,700 ft.
Landing speed ..	44 m.p.h.	42 m.p.h.
Run to "get off" ..	320 yards	300 yards
Run to "pull up" ..	240 ,,	240 ,,



The Handley Page W 8 C : General Arrangement Drawings.

The cruising speed will naturally vary somewhat according to the load carried, but it is expected that an average of about 85 m.p.h. will be maintained. Taking the power of the Rolls-Royce "Eagle" engines as 360 h.p. each, the power expenditure per passenger carried (with full load, of course) is 45 h.p., which is a very reasonable figure, considering that the speed (at full power) is round about 100 m.p.h. At cruising speed the economy is naturally even better. Looked at in another way, the useful load carried is 4,040 lbs., or 5·6 lbs./h.p. at maximum power; somewhat greater at power corresponding to cruising speed. From the point of view of performance, it cannot be denied that there are in existence single-engined machines which, with the same power expenditure per passenger, have a considerably greater speed; but the makers and users of the Handley Page aeroplanes maintain that the speed is sufficient, while the splitting-up of the power plant into two units results in greater security, as simultaneous failure of both engines is a most unlikely happening.

In this connection it is of interest to remark that tests at Martlesham Heath have shown that, with a weight of 12,500 lbs., the machine can be flown straight, although losing height slightly, whereas with slightly less than full load, *i.e.*, when the total weight is about 11,500 lbs., the machine will actually remain aloft with only one engine running. As it is probably not on a great percentage of trips that machines are loaded up to the maximum of their capacity, it is claimed that the twin-engined machine affords every chance of reaching a safe emergency landing ground in case of engine failure, and certainly the record of Handley Page Transport on the London-Paris route would appear to bear out this contention. Another feature of the W 8 B's, which will be retained in the W 8 C, is the low landing speed. The actual figure is round about 40 or 42 m.p.h., but it appears to be less, probably owing to the size of the machine. In watching the Handley Page machines "float" into Croydon aerodrome, one never has the anxious feeling with which one often watches small, fast machines, and if experience has proved that the lower top speed is sufficient, there does not appear to be any very good cause for retaining high landing speeds. The subject is, however, a controversial one, and one upon which we do not propose to enter here.



The Handley Page W 8 C: Diagram of slotted and balanced aileron

As already mentioned, the main alteration will be to the saloon, the length of which is to be increased to 23 ft., so as to afford accommodation for 16 seats, placed along the sides of the cabin, with a passage down the centre. In the W 8 B there was a wireless compartment between the saloon and the pilot's cockpit. In the latest model this will be omitted, and the cabin will extend forward right up to the bulkhead behind the pilot. One result of this arrangement will be that the passengers—those in the front seats, at any rate—will obtain a very excellent view, and as a matter of fact, all passengers in a Handley Page have a fairly good view, owing to the placing of the Rolls-Royce engines well up in the gap between the wings and forward of the leading edge.

The cabin arrangement, apart from the extra seats, will follow closely that of the older machines. Entrance is by a door on the port side, this door being securely fastened before the machine leaves the ground. On the forward wall of the cabin will be mounted such instruments as clock, altimeter and airspeed indicator. A map of the route will also be placed on the wall, so that passengers will be able to follow the progress of the machine, a fact which adds considerably to the interest of the journey. A door will communicate with the pilot's cockpit, should it become necessary for any reason to do so. At the aft end of the saloon will be a lavatory, similarly arranged to that of the W 8 B's, in which, during the journey, a transverse door separates it from the saloon. On landing this door closes back and shuts off entirely the lavatory, while giving access to the exit. This arrangement is particularly neat, and saves a considerable amount of space.

Large Triplex windows will be provided in both sides of the saloon, some of which will be made to open, thus forming emergency exits. Further exits will be provided in the form of ripping panels, so that in case of emergency the passengers should be able to leave the cabin in a minimum of time.

Behind the saloon will be a large freight compartment, measuring 10 ft. in length by 3 ft. 6 ins. in width, and having an average height of 5 ft. 2 ins. The cubic capacity of this compartment will be 178 cu. ft. The door in the port side leading to this compartment will be of large dimensions, and will open in the centre so as to leave an unobstructed opening through which bulky goods may be passed. In order to trim the machine according to load, the man who looks after the loading will know how great is the weight of the contents of the freight compartment, and if heavy freight is carried and the saloon is not full, the aft seats will be locked by a strap running across from one arm rest to the other, thus preventing the passengers from using these seats and thus make the machine tail-heavy. (A wag has suggested that a more positive method would be to lock the passengers in their seats by aforesaid straps, but some might object to this procedure!)

The pilot, placed as he is in the nose of the fuselage, will have a particularly good view in all directions. An extra seat will be provided next to the pilot, for use by an engineer or navigator, should it be desired to carry one for special purposes. A complete wireless outfit will be carried, and it is possible that a "listening-in" set will be fitted in the saloon for the benefit of the passengers.

The power plant will consist of two Rolls-Royce "Eagle" engines, mounted on a structure of steel tubes some distance above and in front of the lower plane. The engines will not be cowled-in, with the result that smaller radiators can be fitted, while access to the engines, or even their removal and replacement, will be greatly facilitated.

As in the W 8 B, the main petrol tanks will be gravity tanks, thus avoiding all pumps, piping, etc. In the new machines, however, the tanks will be slung underneath the top plane, and not mounted on top of it. Each tank will have a capacity of 100 gallons, and the petrol will flow to the engines through metal tubes, incorporating metal couplings of the R.A.F. pattern so as to avoid the use of rubber in the petrol system.

It has been stated that aerodynamically the W 8 C will not differ at all from the W 8 B. This is not strictly accurate, as slotted ailerons will be fitted. The section of these is shown in the accompanying diagram. As the aileron trailing edge moves down, the slot is opened, while on the opposite side the aileron moving up closes its slot. Normally the slots are very slightly open, but as they are the same on both sides, this will not affect the flying of the machine. It should be pointed out that this form of aileron has been found to give excellent results. Not only are slotted ailerons very effective, so that a very small movement suffices, but they have been found to retain their effectiveness right up to the stalling angle of the wings, while the forward projection serves as a balance, and the load on the control column is quite small in proportion to the rolling couple produced by the ailerons.

Although Rolls-Royce engines will be fitted as standard, Napier "Lion" engines of 450 h.p. each may be fitted with this type of machine, with a resulting improvement in performance. The weight will then remain practically the same as before, but the performance will be: Maximum speed near ground, 120 m.p.h.; ground rate of climb, 750 ft./min.; service ceiling, 12,000 ft.; landing speed, 44 m.p.h.

* * *

Wireless-controlled 'Planes in America

From Washington it is announced that the U.S. Army Air Service have recently made very successful tests with wireless-controlled aeroplanes. It is reported that flights of over ninety miles have been made by machines carrying no pilot, being controlled by wireless from a ground base. So successful are the tests said to have been that American authorities have declared that one can now foresee the possibility of making aircraft which, controlled by wireless from a ground base, will carry great loads of bombs to a distant point and either crash there with their load or drop the bombs, the machine returning to its base.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of Flight, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

Only two more weeks remain in which to send in designs for gliders for the competition organised by the proprietors of Flight. The closing date is November 30, and no designs submitted after that date will be considered in connection with the competition. All drawings submitted must be in Indian ink on white paper or tracing cloth, and the proportions of sheets should be such as will reduce to a full page in Flight.

* * *

General arrangement drawings, comprising side elevations, front elevations and plans, must be sent, and all areas and main dimensions marked on the drawings. Details of main constructional features must be sent, although working drawings of every minor detail are not insisted upon.

* * *

Aerodynamical estimates, a chart of gliding angles and stress diagrams of the more important structural members must be sent. The estimates must be based upon recognised data of wing sections, etc., and the source of the information upon which the estimates are based must be stated.

* * *

All drawings, tables, sheets of matter, etc., must be marked plainly with a *nom de plume*, and an envelope containing the name and address of competitor, and marked on the outside with the *nom de plume* chosen, must accompany all designs submitted. The designs will be judged without the judges being aware of the identity of the authors, as the envelopes containing the proper names will not be opened until after the awards have been made.

* * *

Full particulars of the regulations were published in our issue of August 31, 1922.

* * *

November 30, do not forget.

* * *

With reference to our remarks in last week's issue on the competition for the Selfridge £1,000 Prize for covering a distance of 50 miles in a glider, we have received from Mr. J. F. Leeming, of 38, Albert Road, Hale, Cheshire, the following communication :—

"This prize is, I take it, offered for open competition to the whole of Great Britain, and the suggestion that the official starting-point should be fixed either on the North or South Downs places Scottish and northern competitors at a serious disadvantage. The cost of sending a glider by train or road from such a place as, say, Manchester would in most cases prevent the entry of northern flyers ; remember that most of the new glider pilots are not wealthy men, but simply taking the hobby up as a sport, and cannot afford to spend £100 or so in carriage, storage and lodgings for the pilot and assistant. The fairest starting-place—if a fixed starting-place must be named—would be somewhere in the centre of England ; or, better still, why not allow the glider to start from any point in Great Britain ? This would allow the pilot to choose the best weather, and each would have the advantage of knowing something of the country he was to fly over. By fixing a given point in the south of England the local man would not only know the ground better, but be on the spot with all the advantage that means. I quite realise that a place handy for London is a convenience for R.Ae.C. officials and others, but what about the northern and western flyers ? Gliding is being taken up in the north just as keenly as round London.

"I speak as one not new to gliding, for as far back as 1911 a description of one of my gliders was published in the old *Aero*, and I am simply appealing for fair play for the northern flyers."

* * *

There is certainly a good deal to be said for our correspondent's suggestion of letting competitors start from any point they choose ; but the expense of sending Royal Aero Club officials all over the country would be very considerable. Perhaps, however, it might be possible to divide the country into a (relatively small) number of districts, and to appoint locally representatives of the R.Ae.C. to act as official timekeepers and observers. It should not be necessary to have more than four districts (if this number of suitable districts can be found), and in this manner competitors should not be obliged to travel very far from home. To let every competitor start from any point he preferred would entail a number of officials greater than the number of competitors, and is obviously unworkable.

* * *

From Germany it is reported that some of the competitors who had taken part in the Rhön gliding competitions have found themselves without sufficient cash to send their machines home, the railway freight charges having been doubled since the machines were sent to Rhön, and that as a result several students have had to start on foot, towing their machines. From Berlin a party of students is said to have started out to meet their comrades, and to be attempting to collect sufficient funds to enable the machines to be sent home by rail. If the story is true, we must say we admire the grit of the students who chose this means of getting their machine home rather than leave it to rot in the Rhön hills.

* * *

The regulations for the Dreyfus Prize for gliding have now been drawn up. The prize is divided into two sections of 10,000 francs each. The first section will be awarded to the French pilot on a French machine who, before April 30, 1923, has covered the greatest distance in a closed circuit, the distance to be at least 25 kms. (15½ miles). For the second 10,000 francs the time limit is April 30, 1924, and the regulations are the same, with the exception that the minimum distance to be covered is 75 kms. (46½ miles). In addition to the prizes M. George Dreyfus has also offered a cup, which will be won permanently by the winner of the second year's prize, although the winner of the first year's prize will temporarily be the holder of the cup. We do not know what, in the opinion of the judges, will constitute a "closed circuit." Strictly speaking, a flight up and down a range of hills, 7¾ miles each way, would be a closed circuit, provided the homeward trip was made further away from, or closer to, the hill-side than the outward journey. If this interpretation is allowed, it should not be difficult to win the prize, but probably a course approaching more to a circle will be insisted upon.

* * *

At a banquet given on November 14 by the French Society "Vieilles Tiges" (freely translated "Old Beans") M. Laurent Eynac, French Under-Secretary of State for Air, handed the Cross of the Legion of Honour to M. Maneyrol in recognition of his performance in the *Daily Mail* Competition, when he remained in the air for 3 hrs. 21 mins. 7 secs., thus establishing a world's duration record. We wonder what official recognition Raynham would have received had he been the successful competitor.

* * *

The de Havilland Aircraft Co. are at present engaged upon the design of a small sporting machine, to be fitted with a low-power engine. We are not, at the moment, allowed to publish any details, but it may be stated that the engine will not be of more than 12-15 h.p. and that the machine will be able to fly at very low speed so as to alight in quite small fields and—what is, perhaps, more important still—get out of fairly restricted areas. It is hoped, in spite of the low engine power, to have a considerable margin available, so that the engine will not need to be run all-out except for getting off.

* * *

In reply to a number of enquiries we have received regarding the small two-cylinder opposed engine exhibited at one of the Paris Aero shows by the Clerget firm, we learn that this engine is no longer being manufactured, and that, as a matter of fact, only one or two experimental engines were made. Perhaps, in view of the revived interest in the "moto-aviette," the firm may be tempted to reconsider their decision. The engine was a very pretty piece of work, and its 16 h.p. was just about the right size for a really low-power machine. The drive was, however, direct, and it appears probable that to get good airscrew efficiency with the low horizontal speeds that will be attained, some form of gearing might be advisable.

* * *

A competition for model gliders was held at the Hamble works of A. V. Roe and Co. on Sunday last for a prize offered by Mr. C. W. Tinson. Thirty-five models had been entered, and twenty-four faced the starter. Mr. Tinson's prize was for £1, and was won by Mr. Frank Bastow, whose model made several glides of between 450 and 500 ft. (starting from a water tower 60 ft. high). Subsidiary prizes were offered by Mr. A. V. Roe, Mr. Blazdell, Mr. Colvert and Mr. Roferson. Mr. Tinson has since obtained the remarkable distance of 920 ft. (or a gliding angle of 1 in 15½) with a paper model weighing 1½ ozs. The model was flying against the wind for the greater part of the time, and while out over the aerodrome, where one would not expect any up-currents, it darted up from a height of about 12 ft. to over 50 ft. from the ground.

An Opportunity for the British Aircraft Industry

The official *Gazette* of Madrid announces that the Spanish Government is asking for tenders for seventy aeroplanes of three different types, *i.e.*, thirty "Chasers," thirty Reconnaissance machines, and ten Bombers. These tenders should form an excellent opportunity for the British aircraft industry, as doubtless the types accepted will be definitely adopted by the Spanish Government.

Already there are in Spain a fair number of British machines, and they are all well liked by the Spanish pilots. Owing, however, to intensive French propaganda, the French industry has scored rather heavily, indicating once more the extremely great value of timely and consistent propaganda where aircraft is concerned. The assistance given to French aircraft firms by the French Government has enabled them to send out missions to a number of countries, with the result that French machines have, in many instances, been adopted, whereas if British firms had been equally well represented there is little doubt that this country would have received a good many more orders than has been the case.

Spain is a country offering great possibilities, and signs are not lacking that it intends to take up aviation on quite a large scale. This will be even more the case when the proposed airship route to South America begins operations. In preparation for that time it is worth while to get British aircraft introduced in the largest possible numbers, and the present demand for tenders would appear to offer an excellent opportunity for doing so.

Manchester Chamber of Commerce Support Aviation

The importance of rapid transit is appreciated nowhere in the world more than in Manchester, and the constant success of the Daimler Airways Manchester–London service is already bearing valuable fruit. On November 13 the service was referred to at a meeting of the Manchester Chamber of Commerce by the President, Mr. W. Clare Lees. Manchester, he said, with its large foreign trade, offered a splendid opening for the development of an aerial mail service, and it was the business of the commercial community to let the aviation companies and the Post Office authorities know what developments to the air service would be of most service to trade. He, therefore, proposed that the chamber should form a committee to watch commercial aviation. The committee would be composed of members having interests in Manchester's foreign trade, together with men whose practical experience of aviation would enable the committee to keep its discussion within the bounds of possibilities.

The board unanimously approved of the formation of a committee, with the president as chairman.

German Aircraft Firm in Denmark

From Copenhagen it is reported that arrangements have been completed for the German "Rofawerke" to establish a branch in Denmark. Mr. Erik Hildesheim, who, in spite of his German name, is a Dane, is mentioned as the Danish manager, and it is stated that Herr Ing. Rohrbach will be technical director of the new firm. At first it is intended, the report states, to build twin-engined seaplanes fitted with two Rolls-Royce "Eagle" engines.

With reference to above announcement, we have received from Rolls-Royce, Ltd., the following statement:—

"We should be obliged if you would make it clear to your readers that we are not supplying engines to the Rofawerke firm, nor have we had any communication with them.

"It seems probable, therefore, that if the Rofawerke firm are fitting Rolls-Royce aero engines to aircraft intended for German use the engines are the old type of engine (known as 'Eagle VIII'), which were designed and built many years ago, and are now completely out of date. We are now producing a later and considerably improved design known as the 'Eagle IX.'

"It is known that the British Government had a large number of the now obsolete 'Eagle VIII' engines on hand at the time of the Armistice, and we believe that these redundant engines are still being disposed of, directly or indirectly, to foreign governments and others.

"B. Johnson, General Manager, Rolls-Royce, Ltd.,
14-15, Conduit Street, W. 1. Nov. 10, 1922."

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN NOVEMBER 5 AND NOVEMBER 11, INCLUSIVE

Route (including certain diverted journeys)	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	12	34	4	9	10	2 41	H.P.W.8B G-EBBG (2h. 11m.)	B. (1), D.H. 9 (3), G. (5), H.P.W.8B (3).
Paris–Croydon	12	32	2	8	9	3 1	H-P.W8B G-EBBG (2h. 27m.)	B. (1), D.H. 9 (2), G. (4), H.P.W.8B. (3).
Croydon–Brussels–Cologne	4‡	10	1	—	4	4 1	D.H. 18 G-EAWX (3h. 37m.)	D.H. 4 (1), D.H. 18 (1), D.H. 34 (2).
Cologne–Brussels–Croydon	4§	16	3	—	4	5 18	D.H. 18 G-EAWW (4h. 46m.)	D.H. 4 (1), D.H. 18 (1), D.H. 34 (2).
Croydon–Rotterdam ...	5	5	5	5	5	2 29	Fokker H-NABM (1h. 53m.)	F. (4).
Rotterdam–Croydon ...	3	—	3	3	3	3 22	Fokker H-NABR (2h. 54m.)	F. (3).
Manchester–Croydon–Amsterdam	7‖	42	1	—	6	5 8	D.H 34 G-EBBY (5h. 2m.)	D.H. 34 (3).
Amsterdam–Croydon–Manchester	10¶	30	3	2	10	—	—	D.H. 9 (1), D.H. 34 (3).
Total for week ...	57	169	22	27	51			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ Croy.–Brus. 1. § Brus.–Croy. 1. ‖ Man.–Croy. 3, Croy.–A'dam. 2. ¶ A'dam.–Croy. 4, Croy.–Man. 6.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad. Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes.

Incidental Flying.—Messrs. Courtney, Macmillan, Perry, Piercey and Capt. Stocken between them tested five Avros and one D.H. 9 at Croydon for the Aircraft Disposal Co., and flew them to Brussels.

LONDON TERMINAL AERODROME

Monday evening, November 6.

A WONDERFUL mixture of weather during the past week has interfered with the regularity of all the services, but on no day has it managed to hold up flying completely. On Wednesday one of the worst gales experienced on the "airways" for some considerable time was responsible for the cancelling of the Paris and Cologne services; but the K.L.M. and Daimler Airway ran certain of their services on the Manchester-London-Amsterdam route. From Manchester, a Daimler 34, piloted by Mr. Robertson, and carrying six passengers, had a three-hours' fight with the gale before finally alighting at Croydon, while Mr. Herne, piloting another Daimler 34 from Amsterdam to Croydon, had to land no fewer than three times in order to fill up with petrol. His total flying time was over five hours, but, despite the head wind and the buffeting, he succeeded in reaching Croydon. From Croydon to Amsterdam one of the K.L.M. Fokkers, piloted by Mr. Schmernoff, and carrying one passenger and a load of goods, managed to complete the journey. After leaving Croydon the gale drifted it over in the direction of the Thames estuary, so Mr. Schmernoff headed his machine into wind, and was last seen making in the direction of Southampton, with the evident intention of getting well to the south-west before allowing the gale to carry him in the direction of Lympne.

Mr. Robertson's Adventure in Rain, Mist and Smoke

ON Friday rain and mist made flying difficult, especially on the Manchester route, and one of the Daimler machines, flying from Manchester to Croydon with six passengers, encountered rain all the way until, north of London, the rain and mist, combined with the usual "smoke screen" from London, made it impossible for the machine to get through. I understand, in fact, that the weather was so bad that the machine actually passed over Stag Lane aerodrome, but the pilot was evidently unable to see the Very lights which were fired from there, and eventually made a forced-landing in a field near Harrow. Owing to the small size of the fields in the neighbourhood, Mr. Robertson, the pilot, was unable to get his 'plane down undamaged, and, after an encounter with a tree, the machine came down heavily and was badly damaged. None of the passengers were hurt, however, and were able to continue their journey to town by ordinary land transport. The machine was taken over to Stag Lane to be rebuilt.

The Instone Air Line have been making extensive alterations to their offices on the aerodrome, and these are more like a rabbit-warren than ever. To the uninitiated, the difficulty of finding any particular office has to be overcome by the provision of a guide, but the inhabitants of the office seem to be able to find their way about; and no doubt the whole scheme may be conducive, in the end, to business efficiency. Maj. Greer has certainly made alterations in the working of the Instone Air Line since he took over the reins of management.

Another Record Air-Taxi Flight

MR. ALAN J. COBHAM, of the De Havilland air-taxi service, left Croydon on Tuesday *en route* for Cairo, and probably Bombay. He is flying by way of Nice, Rome, and Athens to Cairo, and will then follow the R.A.F. route to Bagdad, and thence on to Karachi and Bombay. He was accompanied as far as Nice by his wife and mother, and will pick up his "fare" for this record trip at Nice. Mr. Cobham expects to be away about six weeks.

Mr. Barnard, also of De Havilland's, left for Holland on Saturday with a newspaper photographer to get pictures of the ex-Kaiser's wedding, but I understand that he was not allowed to leave with them yesterday by the Dutch military authorities.

I learn that the German Government have now given official sanction for the running of the London-Berlin air service by the Daimler Airway, and have also extended the concession of running to Cologne, which they had granted to the Instone Air Line for the month of October. There is, however, no definite news as yet as to the date of the opening of the next section of the Berlin line.

Handley Page Transport continue to get practically full loads for their machines, but on several days this past week they have "washed out" their services in both directions, which has pulled their weekly total down considerably. Passenger traffic on the Cologne line has shown rather a falling off, while that on London-Amsterdam has been about normal. It is on the Manchester service that the most surprising results have been attained. Passengers have increased by 25 per cent. over last week's total, no fewer than 50 air travellers booking tickets during the week. Judging by today, there promises to be an increase on the figure this week, eight passengers travelling from Manchester in the 9.30 a.m. machine.

Some quick journeys have been made on the Manchester line. On Saturday one of the Daimler 34's flew from Manchester to London in 1 hour 25 minutes, while during the week a machine which left Croydon for Manchester in the early morning completed a return journey in a flying time of only 3¾ hours, or actually less time than is taken by the train for the single journey.

I understand that Messrs. D. Napier and Sons are shutting up their Croydon depôt at the end of the month. This is due to the fact that engine orders have—for the time being, at any rate—fallen off to such an extent that rigid economies have to be made in working expenses.

Tonight (Monday) at the Greyhound Hotel, Croydon, was held the annual aerodrome dinner, our Director of Civil Aviation, Maj.-Gen. Brancker, having promised to take the chair, and the occasion being further graced by the attendance of various foreign air attachés.

Monday evening, November 13

NOVEMBER fogs have set in and are dislocating the various air services. One of the outstanding features, however, has been the regularity of the inland service between London and Manchester. This has, in fact, confounded the critics. It has been said ever since commercial flying began that air services in England would be difficult to run to schedule owing to inland mist and the smoke which is sent up from the great industrial centres in the Midlands. But up to the present a much greater regularity has been maintained on this London–Manchester service than on the Continental services.

Another striking feature of this inland service is that not only are the number of passengers travelling by this line exceeding all expectations, but the total is growing week by week. Up to the present 143 passengers have travelled by this line, and last week's total of 53 was higher than any week since the service began. On Saturday, although only six passengers had booked for the flight from London to Manchester, when the car arrived at the Grand Hotel to pick up the passengers, it was found that there were 11 people waiting with their handbags—the extra five having arrived on the off-chance of there being vacant seats.

Air "Specials" Defy the Fog

ON Friday the weather was so bad—a mixture of fog on the Continent and gales in England—that all the services with the exception of the Manchester route and one K.L.M. Fokker (which got through from London to Rotterdam) were suspended. Saturday was little better, but some of the services ran, and, in addition, several "specials" flew between London and France. Capt. Muir, piloting the Surrey Flying Service's new D.H. 9, flew to St. Inglevert to fetch a man who had telephoned through from there for an "air-taxi," and several machines went to France for various newspapers in order to bring back photographs of Armistice Day happenings.

Owing to the condition of Brussels aerodrome, the Instone Air Line have been compelled to suspend their service to this air-station. Levelling operations are being carried out, and the ground has become a quagmire in consequence.

The Instone Air Line are now endeavouring to carry out the London–Cologne service with two D.H. 18's, these being the only two machines with sufficient petrol capacity for the non-stop flight from Lympne to Cologne. Machines now leave Croydon and stop at Lympne for petrol, afterwards making a non-stop flight from there to Cologne.

General Festing, Controller of Aerodrome Licences in Great Britain, flew over to Brussels on the Instone D.H. 4A piloted by Mr. Powell, on Thursday, in order to inspect the aerodrome there, and consult with the Belgian authorities as to the state of affairs. He returned by air on Saturday.

Mr. Alan J. Cobham returned to Croydon from Cairo on Wednesday. He stated that his "fare" had been taken ill, and that when he (Mr. Cobham) arrived at Monte Carlo his "fare" had been moved to a nursing-home, and was unable to make the projected flight. It was, however, arranged that the flight should be made at some future date.

Among the passengers on the north-bound "air express" to Manchester during the week was the wife of one of the candidates for a Cheshire division, who was flying to Manchester in order to be in time to attend an election meeting in the constituency the same evening.

For the past two days fog has disorganised the services, although the Manchester–London route has been maintained.

AN IMPROVED U.S. MAIL 'PLANE

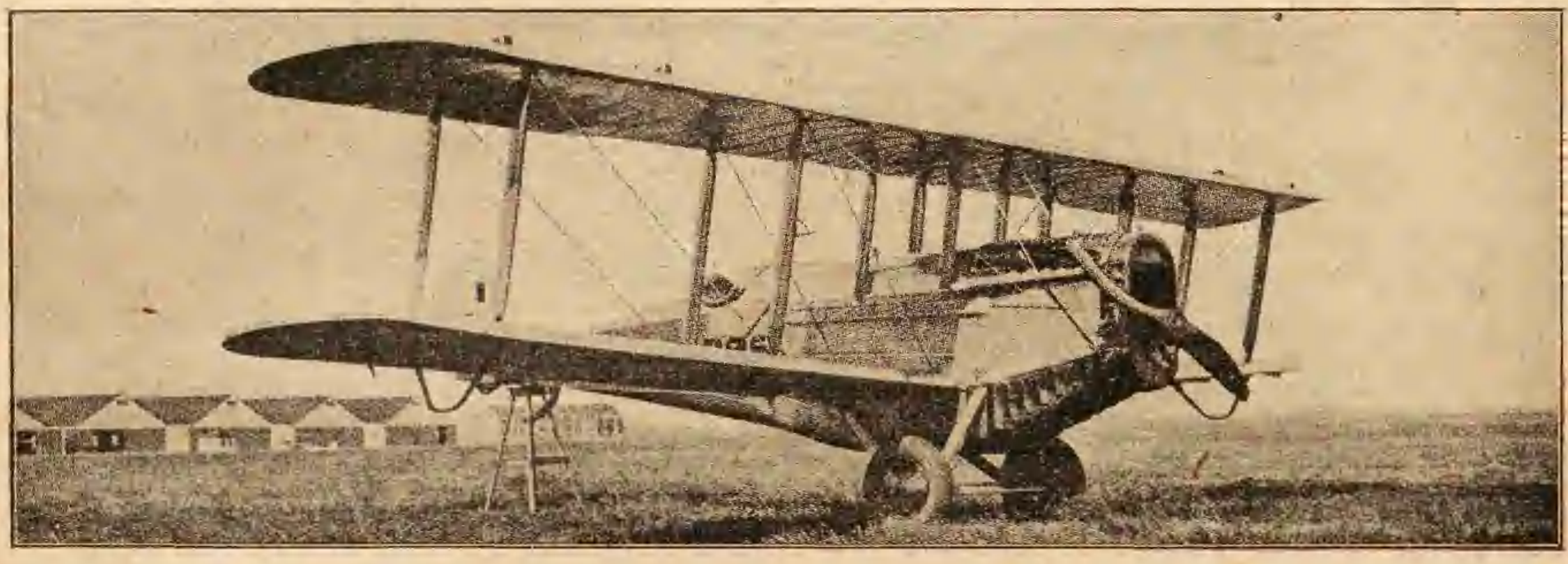
THE following interesting report on an improved American D.H. mail 'plane appeared in a recent issue of our American contemporary, *Aviation*. Some time ago the U.S. Air Mail Service began experiments with a view of increasing the capacity of the D.H. equipment employed in mail work, in the course of which a special fuselage was built for machine No. 299, having 40 cu. ft. of cargo space. It was found, however, that the original R.A.F. 15 wing section was not suitable for the additional load and increased resistance. A special set of wings (A 2) were, therefore, obtained from the Aeromarine Co., and these fitted instead. From the following data of results obtained with this machine under actual service conditions on the New York-Cleveland route, it will be seen that expectations have been more than realised.

The actual over ground speed flying between New York and Cleveland of this machine is only slightly less than that of the regular D.H. with R.A.F. 15 wing, and a certain amount of this loss in speed might be attributed to the larger fuselage. The average speed on five trips over the same route was 96·34 m.p.h., while the speed of the standard D.H., which was flying in opposite directions on the same days, was 97·8 m.p.h. The average load of the latter machine was slightly over 400 lbs., while on three of the five trips made by 299 the load was 800 lbs.

It is very interesting to note that loading up to 800 lbs. did not show any marked difference in the speed, and there is every indication that the A 2 wing curve can be loaded up to 12 lbs. per square foot, and give a very satisfactory performance even at the slower speeds. As to maximum speed, it has been found that the 299 will do 115·3 m.p.h. at 1,725 r.p.m., with the regular club propeller 9 ft. 2 in. diameter and 7 ft. 6 in. pitch, which is about 4 m.p.h. slower than the average standard D.H. machine (U.S. Mail).

Perhaps the most outstanding feature of this modified D.H. is the slow speed at which it will cruise and maintain its altitude with 800 lbs. load; it has been flown for a period of 20 mins. at 1,075 r.p.m. with an air speed of approximately 68 m.p.h. without losing any altitude, and having fair manœuvrability at all times. It does not have a tendency to slip off on a wing as the D.H. does at the slower speeds; in fact, it seems very difficult to make it side-slip, and its tendency is to settle flat in a stall.

Tests have shown a climb of 800 ft. in the first minute and 5,150 ft. in 10 mins. with 800 lbs. load, as compared with 1,000 ft. in first minute and 6,500 ft. in 10 minutes with the standard D.H. with 400 lbs. load. While the 299 has not the "zoom" that the D.H. has, it will climb at a higher angle and at considerably slower speed. It was found that the best climbing angle is at an air speed of 70-75 m.p.h., while the D.H. climbs at a considerably higher speed.



The converted D.H. Mail 'Plane of the U.S. Air Mail Service referred to on this page. It is fitted with A2 wings, and has 40 cu. ft. of cargo space.

A special trip from New York to Washington with 1,032 lbs. load, was recently made, and even with this load the performance was very good, and the cruising speed satisfactory, although the machine was making a head wind. The landing speed is 50 m.p.h. with 800 lbs. load, as compared with 60 m.p.h. for the D.H. with 400 lbs. load. The length of run on the ground for take-off is approximately the same with the D.H., while the time element is slightly greater: when 299 gets off with 800 lbs. load in 11 secs., the D.H. with 400 lbs. load, rises in 9 secs. Streamline wires and other minor refinements are being installed, which will improve the speed and performance somewhat.

* * *

NOTICES TO AIRMEN

Holland. Night Landing in Schiphol Aerodrome

LANDING at Schiphol aerodrome is prohibited between sunset and sunrise.

The landing searchlights are not now in operation, and the general lighting of the aerodrome has been reduced, but the vertical row of white lights on the W/T mast is still lit each evening, for purposes of safety, from half an hour after sunset until two hours after sunset. No. 123 of 1922.

NOTICE TO GROUND ENGINEERS

Rolls-Royce "Eagle VIII" Engines: Friction Anchorage

THE correct method of assembling the friction plates, whether keyed or not, in the anchorage unit of Rolls-Royce "Eagle VIII" engines is as follows:—

(1) Fit anchor ring G. 6405 into the epicyclic gear-box G. 6386.

(2) Slip in one of the non-keyed plates (which are stiffer than the friction plates, with the object of sustaining the load).

(3) Place in position the various keyed plates one after another.

In one or two instances recently it has been observed that the non-keyed or backing plate has been left in position in the aluminium gear-box, and the anchor ring then added. Since, in this way, the backing plate is left with no spigot attachment, it has jambed back underneath the anchor ring and cracked the aluminium case which supports it.

(No. 11 of 1922.)

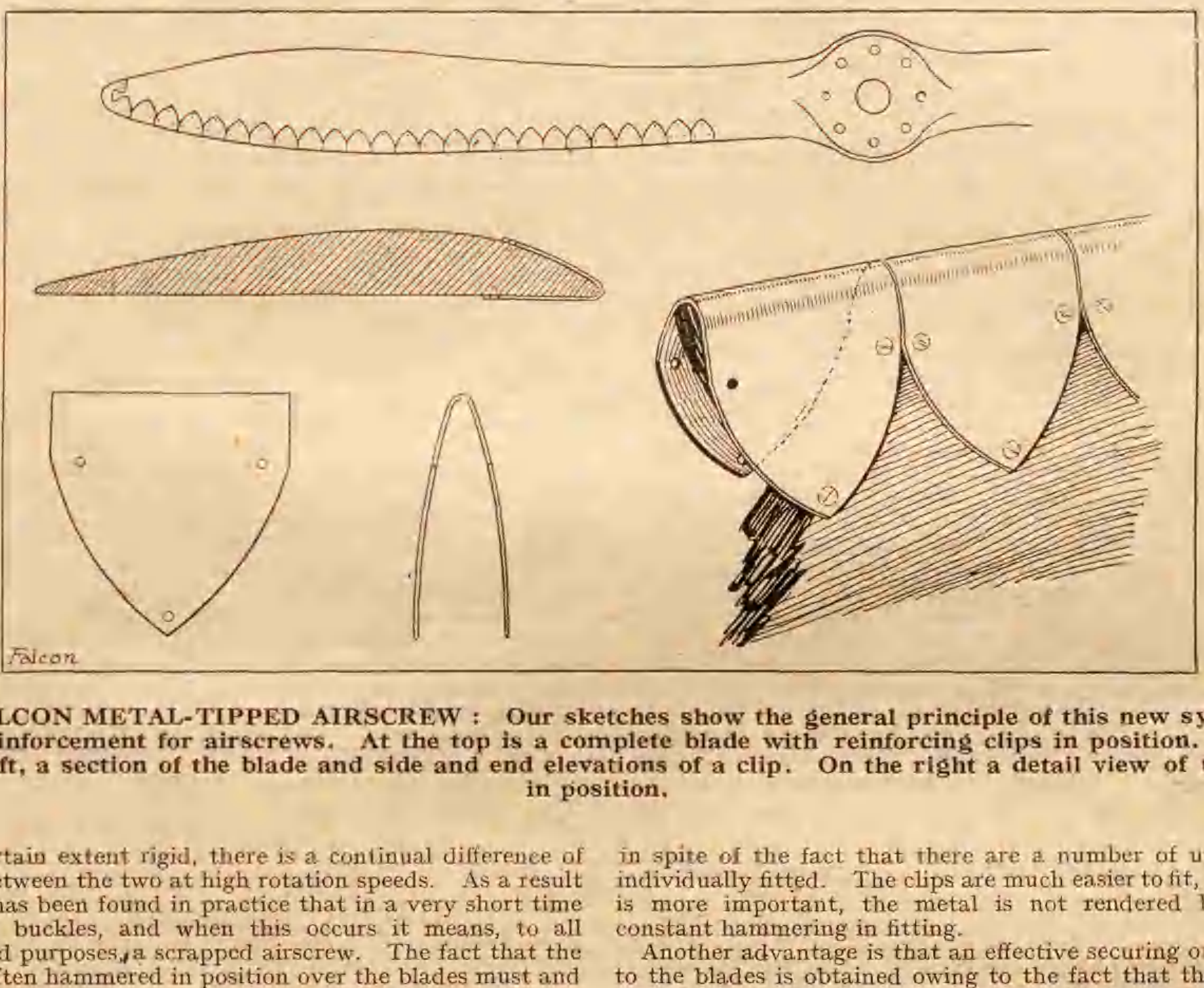
* * *

Wormwood Scrubbs as London Terminus

ON Friday next, November 17, a series of tests will be made to determine the suitability of Wormwood Scrubbs for an air terminus. Various firms have been asked to send machines with full loads in order to make landings and starts from "The Scrubbs" before representatives of the advisory committee recently formed to enquire into the desirability of securing a terminus nearer to the centre of London than is Croydon. Handley Page Transport, Ltd., will send a machine carrying 12 passengers, or the equivalent weight in ballast. The machine is to leave Croydon about 9.30 a.m., and should arrive over Wormwood Scrubbs a few minutes later.

THE FALCON METAL-TIPPING SCHEME FOR AIRSCREWS

PERHAPS one of the biggest items in the maintenance of an aeroplane, especially in commercial services, is the airscrew. In fact, it is quite surprising when one considers how comparatively short is the life of an airscrew on the average—quite apart from the question of accidental breakages. It is, of course, well known that at high speeds of rotation the blades of wooden air screws are subject to a certain amount of deformation, as a result of which the true shape of the leading edge is more or less altered, with a loss of efficiency in consequence. With the object of overcoming this trouble, it has been the usual practice for some time past to reinforce the leading edge of each blade with metal. This generally takes the form of a single narrow strip of sheet brass, bent to a V-shape in cross-section, which fits over the leading edge for varying lengths from the tip—which is usually completely covered. The metal is hammered to a close fit on to the blade, and secured in place by screws or rivets. While this undoubtedly strengthens the blade and protects the leading edge, it has the following disadvantage. Inasmuch as the wood of the blade is comparatively flexible, whilst the metal is to a certain extent rigid, there is a continual difference of opinion between the two at high rotation speeds. As a result of this it has been found in practice that in a very short time the metal buckles, and when this occurs it means, to all intents and purposes, a scrapped airscrew. The fact that the metal is often hammered in position over the blades must and does mean that the metal is thereby hardened somewhat, so that being brittle it will give rise to trouble all the sooner.



THE FALCON METAL-TIPPED AIRSCREW : Our sketches show the general principle of this new system of metal reinforcement for airscrews. At the top is a complete blade with reinforcing clips in position. Below, on the left, a section of the blade and side and end elevations of a clip. On the right a detail view of the clips in position.

An attempt has been made to remedy this buckling by introducing transverse saw-cuts in the metal strip, but this has not met with any great success. It would seem, however, that in the invention of Mr. David Morgan Davies, of the Falcon Airscrew Co., 113, Cottenham Road, London, N. 19, a successful remedy is available, and one so simple that it is extraordinary that it has not been thought of before now.

Briefly, the principle of this new scheme is as follows. The leading edge of each airscrew-blade is reinforced by a plurality of separate sections or clips of metal, which are secured side by side along the leading edge of the blade, and, if necessary, the tip. Thus, instead of the rigid strip of metal covering we have one possessing a certain amount of flexibility, like the shell of a lobster, which can accommodate itself to the flexing of the blade without any tendency to buckle. The accompanying sketches show this arrangement quite clearly.

These sections can be formed by stamping out blanks, more or less diamond-shape, with the corners suitably rounded off, from sheet metal, the blanks then being bent over at the middle to give the V-section corresponding as near as possible to the angle of the leading edge. The clips thus formed are fitted on to the latter, and secured in the usual way by screws or rivets. It should be noted that owing to the pointed shape of these clips, a greater depth of blade reinforcement is obtained for the same weight than is the case with the single strip of metal.

In order to facilitate the stamping, or cutting out of the blanks, and prevent waste, a series of these joined together could be formed in a single strip, and then separated before or after bending. From a production point of view this system possesses considerable advantage over the old method, in spite of the fact that there are a number of units to be individually fitted. The clips are much easier to fit, and, what is more important, the metal is not rendered brittle by constant hammering in fitting.

Another advantage is that an effective securing of the clips to the blades is obtained owing to the fact that the apex of each limb of the clip extends sufficiently far back from the leading edge of the blade—the depth of the single strip hitherto employed being limited on the score of weight—as to enable the innermost holding-down screw to obtain a firm grip in a comparatively thick portion of the blade.

The clips need not, of course, necessarily be confined to the shape shown in the accompanying sketches, and a strip of two or more clips joined together can also be attached to the blade if desirable—near the boss, for instance.

We understand that this system of reinforcement has already given very satisfactory results in actual practice, some airscrews so fitted being employed on the London-Continental services. It is certainly a scheme well worth investigation, and we will watch its progress with interest.

* * * *

Review of Airscrew Theories

THIS was the title of a paper read by Major A. R. Low before the Royal Aeronautical Society on November 2. The paper was of a highly technical nature, as was naturally unavoidable in dealing with the subject of airscrews, and was one which did not lend itself to publication in condensed form. As space does not permit of publishing the paper in full, we would advise readers interested in the subject to obtain a copy of the next issue of the *Aeronautical Journal*, which will doubtless contain Major Low's excellent paper.

GOTHENBURG 1923 AERO EXHIBITION

That the only way aviation can within reasonable time become the vogue with the million is by practical propaganda work can hardly be disputed. With this hard fact to face, a little gathering on Monday at the Métropole, to meet a committee of Swedish representatives of the Gothenburg Aero Exhibition to be held in July and August next year, may do considerable good. The point of the meeting, which was very sympathetically presided over by Admiral Mark Kerr, was to lay before the representatives of the various aircraft and aero engine construction firms in this country the objects of the exhibition, and to invite their co-operation in making it an international success, and, at the same time, spread the gospel of aviation.

Admiral Mark Kerr initially pointed out that he thought British participation was a good business proposition for the firms concerned, as Sweden not only wanted British aircraft, although possibly a bit more expensive than from some other sources, but they *would* have them. And in this respect they were wise, as it must be remembered that Sweden was as vulnerable to attack from the air as was England. At an Exhibition of this character, it was up to England to show that she was not only second to none in aircraft construction, but that she was superior to all others.

Baron Palmstierna, the Swedish Minister, supported the views of the Chairman, and said they were looking to England to reduce, *via* the air, the time for them to reach each other. They wished the British to get into and keep ever in close touch with Sweden, and he therefore welcomed their representatives. Sweden was in acute sympathy with England; it was Russia which had been their great problem in the past.

Gen. Sir Sefton Brancker, in response to his toast, proposed by Admiral Mark Kerr, said he believed in Sweden as an asset to aviation, and if he could only get the price of one battleship transferred, he would guarantee the success of Civil Aerial Transport. He had every confidence in the aircraft industry carrying their burden to a successful issue, and although he was personally more enthusiastic than ever to help them on the road, he feared that road was still a rough one to traverse before they reached smooth ground.

Admiral Kerr, in proposing success to the Gothenburg Exhibition, referred to the wonderful qualities and performances of the Rolls-Royce and Napier engines.

Mr. Ivar Lignell, of Gothenburg, in responding, said the Exhibition covered 72 acres, and already a large number of Swedish exhibitors had secured space. As to the aero section, they might ask why should British exhibitors go to them? It was by propaganda that aviation would rule the world, he claimed, and he quoted from a paragraph in regard to a new French squadron of propagandists which had been formed, and this was an example, he thought should be followed. Again, would they have a chance of selling aircraft if they came over? His reply was that there was considerable prospect, as all the country authorities round the Baltic had sums ear-marked which they were prepared to put into various aviation schemes. They were waiting to see what there was to offer them of the best value. Moreover, he thought that if the air races, with prizes up to £1,000, which were practically assured between Gothenburg and Rotterdam, materialised, it meant an instant success for the Exhibition. They also were making a great effort to secure squadrons of aeroplanes from the various European Governments to attend at Gothenburg, and he hoped their efforts would be successful, which would mean a great precedent for the future. Sweden was a very vast country, practically oblong. It was essentially a country for aerial services which, he maintained, under their geographical conditions, would be cheaper than railways, or other forms of transport. They would welcome very heartily British exhibitors, and they would give them every facility, in addition to the 50 per cent. reduction in freightage already arranged for, to induce them to come over. They attached such importance to British exhibitors that without them they felt the Exhibition would be a failure. If only a few machines were sent it would suffice to support it to success, and he sincerely hoped they would come.

Sir Sefton Brancker added a few words to his previous remarks, repeating that the Exhibition had his personal sympathy and that of the Air Ministry. The Exhibition administration had asked for a unit of the R.A.F. to be sent to the Exhibition, and he had strongly recommended to have that done. From the civil side it must be regarded as a financial question. He would be willing to help and to be worried to any extent in the matter, but the finality rested with the Treasury, who were the crux of the whole question, but he would do everything in his power to get them all they desired.

Mr. Handley Page said he was in sympathy with the idea of their making a show, but private enterprise experienced vast difficulty in getting there, on the top of now having to carry on under peace conditions. He thought that instead of the Exhibition giving a big international prize, they would rather help by paying the expenses of, say, half a dozen selected firms, who would undertake to fly to Gothenburg and remain there for demonstration purposes. They would then get a bigger field, and therefore ensure success. Their giving international flying exhibitions would be a popular and he thought a profitable proposition.

Admiral Kerr said that it was proposed to give every machine which arrived at Gothenburg a price per kilometre flown, in getting there, and in addition there were many demonstration prizes which would be available to competitors.

Sir Henry White Smith also felt that they were in sympathy with the whole scheme, and he suggested that an early meeting between the S.B.A.C. and the Exhibition Committee would probably get them down to hard facts more quickly than any other means.

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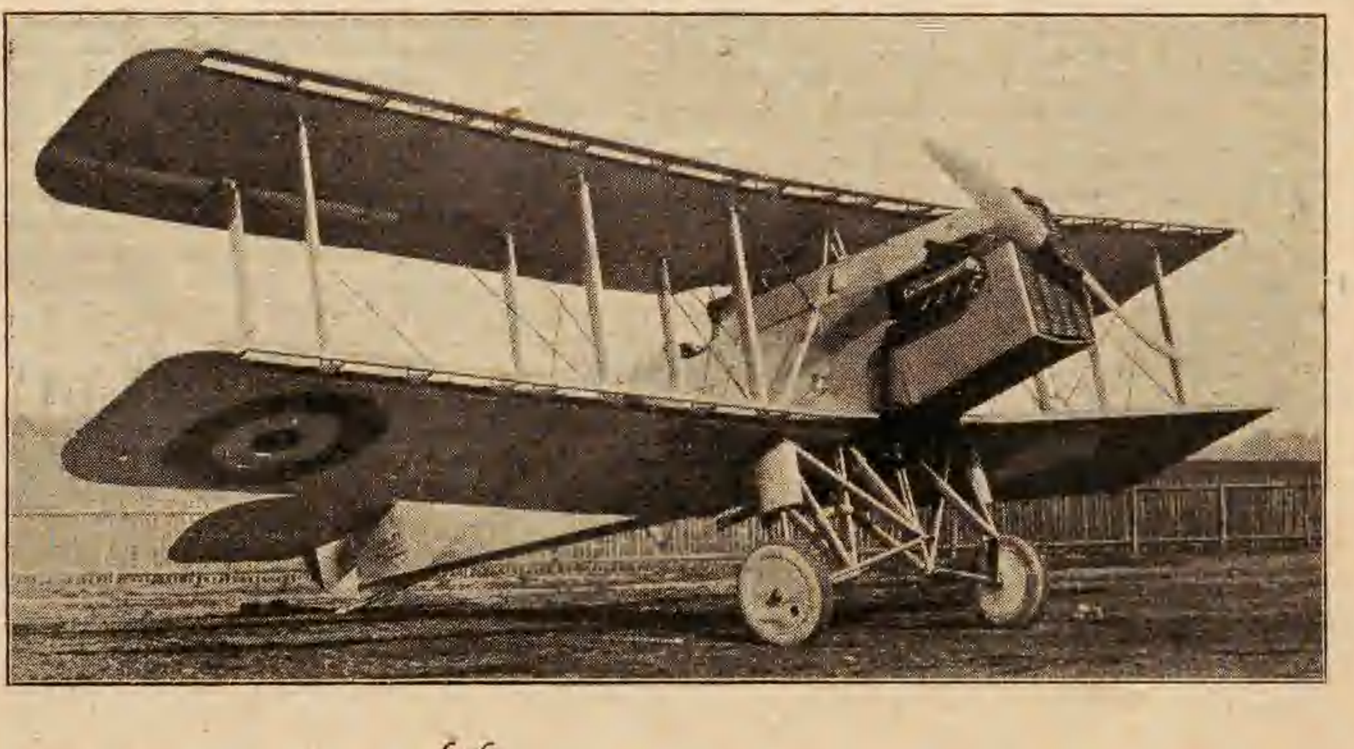

Another view of the Handley Page "Hanley" torpedo 'plane, 450 h.p. Napier "Lion" engine: Three-quarter front view. The slots can be clearly seen in the picture. Although this machine is officially known as the "Hanley," it is affectionately called the "Heintz," owing to the number of levers which the pilot has to operate.

AIRCRAFT IN NEWFOUNDLAND

Activities of the Aerial Survey Co.

In our issue of August 17, 1922, we published an illustrated description of a Martinsyde, type A, Mark II, biplane which had been ordered by the Aerial Survey Co., of 166, Duckworth Street, St. John's, Newfoundland. A few particulars of this firm's activities are now to hand, and these will, we feel sure, be read with interest, showing as they do the great possibilities and variety of uses of aircraft outside England.

Before ordering the Martinsyde described, the firm already had another machine of this type, which had given excellent results, and we learn that it was on account of the satisfactory experience with the first machine that a second was ordered. So far the new Martinsyde has not, of course, had an opportunity of showing what it can do, but it may be of interest to give a brief history of the earlier machine. In November, 1921, the first Martinsyde arrived from England, and was erected at Botwood. After various trial flights, first as a seaplane and then as a land machine, Mr. F. S. Cotton made his first flight to St. John's on January 1 this year. The distance of 150 miles was covered in two hours under arctic winter conditions, and a landing was made on Quidi Vidi Pond, where, apparently, the whole of St. John's waited to welcome the aviators. The machine had been fitted with ice skids, and considerable experiment was necessary before an entirely suitable type was evolved.

During the month of January and the early part of February a series of demonstration and mail-carrying flights were made in the neighbourhood of St. John's, and on several occasions mails were carried to outlying districts at times when all other means of transportation had failed, owing to the heavy fall of snow. Thus, on February 2 Belle Island was ice bound, but not sufficiently to make it possible for traffic to cross over. The difficulty was solved by flying the Martinsyde over, dropping mails, and keeping in communication with the inhabitants.

On March 3 Mr. Cotton started on a flight towards Cartwright on the Labrador, carrying mails for the Government. The machine met with very bad weather on the journey north, and a landing was made at St. Anthony for replenishments. Then the Straits of Belle Isle were crossed, and aerial connection established with Labrador for the first time. Battle Harbour was the landing place, and the machine remained there for three days. From Battle Harbour a flight was made to Cartwright, one of the Hudson Bay Company's posts. Five days later the Martinsyde left Cartwright, and, stopping at St. Anthony and Botwood, made a flight through to St. John's in less than seven hours. The total distance was about 600 miles, and was covered in five hours' flying time.

With the railway and steamship services disorganised, mails and passengers were carried to places otherwise inaccessible, except by the laborious and tedious dog team. On March 16, 1922, the first ice fields patrol was made from Botwood. The object of this was to assist the steamers in their search for seals. The seals were successfully located, but the steamship owners could not at first be persuaded to contract with the Aerial Survey Company to provide the information. It was not until the failure of their ships to locate the seals that the owners changed their minds, and by then it was rather late for effective results to be obtained. However, even at that several good catches were obtained.

The Martinsyde made several flights while the ice lasted, including a special mission to report on a timber proposition on the west coast. On April 20, just as the ice was melting rapidly, the operations of the season were wound up with a mail flight from Botwood to Battle Harbour and return in one day. During the winter operations a Napier-engined Westland limousine (the one which won the Martlesham competition) was used in addition to the Rolls-engined Martinsyde, the two machines making a joint patrol over the ice fields.

In July of this year floats were fitted to the Martinsyde, and considerable flying has been carried out over the inland waterways and timber areas of the country. Special photographic flights were also undertaken, and it may be mentioned that moving pictures, as well as "still" photographs, were obtained of the wreck of H.M.S. "Raleigh." On the return journey from this flight the machine landed alongside the Company's motor yacht in the Straits of Belle Isle, and the crew had breakfast on board, the seaplane floating astern the while. This made a considerable impression on the local fishermen, many of whom had never seen a seaplane before.

This year the Aerial Survey Company hope to extend their activities considerably, and the work thus done should be excellent propaganda for aircraft. It is to be feared that the possibilities of aviation in such places as Newfoundland have not yet been fully realised at home, and the pioneer work done by the Aerial Survey Company merits the thanks of the whole aviation industry. We trust that the enterprise of this firm will reap its due reward.

TWO NEW TEXT-BOOKS ON WIRELESS

From the Wireless Press, Ltd., 12-13, Henrietta Street, W.C. 2, we have received two new text-books dealing with two important subjects relating to wireless. The science of wireless is very intimately associated with aviation, and will play a very important, if not essential, part in the future development of aerial transport—even more, perhaps, than it has in marine work.

One of the text-books referred to above—"Direction and Position-finding by Wireless," by R. Keen (9*s*.)—deals with a subject that has proved to be of immense value to aviation, and should therefore appeal directly to readers of Flight. From our brief perusal of this book it appears to us to be the most complete work on this particular subject that has yet been produced. It not only deals with the principles and theory of the subject, but also with the constructional details of direction-finding installations for shore service and for the navigation of ships and aircraft. In addition, reference is made to the use of special maps for D.F. work, freak phenomena which cause errors in bearings, faults peculiar to D.F. and how to eliminate them, etc. A chapter is also given to the thermionic valve in which the part this wonderful invention plays in D.F. work is briefly but concisely described. It should be mentioned that this book is not only intended for the engineer faced with this field of wireless work for the first time, and those in charge of D.F. installations, but should prove to be of immense value to the general student of wireless telegraphy.

The second book referred to is entitled "The Wireless Telephone; What it is and How it Works," and is by Philip R. Coursey. It is published at the modest price of 2*s*. 6*d*. Now that wireless broadcasting is about to start in earnest this little book should find a ready market—especially as directions for building a simple receiver for W.T. broadcasts is included in its contents. Apart from this, however, it should appeal to many in the aviation world, for wireless telephony forms an important item in the application of wireless to aviation, and this book places before the reader the essentials of the radio-telephone, and how it operates and is constructed, in a very simple manner indeed. Besides numerous diagrams, sketches and photographs of the different components and apparatus connected with wireless telephony are included in the text. In one of the chapters a very easily understood description of the "valve" is given, together with illustrations of the various types.

"STAMPS OF THE FLYING POST."*

Under the above title we have received a very interesting little book on this fascinating branch of Stamp Collecting. The author, W. E. Hughes, is to be congratulated on having tackled so completely the very difficult problem of collecting the various and scattered records of the earlier attempts of carrying mails by air, and arranging them so concisely. These early flights are given for each country in alphabetical order, and in addition to a brief description of each particular flight, details are given of the "labels," stamps or cancellations used in each case. Apart from the various "Semi-Official" labels issued for these flights, all "regular" issues of air mail stamps that have appeared up to August, 1922, are described. "Stamps of the Flying Post" is certainly the most complete work on this subject we have seen, and should be of considerable value and interest to collectors—and non-collectors, for that matter. It is to be regretted, however, the author has not seen his way to include more illustrations of the various stamps, etc.; but then, nothing can be absolutely perfect!

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* "Stamps of the Flying Post," by W. E. Hughes, published by Alan Turton, 32, Great St. Helen's, London, E.C. 3. Price 1*s*. net.

Personals

Married

EDWARD MORTON DRUMMOND, Black Watch, attached R.A.F., eldest son of Mr. and Mrs. Gerald Drummond, of Dayleside, Woodford, Essex, was married on November 9 at the Chapel Royal, Savoy, to DAPHNE, daughter of Mr. and Mrs. WILFRID TAYLOR, of Mitre Court Chambers, Temple, London, E.C. 4.

Flt.-Lieut. THOMAS HENDERSON, M.C., son of the late Mr. Thomas Henderson and of Mrs. Henderson, of Tynemouth, was married on November 9, at the Chapel Royal, Savoy, to EDITH SYLVIA, daughter of the late Mr. ALEXANDER DEUCHAR and of Mrs. Deuchar, of Rodney Court, W. 9. Sqdn.-Ldr. A. S. Morris was best man.

Brigadier-General GUY LIVINGSTONE, C.M.G., late of the R.A.F., was married on November 14, at St. Martin's Registry Office, London, W.C., to Mrs. DIVA AMELIA PRIMROSE, formerly the wife of Mr. A. B. Primrose, of New York.

To be Married

The engagement is announced, and the marriage will shortly take place, between Flight Lieut. ROBERT HUGH HANMER, M.C., R.A.F., eldest son of the Rev. Hugh and Mrs. Hanmer, The Rectory, Whitchurch, Salop, and MARY HELEN, youngest daughter of Mr. and Mrs. NATHANIEL SPENS, Palace Gate Mansions, 29, Palace Gate, W. 8.

The engagement is announced between Capt. A. M. WAISTELL, D.S.C. (R.A.F., retired), youngest son of the late Mr. Charles Waistell, Northallerton, Yorks., and Mrs. Waistell, Totland Bay, I.W., and HONORA MARY, elder daughter of Mr. and Mrs. F. H. CHRISTIAN, Droxford, Hants. The marriage will take place in India early in March.

THE GRAND PRIX DE PARIS

AT present it appears as if the Grand Prix de Paris, for commercial aeroplanes, will prove a failure. Only five machines were entered, and of these one arrived too late to be admitted to the competition. A second machine crashed and killed its pilot, leaving but three machines, of which one is a sporting rather than a commercial type.

The following brief particulars of the machines may be of interest :—

No. 1, Caudron biplane, type C.74, 4-300 h.p. Hispano-Suiza (Poiree). Length, 57 ft. 6 ins. ; span, 82 ft. ; area, 1,400 sq. ft.

No. 3, Farman biplane, type F.90, 300 h.p. Salmson (Bossoutrot). Length, 30 ft. 2 ins. ; span, 46 ft. ; area, 690 sq. ft.

No. 4, Breguet biplane type 20 (Leviathan), four 225 h.p. Breguet engines driving single tractor airscrew (Thiery). Length, 45 ft. 9 ins. ; span, 83 ft. 7 ins. ; area, 1,500 sq. ft.

No. 5, twin-engined "Express-Mureaux," 2-370 h.p. Lorraine-Dietrich (Labouchere). Length, 43 ft. 7 ins. ; span, 68 ft. ; area, 1,330 sq. ft. (This machine is a French-built Vickers "Vimy Commercial.")

No. 2, a three-engined Henry Potez, with 180 h.p. Hispano-Suiza engines, piloted by Douchy, arrived too late at Le Bourget to be admitted to the competition. It is understood that the pilot lost his way in flying to Le Bourget, and was delayed to such an extent as to arrive too late. This is a pity, as the three-engined Potez, type X, is a well-built machine with good possibilities.

The competition itself consisted of various tests for which points were given, as well as for general features thought to be desirable in commercial aeroplanes, and of flights over a 600-kilometres circuit.

The preliminary tests and features were divided up as follows, points being given in each class: A, horse-power expenditure per passenger carried. B, Use of wireless telephone during flight, up to a distance of at least 10 kilometres (6¼ miles). C, (*a*) Starting one engine in the air ; (*b*) starting all engines on the ground. D, Safety tests, mainly in the matter of taking off and climbing to a certain altitude, there doing turns and figures of eight. E, Starts and landings, the distances being measured and points awarded accordingly. The maximum number of points to be awarded are as follows : Speed, 400 ; safe flying, 250 ; power per passenger, 150 ; starting and landing, 75 ; starting the engines, 50 ; and use of wireless, 25 ; giving a total of 950 points.

On the first two days of the competition, November 10 and 11, the preliminary tests were carried out. Thiery, on the Breguet "Leviathan," obtained the following points : A, 25, B 25, C (*a*) 25 and (*b*) 25, D 250, and E 50, giving a total of 400 points. Bossoutrot, on the Farman, gained 275 points, composed as follows : A 150, B 0, C (*a*) 25 and (*b*) 25, D 0, and E 75. Poiree, on the four-engined Caudron, was third with 200 points, as follows : A 0, B not passed, C (*a*) 25, (*b*) 25, D 150, and E 0. Labouchere, on the "Express-Mureaux," was last with 150 points, *i.e.*, A 50, B 25, C (*a*) 25, (*b*) 25, D 0, and E 25.

Owing to bad weather, with fog and low clouds, the two flights of 600 kilometres—one of which, with full loads and one compulsory landing ; and the other, over the same distance but with half-load and without landing—had to be postponed from day to day.

On Tuesday, November 14, the weather was still unfavourable, but it was decided to run the first speed competition over a 43-kilometres circuit, which had to be covered fourteen times, with a compulsory landing at Le Bourget on the seventh lap. Poiree got away well with full load, and was on his fifth lap when, as he failed to return at the approximate time he was expected, a machine was sent out to look for him. The machine, on its return, brought the news that Poirce's machine had been seen crashed in a field at Villepinte, near Aulnay-sous-Bois. Later it was learned that the machine while travelling at considerable speed, had turned over in the air and crashed to the ground, the three occupants, Poiree and his two mechanics Courcy and Bobillier, being killed instantly.

At the moment it is not certain what happened, but according to eye-witnesses, and an examination of the wreckage, the conclusion has been formed that one of the aft airscrews burst and damaged the fuselage, thus causing the machine to lose all controllability. An enquiry is being made which may throw more light on the cause of the sad accident, and may even prove this suggestion to be wrong. Poiree was one of the earlier French pilots, having flown long before the war. He did a great deal of work in Russia, but returned after the outbreak of the revolution, and had been piloting for the Caudron firm for a considerable period.

Of the remaining three machines in the Grand Prix the Breguet "Leviathan" had to land a short distance from Le Bourget owing to petrol system trouble. Bossoutrot, on the Farman, and Labouchere, on the "Express-Mureaux," both completed the first half of their 600 kilometres, landing as prescribed at Le Bourget. On starting for the second half of the course, Labouchere discovered a leak in the water circulation of his Lorraine engines, and had to abandon the attempt. This left only Bossoutrot, who completed the course alone, his time for the 600 kilometres being 4 hrs. 7 mins. 12⅕ secs.

Thus the Grand Prix can scarcely be said to have been a success, and it may be questioned whether it was wise to hold this competition at this time of the year, when fogs and unfavourable weather are to be expected. We sincerely sympathise with the Caudron company, and with French aviation generally, in the sad loss which has befallen them. As one of the objects of the Grand Prix was to attract public attention to aviation, it is to be feared that more harm than good has been done by the accident, which cost three men their lives.

Simultaneously with, but entirely separate from, the Grand Prix de Paris for commercial machines, was to have been flown a squadron competition for military machines, piloted by service pilots, but owing to bad weather these were postponed. They were to consist of speed races over two laps of the Circuit of Paris : Le Bourget, Cormeilles, Toussus-le-Noble, Orly, Chelles, Le Bourget, giving a total distance of 200 kilometres. The machines were to be started off in squadrons.

THE ROYAL AIR FORCE

London Gazette, November 7, 1922

General Duties Branch

Flt. Lt. R. H. C. Usher, M.C., A.F.C., is granted a permanent commn. retaining his present substantive rank and seny.; Aug. 31. Flying Offr. E. J. McLoughlin is granted a permanent commn. in the rank stated, with effect from Oct. 24, 1919 (since promoted). *Gazette*, Oct. 24, 1919, appointing him to a short service commn., is cancelled. The following are granted permanent commns. as Flying Offrs., with effect from dates indicated, retaining their present seny. *Gazettes* of dates indicated in brackets, appointing them to short service commns., are cancelled:—A. P. Ritchie, A. F. C., July 14, 1920; (Aug. 10, 1920). A. J. Rankin, Sept. 27, 1920; (Oct. 1, 1920).

The following are granted short service commns. as Flying Offrs., with effect from, and with seny. of, the dates indicated:—A. C. Hine; Oct. 24. A. L. Moore; Oct. 30. F. C. Baker is granted a short service commn. as Flying Offr. for three years on active list, with seny. Dec. 24, 1919; Oct. 1.

The following are granted short service commns. in ranks stated for three years on active list, with effect from and with seny. of Oct. 1:—Flt. Lt.: R. Hutton. Flying Offrs.: F. H. Bedford, M.C., M.M.; H. W. Parker; C. L. Watson.

Lt. R. L. Yates, R. Scots Fus., is granted temp. commn. as Flying Offr. on seconding for four years' duty with R.A.F.; Oct. 26. Pilot Offr. E. H. M. David to be Flying Offr.; June 21. Flt. Lt. S. G. Frost, M.B.E., is placed on retired list on account of ill-health contracted in the Service; Nov. 1.

The following are transferred to Res.:—

Class A.—Flying Offr. M. H. McErlean; Nov. 8.

Class B.—Flying Offr. L. E. Vine; Oct. 24. (Substituted for *Gazette* Oct. 24.) Observer Offr. H. Wisnekowitz, M.C.; Nov. 8.

Class C.—Flying Offr. O. A. P. Heron, D.F.C.; Nov. 7.

Flying Offr. T. W. Cave, M.C., relinquishes his short service commn. on account of ill-health contracted in the Service, and is permitted to retain rank of Lt.; Oct. 24. *Gazette*, Oct. 24, regarding the transfer to the Res. of Flying Offr. T. W. Cave, M.C., is cancelled. The short service commns. of the following Pilot Offrs. are terminated on cessation of duty:—J. C. Lindsay, M.C.; Nov. 1. W. H. E. Labatt; Nov. 8. A. W. Taylor; Nov. 8.

Stores Branch

The following are granted short service commns. as Flying Offrs. for accountant duties, with effect from dates indicated:—H. Hedderwick, J. P. A. Fulton; Oct. 1. W. Vaughan-Shaw, H. C. Roberts; Oct. 6.

Medical Branch

Lt. H. J. Henderson, Army Dental Surg., is granted temp. commn. as Flying Offr. on attachment for duty with R.A.F.; Oct. 26. He will receive emoluments from Army Funds.

Nursing Service

Miss N. C. M. Kelly (Staff Nurse) relinquishes her appt. on account of ill-health; Nov. 8.

Erratum

Gazette of Jan. 1, 1919 (FLIGHT, Jan. 9, 1919, p. 50):—For 231825 Sgt. (Obs.) W. Clark, read 203947 Sgt. (Obs.) W. L. Clark.

London Gazette, November 10, 1922

General Duties Branch

The following Pilot Officers on probation are confirmed in rank:—C. B. Greet, H. S. C. Bassett, A. E. B. Bateman, D. R. Dawson, B. C. Duke, R. B. Fleming, L. P. Hirsh, P. J. A. Hume-Wright, H. W. Pierce, S. H. G. Trower, F. S. C. Vaughan, M.C., G. Wake, A. W. B. Walker, M. Wiblin, J. B. Wilson, L. Young; Oct. 1. J. B. Rose; Oct. 3.

The following are transferred to the Reserve:—

Class A.—Flying Offr. L. A. Walters; Nov. 11.

Class C.—Sqdn. Ldr. T. S. Impey, Flying Offr. W. M. Long; Nov. 11.

Flt. Lt. G. E. Wilson to take rank and precedence as though his appt. as Flt. Lt. bore date Jan. 1, immediately following Flt. Lt. O. W. de Putron; Aug. 9.

Medical Branch

Lt. N. F. Smith, Dental Surgn., Gen. List, Army, is granted temp. commn. as Flying Offr. on attachment for duty with R.A.F.; Sept. 28. He will continue to receive emoluments from Army funds. (Substituted for *Gazette* Oct. 10.)

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The undermentioned appointments in the Royal Air Force are notified:—

Air Commodore C. L. Lambe, C.B., C.M.G., D.S.O., from Air Ministry (D. of E.) to Half Pay List. 1.8.22.

Group Captain E. F. Briggs, D.S.O., O.B.E., from Headquarters, R.A.F., Iraq, to command Basrah Group Headquarters (Iraq). 1.10.22.

Squadron Leaders A. Gray, M.C., from R.A.F. Depot (Inland Area) to Central Flying School (Inland Area) (Supernumerary). 10.11.22. M. G. B. Copeman, from No. 2 Armoured Car Company (Middle East) to R.A.F. Depot (Inland Area) (Supernumerary). 21.10.22. A. E. Panter, B.A., from Egyptian Group Headquarters (Middle East) to Headquarters, Iraq Command (Iraq) (Supernumerary). 14.10.12. D. Power, M.C., Aircraft Depot (Middle East) to Headquarters, Iraq Command (Iraq) (Supernumerary) 13.10.22. R. A. G. Elliott, M.B., B.A., from Headquarters, R.A.F., Middle East (Middle East), to Egyptian Group Headquarters (Middle East). 10.6.22. J. H. Lidderdale, O.B.E., from Air Ministry (Dept. of A.M.P.) (D.D.O.) to R.A.F. Depot (Inland Area) (Supernumerary). 6.10.22. F. N. Smartt, M.B., B.A. The notification which appeared in R.A.F. Intelligence No. 84, dated 1.11.22, wherein this officer was posted from R.A.F. Depot (Inland Area) to No. 1 Group Headquarters (Inland Area) is hereby cancelled. H. E. M. Watkins, A.F.C., from Headquarters, R.A.F., Iraq, to command Rest Camp (Iraq). 1.10.22. W. Sowrey, D.F.C., A.F.C., from R.A.F. Depot (Inland Area) to No. 1 Flying Training School (Inland Area). 13.10.22. Substituted for the notification which appeared in R.A.F. Intelligence No. 84 dated 1.11.22, wherein this officer was posted as stated above, with effect from 1.11.22.

Flight Lieutenants K. H. Riversdale-Elliot, from Palestine Wing Headquarters (Middle East) to No. 47 Squadron (Middle East) (Supernumerary). 25.9.22. C. K. Chandler, M.B.E., from School of Naval Co-operation and Aerial Navigation (Coastal Area), from No. 267 Squadron (Mediterranean). 30.10.22. F. H. Laurence, M.C., from Boys' Wing (Cranwell), to R.A.F. Depot (Inland Area) (Supernumerary). 14.11.22. (Actg. Sqdn. Ldr.) W. B. Johnston from Army (R.A.P.C.) to Central Accountant Office, Poona, for accountant duties; on secondment from the Army. 1.10.22. E. A. Lumley, M.C., M.B., from No. 47 Squadron (Middle East), to No. 4 Flying Training School (Middle East). 11.10.22. J. T. T. Forbes, from No. 4 Flying Training School (Middle East) to Aircraft Depot (Middle East). 12.10.22. G. H. H. Maxwell, M.B., from Headquarters, R.A.F. (Middle East), to No. 47 Squadron (Middle East). 6.10.22. A. J. Brown, D.S.O., from R.A.F. Central Hospital (Coastal Area) to Headquarters (Coastal Area). (Supernumerary.) 30.10.22. B. F. Beatson, D.T.M., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Depot (Inland Area) (Supernumerary). 6.11.22. A. Williams from Inland Area Aircraft Depot (Inland Area) to Headquarters, R.A.F., Cranwell. 13.11.22. H. E. Hayes, from Headquarters, R.A.F., Cranwell, to Inland Area Aircraft Depot (Inland Area). 8.11.22. M. V. German, from Headquarters, R.A.F. (Iraq), to command R.A.F. Prison (Iraq). 1.10.22. L. O. Brown, D.S.C., A.F.C., from Headquarters R.A.F. (Iraq) to Basrah Group Headquarters (Iraq). 1.10.22. H. B. Russell, A.F.C., from Headquarters, R.A.F. (Iraq), to Rest Camp (Iraq) for duty as Adjutant. 1.10.22. C. S. Richardson, M.B.E., from No. 6 Squadron (Iraq) to Headquarters, R.A.F. (Iraq). 17.7.22.

Lieutenant J. B. Glubb, M.C. (R.E.), to Headquarters, Iraq Command. On appointment as G.S.O. 3 (Intell.). On attachment to Royal Air Force for two years.

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"IRAQ COMMAND"

WITH effect from October 1, 1922, the Royal Air Force, Iraq, is designated the "Iraq Command."

The A.O.C., Iraq Command, is responsible for the command and administration of all units of the Royal Air Force, the British Army and the Indian Army stationed at Iraq.

The command of the army units forming the infantry brigade, *i.e.* infantry battalions, artillery units, and sapper and miner company, will be vested in the Colonel Commandant, Infantry Brigade, who will be under the orders of the A.O.C.

The Colonel Commandant will, on all questions of policy and all major questions of administration in regard to the forces under his command, address the A.O.C., who will communicate with the Air Ministry on such matters.

The Colonel Commandant will communicate direct with the War Office, or the Commander-in-Chief in India, on minor administrative questions regarding the military forces under his command.

The A.O.C. will be directly responsible for the command of the Iraq Levies, and for the general administration of the force. Detailed administration of the Levies will be the responsibility of the Officer Commanding the Iraq Levies, and of his staff. No responsibility in this respect will devolve on the military staff.

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CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

ROLLS-ROYCE AND INCORRECT STATEMENTS

[2065] Persistent statements are being circulated to the effect that all or the majority of the parts of the new 20 h.p. Rolls-Royce chassis are manufactured at the Works at Springfield, Mass., of Rolls-Royce of America, Inc.

We should be glad if you will allow us to state most emphatically that there is not an atom of foundation for this ridiculous statement.

It is difficult to understand how anyone should believe that we should import parts from America, seeing the magnitude of our plant at Derby.

As a matter of fact, the orders for the American-made 40-50 h.p. Rolls-Royce car are now exceeding every week the number of chassis produced, and the writer is on the point of leaving for America to discuss, amongst other things, the proposal that the English Company should send chassis to America to made good this deficiency.

C. JOHNSON,

Nov. 1st. *Managing Director*, ROLLS-ROYCE, LTD.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

(London Aero-Models Association)

ON the 10th inst. at Headquarters, a very interesting debate was opened by Mr. Pavely on "Wing Sections," before 25 members, most of whom joined in the discussion which followed. The Chairman, Mr. Houlberg, concluded an interesting meeting wlth a general survey of the proceedings.

Mr. Evans reports that on Saturday at Sudbury some interesting flying was done, Messrs. A. and W. Rasmussen flying fuselage tractors. The former had several good flights of 30 secs. and over, and the latter did well with a spar model. Mr. Evans had his new fuselage model, which, not yet being tuned up, did not give the expected results. Tea at the old farm-house concluded a pleasant afternoon.

On the 27th October it was proposed by Mr. M. Levy and seconded by Mr. Williams that "Record cups shall be awarded to the members making the best improvement on records during each calendar month." This was carried unanimously.

On Sunday morning last another excellent meeting on Parliament Hill was held. Over a dozen members entered their model gliders in an attempt to improve the record of 41⅗ secs. held by Mr. H. Davies. This was accomplished by Mr. C. Burchell, who put up a glide of 44 secs. Mr. Whelpton's glider was very consistent, but could not get over 27 secs. duration. Mr. Howse's best glide was 27⅕ secs., H. Davies 36 secs., B. K. Johnson 35⅕ secs. Nearly all the members managed to do 20 secs. and over, which shows a great improvement on the last attempt.

There was also some excellent model aeroplane flying, Messrs. Rippon and Davies with Farman Type models, Messrs. Burchell and Whelpton with enclosed fuselage models, and other members with spar models, giving a good exhibition.

Given favourable weather conditions on Sunday next, there will be a large entry of enclosed models for Mr. Pilcher's Challenge Cup.

At Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, on Friday next, at 7.30 p.m., an interesting discussion is promised by Mr. Rippon and Mr. Burchell. Subject: "Large Models *v.* Small Models." Mr. B. K. Johnson has kindly offered to make lantern slides of interesting models and flights, etc., if members will let him have negatives of same and data.

A. E. JONES,
Hon. Sec.

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IMPORTS AND EXPORTS, 1921-1922

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
Mar. ...	14	1,471	118,199	166,607	1,565	100
April...	1,370	3,846	138,983	139,995	450	5,880
May ...	3,350	2,416	59,624	167,999	1,818	4,254
June ...	5,181	816	79,713	129,137	—	14,530
July ...	540	1,039	530,628	24,405	860	—
August	343	198	111,595	88,910	—	685
Sept. ...	620	3,043	145,755	71,508	—	44
Oct. ...	4,256	633	101,567	40,225	580	90
	22,512	15,181	1,433,021	974,467	7,577	26,706

* * *

SIDE-WIND

DUNLOP COMPANY'S advertising in the past has probably been one of the outstanding examples of bold publicity, and has always reflected the belief of the company in the power of advertising as a means towards large production and consequently low selling prices. We now learn that this policy is to be maintained and even elaborated, so as to keep the famous name before the public next year with all the dominance characteristic of Dunlop advertising in the past. The advertising contractors acting for the Dunlop Company are Messrs. A. J. Wilson and Co., Ltd.—a firm whose name has been closely identified with the motor industry since cars first appeared on the road. Sir Charles F. Higham acts as adviser on Dunlop publicity.

PUBLICATIONS RECEIVED

The Internal Combustion Engine. Vol. I—Slow-Speed Engines. By Harry R. Ricardo, B.A. London: Blackie and Son, Ltd. Price 30*s.* net.

The Wireless Weather Manual: A Guide to the Reception and Interpretation of Weather Reports and Forecasts. Air Ministry, M.O. 255. Meteorological Office. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 9*d.* net.

Les Avions. By Jean A. Lefranc. Bibliotheque des Merveilles. Paris: Librairie Hachette et Cie., Boul. Saint-Germain, 79. Price 6 fr.

Wireless: Popular and Concise. By Lieut.-Col. C. G. Chetwode Crawley, R.M.A. London: Hutchinson and Co. Price 1*s.* 6*d.* net.

The Wireless Telephone: What It Is and How It Works. By Philip R. Coursey, B.Sc. London: The Wireless Press, Ltd. Price 2*s.* 6*d.*

Aeronautical Research Committee Reports and Memoranda.—No. 773: *Lateral Control at Large Angles of Incidence.* By A. S. Batson, B.Sc., and C. N. H. Lock, M.A. March, 1921. Price 9*d.* net., by post 10*d.* (Ae. 39.). *No.* 779: *Experiments on Model of Rigid Airship R.* 32. By R. Jones, M.A., D. H. Williams, B.Sc., and A. H. Bell. September, 1921. Price, 9*d.* net., by post 10*d.* *No.* 780 (*Ae* 40): *Aerodynamic Pressure on Airship Hull in Curvilinear Flight.* By R. Jones, M.A. November, 1921. Price 6*d.* net., by post 7*d.* *No.* 781 (*Ae.* 41): *Motion of Airships under certain Imposed Movements of the Rudders.* By R. Jones, M.A. November, 1921. Price 1*s.* 3*d.* net., by post 1*s.* 4*d.* *No.* 784 (*Ae.* 37): *Seaplanes—Taking Off and Alighting.* By Flight Lieut. E. S. Goodwin, A.F.C. December, 1921. Price 3*d.* net., by post 3½*d.* *No.* 789 (*M.* 11): *Preliminary Report on Properties of Commercially Pure Nickel as a Standard Material for Fatigue Investigations.* By G. A. Hankins, A.R.C.Sc. November, 1921. Price 9*d.* net., by post 10*d.* London: H.M. Stationery Office, Kingsway, W.C. 2.

* * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: **cyl. = cylinder; I.C. = internal combustion; m. = motors**
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published November 9, 1922

7,254. T. E. W. T. HENDERSON. Seats. (186,944.)
18,040. A. MARCHETTI. Stabiliser for flying-apparatus sustained by propellers. (186,975.)
18,436. A. P. THURSTON and BRISTOL AEROPLANE CO., LTD. Planes, etc. (186,990.)
19,251. G. W. and H. E. JOHNS. Mooring means for airships. (187,036.)
28,896. SOC. DES MOTEURS SALMSON (SYSTEM CANTON-UNNE). Compression relief system for radial-cyl. I.C. engines. (171,375.)
32,131. SKYWING AIRCRAFT CORPORTION. I.C. engines. (172,308.)

APPLIED FOR IN 1922

Published November 9, 1922

1,300. N. F. JOHNSTON. Rotary engines. (187,170.)

NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

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The Aircraft Engineer and Airships

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Should any difficulty be experienced in procuring* "FLIGHT" *from local newsvendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.

FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from* p. xiv.)

FABRICS AND YARNS—

Victoria Rubber Co., Ltd., Edinburgh.

FLYING SCHOOL—

Fraser's Flying School, Kingsbury, N.W. 9.

GLIDERS—

Peyret, L., Ingenieur, 23, Rue Lambrecht, Courbevoie sur Seine, France.

GLUES—

Lang Propeller Ltd., Weybridge, Surrey.
Weybridge 520-521; "Aerosticks, Weybridge.

HANGARS—

Vauxhall Trading Co., Ltd., 37, Great James St. Bedford Row, W.C. 1.

INGOT, ALUMINIUM—

British Aluminium Co., Ltd., The 109, Queen Victoria St., London.
City 2676; "Cryolite," Cent. London.

INSTRUMENTS (Speed), Watches, &c.—

Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

Goldsmiths & Silversmiths Co., 112, Regent Street, W. 1. Gerrard 9091 (3 lines).

Smith, S., & Sons (M.A.), Ltd., Cricklewood Works, N.W. 2. Willesden 2335 (7 lines).

INSULATING MATERIALS—

MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent, London.

LUBRICATING OILS—

Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent, London.

MACHINING—

Monk Engineering Co., Ltd., Coventry.
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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Nov. 30	**Closing date for FLIGHT Glider Designing Competition**
Dec. 1	**Lecture, "Constructional Design of Aeroplanes," by C. W. Tinson, before I.Ae.E.**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
Mar. 15	**Entries close for Dutch Height Indicator Competition**
June	**International Air Congress, London**
Dec. 1	**Entries close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**

EDITORIAL COMMENT.

CONSIDERABLE publicity has lately been given to the doings of the Royal Air Force in Iraq, through the articles by Sir Percival Phillips in the *Daily Mail*. The fact that it is the R.A.F. upon which the spotlight has been directed is mainly incidental, and is but a part of the propaganda for the entire evacuation of Iraq which the proprietors of that and other journals have been carrying on for a considerable period. With the arguments used in Sir Percival's articles we are not so much concerned here. He, like many others, appears to overlook the fact that, quite apart from the question of the wisdom or otherwise of spending money upon upholding King Feisul's Government and maintaining law and order, the Persian oil fields are of vast importance to the Empire, and conditions can easily be imagined under which these oil fields might form Britain's only supply of oil fuel. Thus, whether we like it or not, we must defend the pipe line from Basra to Jaffa, and that being so, nobody would seriously claim that this task could be more cheaply or more efficiently done than by the R.A.F. Amid all the wild talk about protection of the poor Arab, killing women and children, "Government by Bomb," and all the rest, this salient fact should be kept in mind. It seems fairly probable that those who now clamour loudest for the evacuation of Iraq would be the first to cry out loud and long about lack of foresight, should the pipe line and, through that, the oil supplies in Persia be cut off and the supply of oil fuel for our Navy and petrol for our aircraft, motor transport, etc., be endangered. At that we are content to let the matter rest as far as the necessity for our being in Iraq at all is concerned.

The R.A.F. in Iraq

As regards the effectiveness of the R.A.F., even Sir Percival does not deny it. On the contrary, he says, in one of his articles: "Until now, government by bomb as I have described it has been the only really effective form of authority in many parts of Iraq." And, again, as showing another direction in which aircraft has proved its usefulness: "Recent operations in Kurdistan proved the efficacy of aeroplanes in another way. Turkish bands pressed down from the hills against Sikh outposts, and we had to evacuate Sulaimaniyeh and Rania hurriedly. . . . . Between dawn and noon next day a succession of aeroplanes flew into the town and took away some sixty persons and the detachment of Arab levies."

Thus, whatever may be one's opinion of the wisdom of our being in Iraq at all, the justification of handing over the command of Iraq to the Royal Air Force appears to be rapidly forthcoming, and we have not the slightest doubt that in Sir John Salmond the R.A.F. in Iraq has a chief, a man of action, who has been given full authority, and who is not afraid to use it to the best advantage.

◆ ◆ ◆

Exit Hendon It was with extreme regret that we learned recently that in a short while Hendon as we knew it will be no more. The extension of the Tube from Golders Green, instead of, as we had hoped, being an opening for civil aviation and causing most of our sporting aviation to revert to the old aerodrome, has had an entirely different effect. The aerodrome, we understand, is being split up into building plots, and thus the chance of restoring Hendon's former greatness as an aviation centre vanishes for ever. We shall not attempt to deny that we are sorry. Hendon was always connected in our thoughts with the earliest—and glorious—days of flying. From the Circuit of Britain to the Aerial Derby in 1921, all important flying events took place at Hendon. Hendon was the scene of many early struggles to master the air, and it was the scene of many a glorious race. Everybody who was anybody could be found at Hendon on Saturdays and Sundays, and the popularity of the aerodrome could be gauged by the "gate." Although there was never a great deal of shouting and no big prizes, a week-end at Hendon was never wasted, and the Saturday races under the clever organisation of the late and ever-to-be-regretted Richard Gates, small as they were, were usually more full of entertainment than the more formal flying meetings Waddon has seen.

And now Hendon is no more. With the advent of the Tube, presumably the ground has become too valuable to retain for the problematic use as an aerodrome, and has been given over to the prosaic, but immediately useful, purpose of carrying rows upon rows of "semi-detached." In a few years' time we shall be able to take our children up to the top of the hill by the old church—the mere mention of the edifice brings back memories—and point out to them that down there, just beyond the railway, Britain grew her wings and made her early fledgling attempts at conquering the air; there worked many of the pioneers to whom Britain owes her position in the air today.

◆ ◆ ◆

England's First Gliding School Elsewhere in this issue we publish a few notes dealing with the opening of what may be considered England's first school of gliding. If the sport of motorless flight is to become what we all hope for, it is essential that the greatest possible number of enthusiasts should be attracted to the practical, no less than to the theoretical, side. At first it is to be expected that a goodly proportion of those who take up gliding and soaring will be recruited from the ranks of pilots or ex-pilots, who see in this form of flying a means of "keeping their hands in."

We are convinced, however, that the new sport will soon spread outside the relatively narrow limits of those who have in the past been associated with aviation in one form or other, and the formation of a school for the training of glider pilots should help materially in this respect. The fee asked is to be so reasonable that large numbers should be in a position to afford it.

Apart from the training specially for glider pilots (and incidentally the Royal Aero Club will soon have to draft a set of rules defining the tests which a pupil should be able to pass in order to be considered entitled to a glider pilot's licence), the practice obtained on motorless aircraft should be a very valuable asset when and if the pupil decides to go over to power-driven machines. It is not difficult to envisage a system of tuition comprising a series of carefully graduated steps by which a pupil starts on a slow, stable, easily controlled glider; from that proceeds to a more highly-loaded and efficient monoplane; from that, possibly, to a very low-powered machine, and so by easy stages to the full-powered military or commercial aircraft. Should it prove to be the case that preliminary training on gliders was an asset in the training of pilots for power machines, it would appear that it might easily be worth while for the Air Ministry to grant a small subsidy to glider schools for each pupil trained, as his preliminary training on gliders might very easily have the effect of considerably reducing the expense of later training on power-driven aircraft.

◆ ◆

Recruiting for London Air Defence

RECRUITING is now open for the first Territorial Battalion of Royal Engineers, to be formed under the War Office scheme for defending London against aerial attack.

The new unit is designated the 10th (London) Anti-Aircraft Battalion, Royal Engineers, and the training of the battalion, which is of scientific nature, will consist of operating the searchlight projectors, engines and sound locators. Men of a high standard are being selected, and engineering students and men with technical knowledge in electrical or mechanical engineering are particularly asked to join.

The rate of pay during camp or if embodied will be 9*s*. a day for sergeant, 5*s*. to 7*s*. 3*d*. for corporal and 3*s*. to 6*s*. for sapper, in addition to bounty and, under the usual conditions, marriage allowance. Those desirous of joining should apply any weekday (except Saturday), between 6 p.m. and 8 p.m., at the Headquarters, 10th (London) A.A. Battalion, R.E., Duke of York's School, Chelsea, S.W.

An Aeronautical Library Saved for Britain

THE Council of the Royal Aeronautical Society announces that through the generosity of the Trustees of the Carnegie United Kingdom Trust it has been able to arrange for the purchase of a large number of valuable historical books on aeronautics which would otherwise have shortly been sold to an American purchaser. This purchase, together with the works already possessed by the Society, renders its collection of early and modern aeronautical literature probably unsurpassed in this or any other country. Comprising as it does many early works of extreme rarity, as well as the most modern English and foreign treatises, the Society's library will now form a complete collection of all important works on aeronautics from the XVIIth century down to the present day. In recognition of its appreciation of their generosity, the Council of the Royal Aeronautical Society has, at the request of the Carnegie Trustees, agreed to make the books in the Society's library available for any student in the British Isles through the medium of the Central Library for Students, 9, Galen Place, London, W.C. 1. The Central Library for Students has been formed by the Carnegie Trustees to provide a loan collection for students of technical books which are unsuitable for placing in rural libraries. By receiving permission to use the Royal Aeronautical Society's Library, the Central Library for Students will be spared the necessity of forming a special section devoted to aeronautics.

A REALLY LIGHT LOW-POWERED ENGINE AT LAST?

The German Statax Three-Cylinder Rotary

If the claims advanced for it can be substantiated, it would appear that the "Statax" three-cylinder rotary two-stroke engine, which has just been produced in Germany, provides a power plant with which very light aeroplanes, such as the recently constructed gliders, should be able to fly quite creditably. The engine in question, which has been designed and built by Herr F. J. M. Hansen, is stated to weigh but 8 kg. (17·6 lbs.) complete with airscrew, while the power is claimed to be 7·5 h.p. This figure does not refer to a short burst at full throttle, but is the power which the engine is guaranteed to develop for long periods.

The accompanying photograph gives an idea of the general arrangement of the engine. The chief feature is that there is no crank-case, in the ordinary sense of the word, but merely a cylindrical induction chamber to which the cylinders are bolted, with their closed ends turned inwards. The outer ends of the cylinders are open, and the pistons have of course, their skirt pointing outwards. It is claimed that the extremely light weight is a result of so designing the engine that all the most highly stressed members work in tension. While this is so to a certain extent, it is somewhat difficult to see how sufficient weight could be saved to give the low figure stated. From the very brief particulars available (from *Flugsport* of November 15, 1922), it is not quite clear how the force of the explosions and centrifugal force is transmitted from the flat steel straps to the connecting rods or their equivalent. It would appear that, instead of connecting rods, the skirt of the pistons is extended outwards, the two extensions carrying lugs for the steel straps coming out from the boss which represents the crank-pin. These steel straps are, it will be seen, bent over the lugs and then twisted so as to be brought edge-on to the air as the engine is turning.

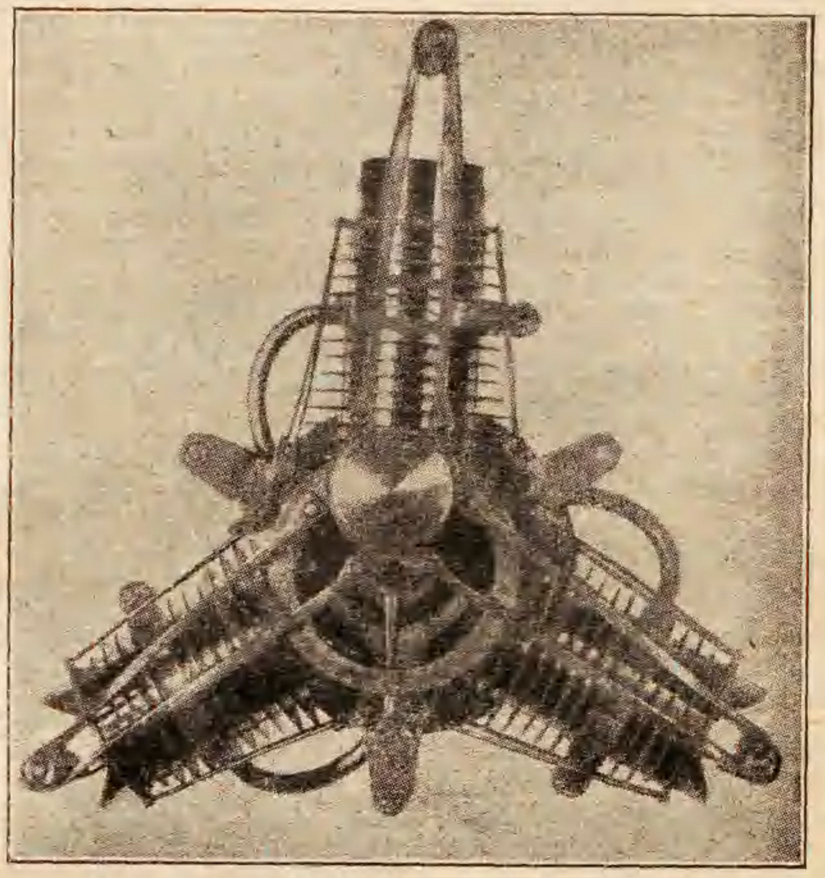
There are no valves, induction and exhaust ports of usual type, closed and opened by the pistons, being used instead. The combustion chamber is, of course, at the inner end of the cylinders, and the mixture is transferred to the combustion chamber through bent induction pipes. Centrifugal force is relied upon to get the charge from the induction chamber out to the cylinders.

The latter are of steel, machined from forgings, and are provided with fins of the usual type. The pistons are made of aluminium alloy, as is also the crank-case, or, more correctly speaking, the induction chamber, which, owing to the tie-rods by which the cylinders are held down, does not have any great centrifugal force to resist. Also, instead of the explosion pressure being added to that of centrifugal force on the cylinders, as it does in ordinary rotaries, it acts in opposition to centrifugal force. It is, of course, through such details that it has been possible to get the weight down.

The propeller blades, of which there are three, are bolted to the induction chamber in the spaces between the cylinders. It would, for this reason, appear to be impossible to cowl-in the engine, and as the combustion chambers are near the foot of the cylinders, probably this portion will require ample cooling, so that a cowl could not be used in any case. The engine would, it might be imagined, be somewhat "dirty," as there does not appear to be any way of collecting the oil flung out.

The magneto fitted is a Bosch of the smallest type, and the plugs are Bosch-Gnome-Lilliput. The magneto is mounted on the back of the engine, as is also the oil pump.

The engine is started by injecting a few drops of petrol through the exhaust ports, when, on swinging the propeller, the engine usually starts after about one-half turn. Owing to the centrifugal induction system it has been found that the engine will not function with any regularity at speeds below 500 r.p.m. The maximum revs. (for long periods) is 1,600 r.p.m. At that speed it may be assumed that the propeller efficiency will not be very good in a slow machine.



Front view of the German Statax engine.

Following are the main dimensions, etc., of the Statax: Bore 60 mm. (2 ins.); stroke, 70 mm. (2¾ ins.); speed, 1,600 r.p.m.; petrol consumption, 320 grammes per h.p./hour (0·705 lb./h.p./hour); oil consumption, 30 grammes/h.p./hour (0·07 lb./h.p./hour); total weight, including a propeller of 4 ft. 11 in. diameter, 8 kg. (17·6 lbs.). These figures, it is stated, are guaranteed.

All enquiries should be addressed to Herr F. J. M. Hansen, 2, Neue Mastrichterstrasse, Cologne.

◆ ◆ ◆ ◆

Members of the New Parliament.

Many candidates who have been elected to the new Parliament are, or have been, interested or closely associated with aviation—amongst these we notice, and welcome back to his seat, Sir William Joynson-Hicks; also Lieut.-Col. J. T. C. Moore-Brabazon, Admiral M. F. Sueter, and Maj.-Gen. Sir F. Sykes. Possibly a good omen for the future of air matters is the fact that Sir Samuel Hoare, Minister for Air, was the first Minister returned, whilst Sir J. L. Baird, who was a member of the Air Board for the Royal Air Force, appropriately as an air supporter, represents "Ayr" in the House, and it may be noted for this same constituency the Labour candidate, who was defeated, was named Airlie. Many other supporters and well-wishers of aviation are welcome members, including: Capt. W. Brass, a distinguished R.A.F. officer; Comdr. Burney of Imperial Airship fame; Capt. Wedgwood Benn; Rt. Hon. Lord Hugh Cecil (R.F.C. 1915); Capt. A. G. Reid, R.A.F., D.F.C.; Capt. D. Shipwright (R.F.C. 1916); Sir John Simon (R.F.C. 1915–16); Maj. G. C. Tryon (Under Secretary for Air, 1919), etc.

Air Mail to Holland: Reduced Fees

The Postmaster-General announces that the fees on letters and parcels for conveyance by air to Holland are now reduced. The charge for letters is 2*d*. per oz., instead of 3*d*., in addition to ordinary foreign postage. The rates for parcels are as follow:—Up to 3 lbs., 3*s*. 6*d*. (instead of 4*s*.); from 3-7 lbs., 6*s*. 6*d*. (instead of 7*s*. 6*d*.); from 7-11 lbs., 9*s*. (instead of 10*s*. 6*d*.). The new scale of parcel fees, like the old, is inclusive of express delivery at the place of destination. On parcels addressed "*Poste Restante*," the fees will be 6*d*. less.

India's Air Command

As the result of Air Vice-Marshal Salmond's visit to India, the air command in India has been raised to the dignity of an Air Vice-Marshal's command. Air Vice-Marshal P. W. Game has been appointed to the post in the place of the present commander, Air-Commodore Tom I. Webb-Bowen, air officer commanding R.A.F. in India. The headquarters of the Indian Air establishment will be transferred from Umballa to Delhi.

Seaplane Squadron No. 8, R.N.A.S. Annual.

Seaplane Squadron No. 8, R.N.A.S., German East Africa, 1916-18, third annual dinner will be held at Gatti's, Strand, on Friday, December 1. Group Capt. F. W. Bowhill, C.M.G., D.S.O., R.A.F., in the chair. All officers and men of R.N.A.S. in East Africa cordially invited. Mufti. Write immediately to C. R. Lucate, 17, Garden Avenue, Mitcham, or C. S. Thompson, 25, Wharncliffe Gardens, N.W. 8.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

THERE is still one week in which competitors may send in designs for the Glider Designing Competition for prizes of £25 and £10 offered by the proprietors of FLIGHT. Particulars of the competition were published in our issue of August 31, 1922.

* * *

THE first prize will be awarded to the competitor who sends in the design which, in the opinion of the judges (Mr. F. Handley Page and Mr. C. R. Fairey), gives greatest promise of being efficient, controllable, and of low production cost. A Consolation Prize of £10 will be awarded to the competitor who sends in the most promising design along unorthodox lines, and for which the usual estimates cannot easily be made.

* * *

DESIGNS may be for any type of machine, monoplane, biplane, or triplane, and already it is becoming evident that gliders fall into various classes: The most aerodynamically efficient for soaring flight and competition work; those less efficient may still be very good machines for pure gliding or for school work, while even comparatively crude machines, built from all sorts of odds and ends, may provide quite a good deal of amusement, and need cost but very little.

* * *

THE closing date for the competition is November 30, by which date all designs must be in the hands of the Editor. No designs sent in after that date can be considered for the competition, although this does not necessarily mean that such designs will not be published. The winning drawings become the property of FLIGHT, and will, with others considered of sufficient interest, be published in forthcoming issues.

* * *

ALL drawings, tables, matter, etc., must be marked with a *nom de plume*, and accompanying these a sealed envelope must be sent containing the name and address of the competitor, this envelope to be marked on the outside with the *nom de plume* used on the drawings. Thus designs will be judged solely on merits, without the judges being aware of the identity of competitors.

* * *

SEVERAL items from the German competition in the Rhön appear to us to be of interest to gliding enthusiasts in this country also, and consequently we give below certain facts, features and opinions which have resulted from the German experiments. For most of these we are indebted to that excellent journal *Zeitschrift für Flugtechnik und Motorluftschiffahrt* (usually abbreviated to "Z.F.M.").

FOR this year's Rhön competitions no less than 53 machines had been entered, of which 50 were German. Of the 53 machines, 45 appeared at Rhön, and of these 39 made their appearance before the close of the entries list. Of these 39 gliders 32 were admitted to the acceptance flights, the others being forbidden, for various reasons, to take part. As a result of the acceptance tests 19 only succeeded in passing, and of these 6 were passed as "gliders" only, 13 being passed as "soarers." In order to qualify for the latter category it was necessary to fly for at least 60 secs., or cover a distance of at least 600 metres, with a rate of descent not to exceed 1·5 metres per second.

* * *

IT is of interest to note that the Germans appear to have had much the same trouble with their gliders as we did, *i.e.*, lack of lateral and directional control. In several instances (such as the Hannover "Vampyr" and "Greif") warping was used instead of ailerons, with, it appears, an improvement in control. The warping appears to have taken the form of fairly flexible tips, which could have their camber altered by the warp, rather than a change in incidence without change in section.

* * *

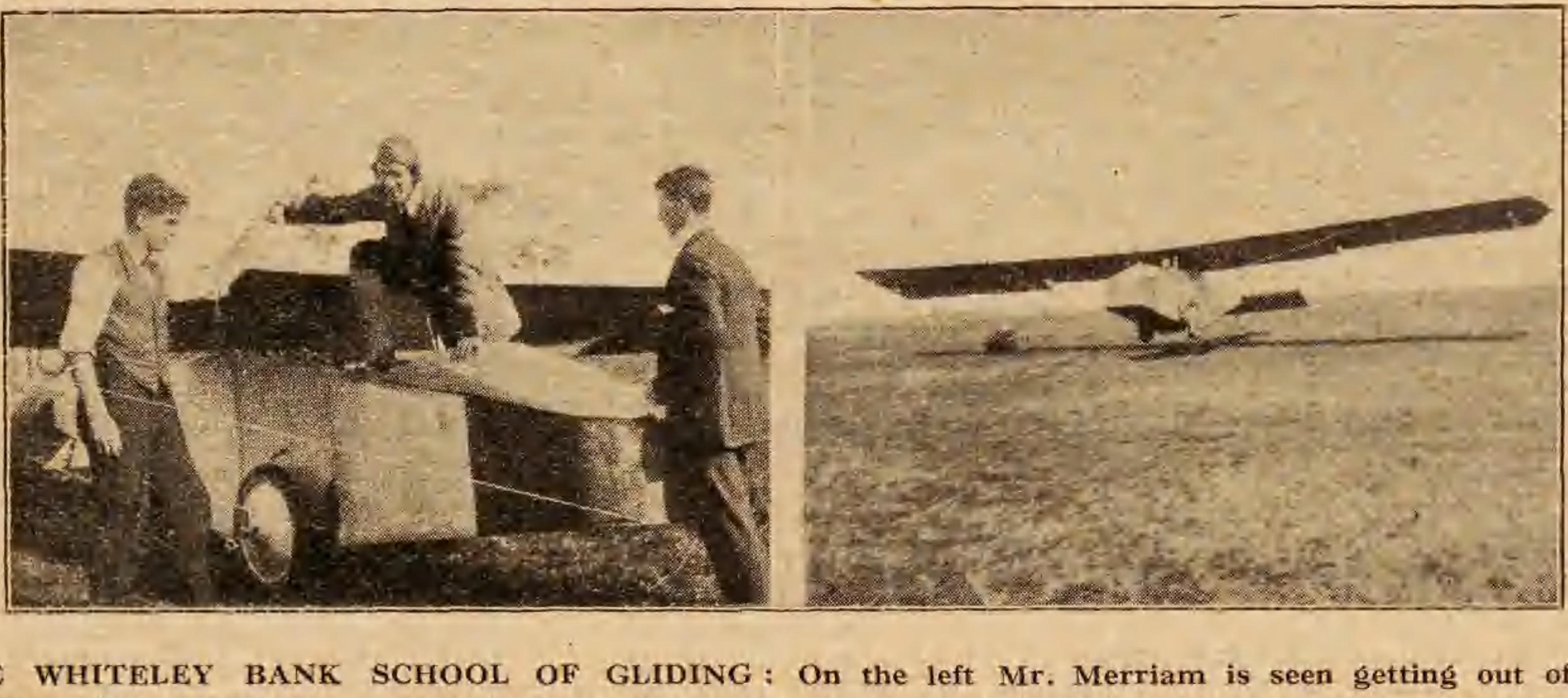
A FEW of the machines had their wings so mounted that the angle of incidence relative to the fuselage could be altered. A notable example is the Darmstadt "Geheimrat," in which the incidence can be changed during flight. To trim the machine a trimming tail plane was used, the controls of which worked on a notched quadrant. In spite of the fact that Hackmack does not appear to have made any extensive use of the trimming tail, several observers are of the opinion that the variable incidence wing form of control was superior to the usual elevator control. Presumably suitable checks were provided so as to prevent the pilot from reducing the angle to such an extent that the machine became unstable.

* * *

THE relatively poor performance of the Hannover "Greif" is put down to the fact that the pilot was seated so deep in the fuselage that his head scarcely protruded, and that therefore he could not feel the wind so well as could pilots of other machines (the Germans used no air speed indicators, it should be remembered). It is also thought that the distance from the c.g. of the machine to the centre of pressure of the rudder was too short. This applies probably also to the majority of the British machines at Itford, all of which had trouble with directional control.

* * *

IN connection with our article on the choice of a wing section for gliders, it is of interest to note that at the Rhön it was found that the machine with the highest value of $(L/D)^2 x\, k_L$ (the Hannover "Vampyr") was also the machine which could reach the greatest height above the top of a



THE WHITELEY BANK SCHOOL OF GLIDING: On the left Mr. Merriam is seen getting out of his machine after a trial flight. Mr. Newman, who had a large share in building the machine, is standing by the nose. On the right, the Merriam-Newman glider is seen just before touching after a flight.

hill. This was, of course, to be expected from theoretical considerations, but it is of interest to know that it was actually proved in practice. The Darmstadt appeared to be as good within its own range, but in trying to gain altitude the "ceiling" of the "Vampyr" always appeared to be about 50 ft. above that of the Darmstadt. Thus the machine with the lowest rate of descent will not only be the best glider in light airs, but it will also, for a given wind strength, be able to reach a higher level above the starting point. For distance gliding this is of great importance.

* * *

PROFESSOR PRANDTL of Göttingen thinks that the variable incidence-*cum*-trimming tail should possess many advantages in a glider, not only for ordinary gliding and soaring in upward currents, but also for gust soaring, as the incidence can be increased much more rapidly than is the case when the whole machine has to be tilted through an angle, as is the case with the ordinary elevator control. He also points out that for getting off without outside assistance this form has possibilities, as a machine can sit on the hillside with the wing at a very small angle; then, during a gust, the incidence can be instantly increased and the machine lifted straight off the ground and commence its glide.

* * *

PRANDTL also suggests the advisability of holding competitions for a number of smaller prizes, the conditions for which are not so severe, as in this way beginners may be attracted who would not otherwise be attracted, and it is only by the constant addition of "new blood" that we can hope to make gliding the popular and valuable sport which it should be. With this opinion we cordially agree, and hope that, in the enthusiasm of great performances, we shall not lose sight of the value of more modest attempts.

* * *

WE are very pleased to learn that our very old friend F. Warren Merriam intends to establish a gliding school in the Isle of Wight. The school, which will be known as the Whiteley Bank School of Gliding, is to start operations as soon as the Merriam-Newman glider has been repaired. The machine will be slightly altered to take a passenger, and will be provided with dual controls, so that school work of a most enjoyable nature should be possible. As there is no engine noise to contend with, the instructor will be able to talk to the pupil in comfort, and the work of tuition should be correspondingly facilitated.

* * *

MERRIAM already has a nice place in "the island" at Whiteley Bank, with a field situated on a slope facing south-west, *i.e.*, into the prevailing winds. Here the preliminary school work will be carried out, while, when pupils have gained a certain measure of proficiency, the scene of operations may be transferred to Arreton Downs.

* * *

THE school fee of the new establishment has been provisionally fixed at £25, which seems very reasonable indeed, and should place the learning of glider piloting within the reach of most enthusiasts. It should further be pointed out that Merriam has room to accommodate the pupils, who will thus be able to live right "on the spot," and need therefore waste no favourable opportunity. The terms for board and lodging will be very moderate, and we cannot conceive of a more enjoyable way of spending a couple of summer months than by living in the "island" and learning to fly.

* * *

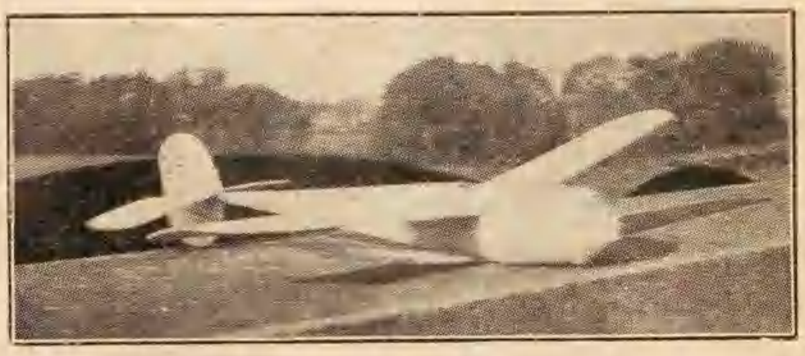
IN connection with the new school it is of interest to learn that one pioneer of aviation has already signified intention of joining the school. This is Mrs. Hewlett, whose name will be familiar to most readers of FLIGHT. Mrs. Hewlett was a partner in the firm Hewlett and Blondeau before the War, and during the War established large works at Luton. It will be a very fitting beginning for Merriam's new school if Mrs. Hewlett is his first lady pupil.

* * *

MERRIAM has probably taught more people to fly than has any other pilot in this country today. During the War he was stationed at Hendon and Chingford, where he taught literally thousands of pupils to fly. That he will be as successful—as regards numbers—may be doubtful, but that his instruction on gliders will be as sound as was that on power machines cannot be doubted for a moment, and we have therefore not the slightest hesitation in recommending the Whiteley Bank School of Gliding to all interested in the new sport and have a desire to take it up in practical form.

* * *

WE understand that there is a possibility of Raynham and Sydney Camm taking the Martinsyde glider (which has been slightly altered since the Itford competition) to Algiers for the great contest which is scheduled to take place there in January of the coming year. We are certain all will wish Raynham better luck than he had in England. Presumably he will test the machine at Itford before taking it abroad.



The Tinson paper model glider, which covered a distance of 920 ft. after being dropped from a water tower 60 ft. high.

* * *

A REPORT from Germany states that a pilot has succeeded in covering a couple of hundred yards over flat country in a glider. The report fails to state at what height the machine started, but presumably it was just "lifted" off, probably by a variable incidence wing, in which case it would appear that some form of "gust soaring" must have taken place.

* * *

THE accompanying photograph of Mr. Tinson's paper model glider should be of interest. This machine has covered a distance of 920 ft. when launched from a water tower 60 ft. high. The photograph was taken just after the model had been retrieved from the water, which explains the somewhat untidy appearance of the tail. Mr. Tinson has sent us the following particulars of his glider: The slots for the wing are marked out on the development of the conical fuselage, and thus the incidence of the main plane to the tail is definitely known, which should be a step in the right direction if we are to make model gliding a science as well as an amusement.

* * *

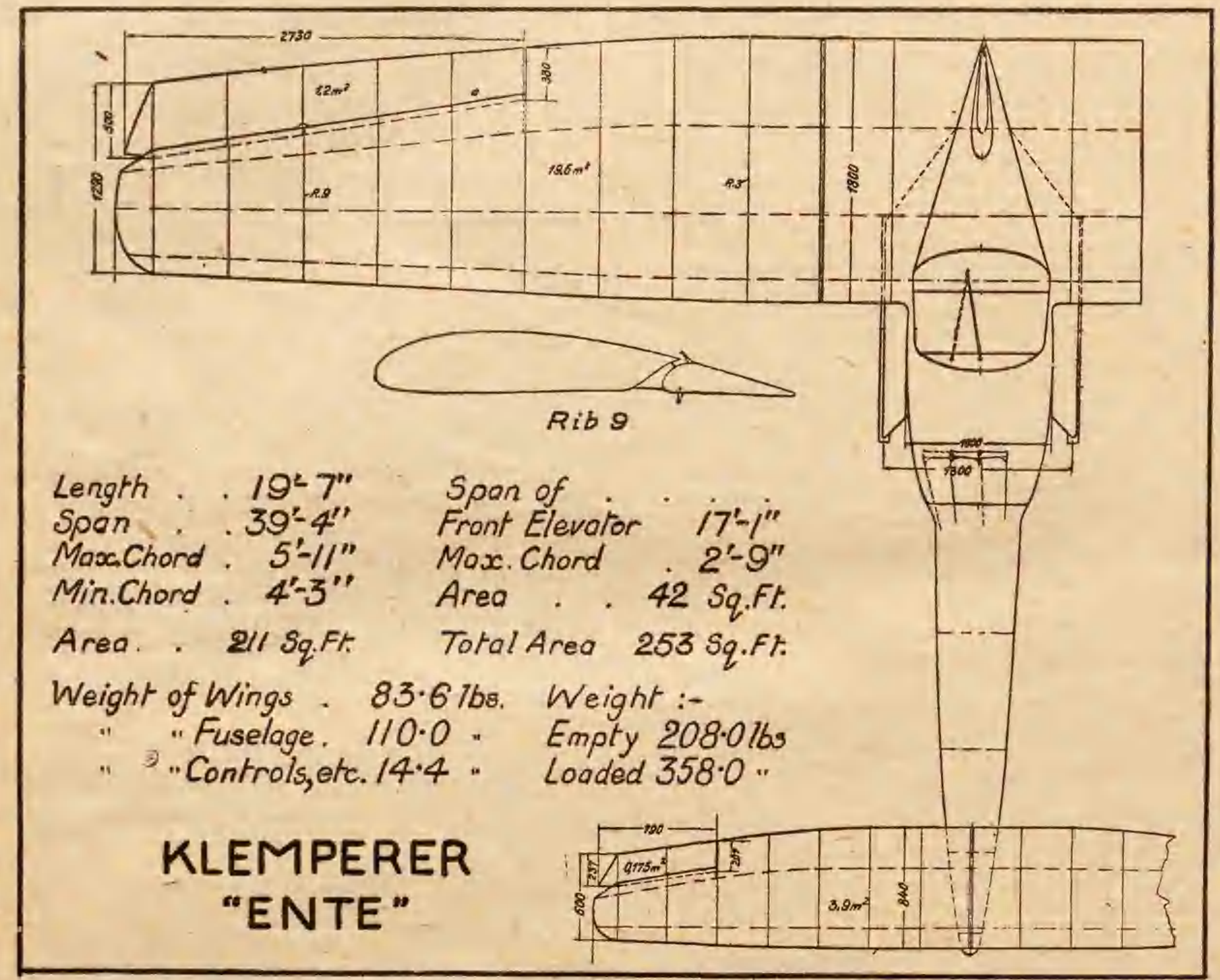
FOLLOWING are the main particulars of the Tinson paper model glider: Span, 18 ins.; mean chord, 2½ ins.; weight, 1½ ozs.; loading, 0·3 lb./sq. ft.; balance, 0·37 of chord; distance of c.g. from stern post, 3·25 times the chord; incidence of wing to centre line 6½ degrees; incidence of tail to centre line, 5° 23′; elevators to tail, — 5° average for best glide, and — 1° for soaring in a strong wind.

THE KLEMPERER "ENTE"

An Interesting German Glider Incorporating Many Novel Features

MENTION has been made in our gliding notes from time to time of the tail-first machine or "Ente" (Duck) which Herr Ingenieur Klemperer had produced for this year's Rhön competitions. Unfortunately, the machine was finished late, and there had been no opportunity of making test flights with it when the competition opened. As the machine was of novel design, it is small wonder that a sufficiently thorough trial of it could not be made in time for it to take part in this year's Rhön meeting. Such flights as were made were purely in the nature of test flights, and revealed the fact that several alterations are still necessary before the machine can be considered tuned up. We believe that most of these were necessitated by wrong weight distribution. Before commencing a description of the machine, a drawing of which we reproduce by courtesy of *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, it may be of interest to quote some notes by Herr Klemperer in the same journal.

"The problem of the 'Canard' type," Herr Klemperer writes, "cannot yet be said to have been solved. It is a question of building a 'Canard' type conforming to modern aerodynamical ideas, especially with regard to incorporating cantilever wings. Secondly, it was to be supposed that particularly for a glider, the front plane might under certain conditions be useful in acting as a 'wind vane.' [The word used by Herr Klemperer is *Windfühler*.—ED., FLIGHT.] The tail-first machine offers favourable possibilities for carrying a passenger without this resulting in making the machine unsuitable for use as a single-seater. In this type the centre of gravity and centre of lift approximately coincide so that, as distinct from the tail-behind type, the c.g. and c.p. of the empty machine are close together. The crew can therefore be placed on the c.g. without the trim of the machine being altered. A further advantage is that the centre of gravity (and, therefore, the seats) does not fall inside the centre-section of the wing, but in front of it. The result is that the wing attachment is simplified, while 'straight-through' wing spars can be used. Finally, the 'Canard' type lends itself to experiments with Lachmann slotted wings, as it can be landed at a much greater angle of incidence than can the tail-behind type.



THE KLEMPERER "DUCK": Plan view of the machine, with main dimensions, etc., shown.

"Thorough wind tunnel experiments carried out at Friedrichshafen and Göttingen have indicated the suitability of slotted wings on this type of machine, and the results of these tests will be published later. In the actual machine built, the slotted portion was confined to the *ailerons*, owing chiefly to the difficulty of providing a suitable arrangement for opening and closing the wing slots.

"The tests on the machine carried out up to the present, ten in all, included a few short 'hops.' At first we had trouble with starting the machine. These were overcome by altering the skids, and after the end of the meeting the machine got off very easily. A wind of but 3 to 4 metres per second, and a very short run along the gentle slope running from the top of the 'Kuppe' towards the plantation near the camp was sufficient for getting off. The difficulties which were experienced with directional stability were considerably lessened when a rear rudder, connected up to the front swivelling plane, was fitted.

"Although the 'Canard' type shows great longitudinal stability on tests of models, we found it very difficult on the elevator control. Even after the range of angles through which the front elevator could be moved had been increased, we found that longitudinal stability had not been attained. Evidently the large moment of inertia of this type of machine requires exceptionally large control surfaces. It is possible that difficulty may also be caused by the front plane, on taking off with the front at a considerable height above the ground, getting into a region of stronger wind which, at that low speed of the machine, may have considerable effect.

"The slotted *ailerons* did not behave badly, even in cases of stalling, of which there were several during the tests. As the machine, on account of its robust construction, suffered no serious damage during the tests, the experiments will be continued when the controls have been altered. The results will be published in due course."

Regarding the machine itself, comparatively little information is available. The accompanying plan view gives a fair idea of the general arrangement. It will be seen that the main plane has a span of 39 ft. 5 ins., and a maximum chord of 5 ft. 11 ins. tapering to 4 ft. 2½ ins. at the tip. The *ailerons*, which are of the slotted type, have a length of 9 ft. and an area of 13 sq. ft. each. The area of the main plane is 210 sq. ft. On the nose of the machine is placed the front elevator, which has an area of 42 sq. ft., the span being 17 ft. and the chord 2 ft. 9 ins. in the centre.

An interesting feature of this front elevator is that it serves the double purpose of elevator and rudder. To this end it is mounted on a ball-and-socket joint, which allows it to pivot around a lateral axis and also to rock around a longitudinal axis. To reduce the force necessary to turn the plane around the latter axis, small *ailerons* are fitted near the tips. These *ailerons* are connected up with the controls which rock the plane in such a way that, when it is desired to tilt the plane to port, the starboard flap moves down and the port flap up. The controls in the cockpit are of normal type, so as not to present unduly great difficulties in mastering this unusual system.

LONDON TERMINAL AERODROME

Monday evening, November 20.

THE "airways" suffered this last week, as did the railways from the persistent visitations of the fog-fiend. For several days, in fact, the continental air routes had their services dislocated and interrupted.

A typical instance of a swift advantage taken of a few hours' improvement in visibility occurred on Wednesday, the 15th. Mr. Robertson, piloting a Daimler 34, was fog-bound at Manchester with five passengers, waiting for a chance to get through to London. Suddenly, soon after 12, a wind that sprang up began to roll away the fog; whereupon Mr. Robertson was quickly in the air and speeding towards London. In the neighbourhood of the Metropolis the visibility was too bad to attempt to reach Croydon; so, doing what it has been found most convenient to do on several occasions lately, Mr. Robertson used the Stag Lane aerodrome, Edgware, as his London air-station, and, setting his five "fares" down there, a fast car soon brought them up into the heart of the city.

The two Fokker monoplanes which—as I mentioned in my last dispatch—were caught on the 12th in a sudden dense fog-belt and were compelled to get down on Epsom Downs, were completely fog-bound until the 17th, when their pilots—Smirnoff and Silliviers—managed in the morning to fly them across to Croydon.

In this regard Capt. Leverton points out that, thanks to the wooden-wing construction of these machines, it was possible to put them straight on to the regular service, once they had reached Croydon, without their having suffered any harm at all through their days of standing out in the fog.

He tells me, incidentally, that some of these wooden wings of the Fokker Amsterdam-London machines have just been taken to pieces and thoroughly examined after a couple of years of regular airway service, and it has been found that there is absolutely nothing the matter with them at all, and that they are as good for flying service as they were on the day they were built.

Fog-compelled inactivities have been relieved by discussions as to the possibility of finding some new location for the London Terminal Aerodrome.

Taking things all round, the feeling is that to make any sudden change might be like jumping out of the frying-pan into the fire. What those who have good words to say of Croydon insist upon is pressure being brought to bear in the right quarter so as to get a railway connection direct, say, from Victoria down on to the edge of the aerodrome, using the siding which already connects the Brighton line with the Aircraft Disposal factory. With this convenience provided, and in full working order when the passenger traffic rush begins again in the spring, it is held that one would have a big job to find a London air-station more suitable than Croydon.

Vagaries of the Fog

TODAY (Monday) the fog has been playing us some odd tricks again. In the early part of the day, for instance, machines were in and out without experiencing any difficulty. Then later on, just as a Handley Page was due in from Paris, some trick of the wind brought a great bank of London smoke and mist drifting across the aerodrome and out to the country beyond. But, thanks to wireless and our other aids, the "Handley" managed to creep in to a perfectly safe landing.

This foggy weather, and other bad conditions atmospherically, such as we have been wrestling with of late, draws particular and renewed attention to a matter I have mentioned in these notes before. That is the admirable confidence with which passengers now come forward to fly, even in weather which one might think would effectually deter them. Fogs, rainstorms, gales of wind—none of these prevent them from being on the spot ready to start, if the flying officials think it is good enough to go; and I think a most encouraging lesson is to be drawn from this alacrity with which "air express" travellers, and more especially business men in haste, now face bad weather in the air without a qualm. It shows, better than anything else could, the growing faith there is in the inherent safety of aerial transport.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN NOVEMBER 12 AND NOVEMBER 18, INCLUSIVE

Route (including certain diverted journeys)	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	2	7	2	2	1	2 9	H.P.W.8B G-EBBG (2h. 9m.)	B. (1), H.P.W.8B (1).
Paris–Croydon	4	9	1	4	1‡	3 31	H-P.W8B G-EBBH (3h.31m.)	B. (1), G. (2), H.P.W.8B. (1).
Croydon–Brussels–Cologne	1	1	1	—	1	4 0	D.H. 34 G-EBBR (4h. 0m.)	D.H. 34 (1).
Cologne–Brussels–Croydon	1	5	1	—	—§	—	—	D.H. 34 (1).
Croydon–Rotterdam ...	2	1	2	2	2	2 29	Fokker H-NABM (2h. 22m.)	F. (2).
Rotterdam–Croydon ...	4	2	2	4	2	3 0½	Fokker H-NABS (3h. 0m.)	F. (4).
Manchester–Croydon–Amsterdam	4‖	20	—	—	4	5 27	D.H 34 G-EBBQ (5h. 27m.)	D.H. 34 (2).
Amsterdam–Croydon–Manchester	4¶	8	1	—	3	5 57	D.H. 34 G-EBBY (5h. 57m.)	D.H. 34 (2).
Total for week ..	22	53	10	12	14			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ 3 to Lympne. § Land. Lympne. ‖ Man.–Stg. Lane 2, Croy.–A'dam. 1. ¶ Stg. Lane–Man. 1, Croy.–Man. 1.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad.
Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes.

Incidental Flying.—Mr. Perry out testing a Sopwith Snipe, and Capt. Stoken testing a similar machine and two Avros for the Aircraft Disposal Co. at Croydon on 17th and 18th.

THEORY OF THE SLOTTED WING*

LECTURE by A. BETZ, GÖTTINGEN.

Through the intensive study of all technical aviation problems during the war, the most important aeroplane parts, especially the wing, were so thoroughly tested as to create the impression that no further substantial improvement was possible. The characteristics of the different wing sections were sufficiently known to enable one to select the most suitable section for almost any purpose.

Then the discovery by Lachmann and Handley Page suddenly revealed entirely new possibilities and the wing section again became a rich field of problems. As probably you all know, this discovery consisted in making one or more slots in the wing section (Fig. 1). In this way it is possible to use the wing at higher angles of attack, and thus considerably increase the lift. The lift-drag ratio, however, seems to be no better in general than for ordinary wing sections. The advantage lies principally in the ability to vary the coefficient of lift, and hence the speed, within considerably wider limits. Hereby, the difficulties of taking off and landing are diminished and greater flight speeds made possible. Our knowledge of the behaviour of such slotted wings under the most diverse conditions is, unfortunately, very limited, and there is still much work to do before we shall have carried our investigations so far as to be able to choose, from the many possible modifications, the one best adapted for any given purpose.

The question of the most practical importance is what must be done in order that with an aeroplane we can obtain the best possible lift-drag ratio if the lift-coefficient is low, and, in addition, be able to reach, by easily made changes, a considerably higher coefficient of lift where the lift-drag ratio does not need to be especially good. The former condition would be used in ordinary horizontal flight, and the latter in taking off or in landing. The purely experimental solution of all the problems connected with these new wing sections is rendered very difficult by the large number of possible modifications. The most diverse cross-sections may be given the component parts of the wing and their relative size may be varied, thus bringing the slot nearer either the leading or trailing edge. Furthermore, the relative position of the parts and the width of the intervening slot may be varied. Lastly, there is the possibility of varying the number of the component wing-parts by the introduction of one or more slots. Although, for structural reasons, many forms do not come into practical consideration, the number of possibilities is still very large.

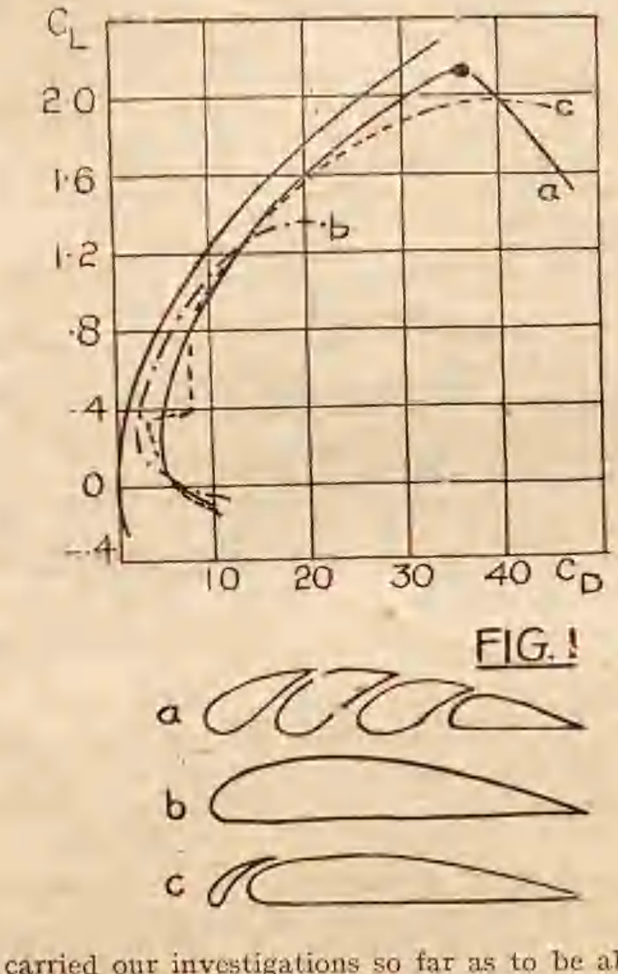

FIG. 1

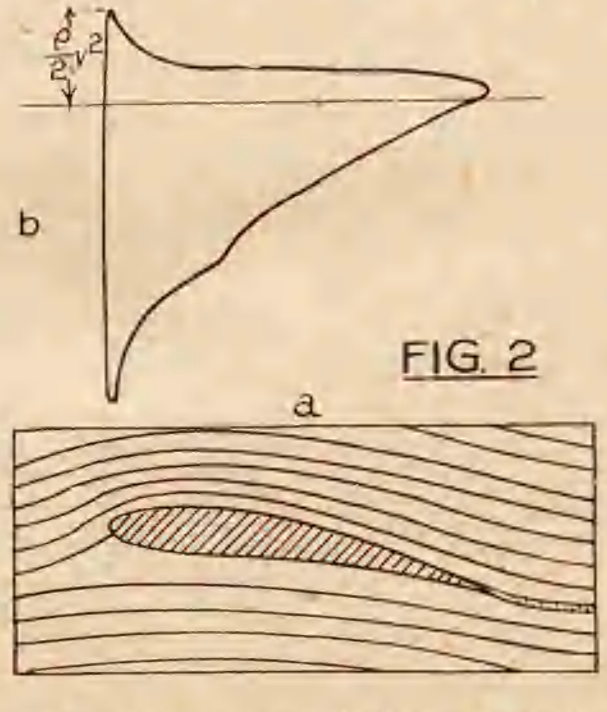

FIG. 2

Fig. 1.—Polars of an ordinary wing and of two slotted wings.
Fig. 2.—Flow around a wing section (a), and, (b), corresponding pressure distribution.

The experimental work will be considerably simplified and rendered more productive of results if we succeed in obtaining at least an approximate idea of what takes place. We are still, however, far from being able to give a complete theoretical explanation of the phenomena of slotted wings. Nevertheless, we can contribute something towards the explanation of the unusual increase of the lift-coefficient. I do not wish, however, to create the impression that what I am about to say is conclusive. I wish rather to bring the matter up for discussion, in the hope that still other viewpoints may be presented which will help to clarify the problem.

We must first consider the question as to how it happens that, with a given wing section, the lift-coefficient cannot be increased at will. In order to answer this fundamental question, we must consider more carefully the process by which lift is generated. It is known that lift is produced by the greater velocity, and consequently smaller pressure, of the air on the upper side of the wing than on the lower (Fig. 2). This difference must vanish at the trailing edge, around which the pressures can become equalised. The difficulty lies in the fact that a strong suction must be generated on the upper side, only to vanish again at the trailing edge. From the point of least pressure on, the kinetic energy of the air must therefore be transformed into pressure by a gradual increase in the cross-section of the tubes of flow. There accordingly takes place, on the rear portion of the upper side, a phenomenon very similar to the flow through a widening tube.

Now, it is known that such a flow, in which kinetic energy is transformed into pressure, remains stable only for a very gradual increase in the size of the cross-section. If the diameter increases too rapidly, the air does not continue to flow smoothly along the wall, but separates from it and goes its own way as a free jet, and the increased pressure is not obtained. If we increase the angle of attack of an aeroplane, the cross-sections of the tubes of flow on the suction-side are increased; and if a certain figure is exceeded, the air no longer flows along the upper surface of the wing, but is torn off, as it is expressed. This phenomenon is shown by Figs. 3 and 4. (The photographs were made by Dr. Heis and published in Prof. Prandtl's report on the Göttingen Aerodynamic Laboratory, in the *Year-Book of the Air Traffic Association*, 1912–1913.) The first picture shows a wing having a normal angle of attack. The flow conforms quite well to the top of the wing, and is not seriously affected by the small vortices which cover the wing. With larger wings and greater velocities the vortices are probably still smaller. The second picture shows the same wing at a somewhat greater angle of attack, in which case the fluid no longer follows the top of the wing.

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* Reprint from *Berichte und Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt* (supplement to *Zeitschrift für Flugtechnik und Motorluftschiffahrt*), No. 6, January, 1922 (Technical Note No. 100 of the American N.A.C.A.).

Involuntarily we now ask how it happens that the air does not separate on even a moderate increase in the diameter of the cross-section. The explanation lies in the viscosity of the air or, in most cases, more correctly, in an apparent viscosity, which in turbulent phenomena is conditioned by the turbulence itself. The case may be pictured qualitatively as follows:—The fluid has a tendency, on account of its inertia, to flow straight ahead, instead of following the curved surface, but then there must exist, between it and the surface of the wing, a quiet or an eddying "dead-water" region. This "dead water" is now carried along by friction (or the effect of viscosity), and must be constantly replaced (Fig. 4). Now, when the viscosity is so great that, in a given time, more fluid is carried away than can flow in, the "dead water" disappears and the flow follows the surface of the wing (Fig. 3).

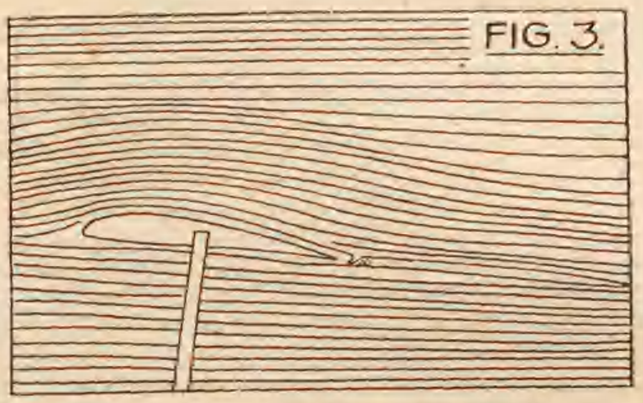


Fig. 3.—Flow about a wing section at an angle of attack of 8 degrees.

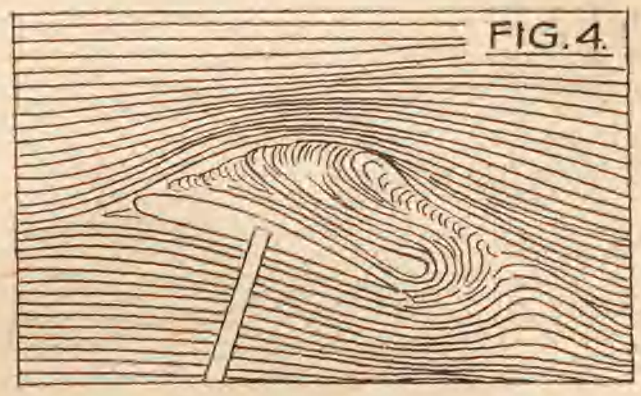
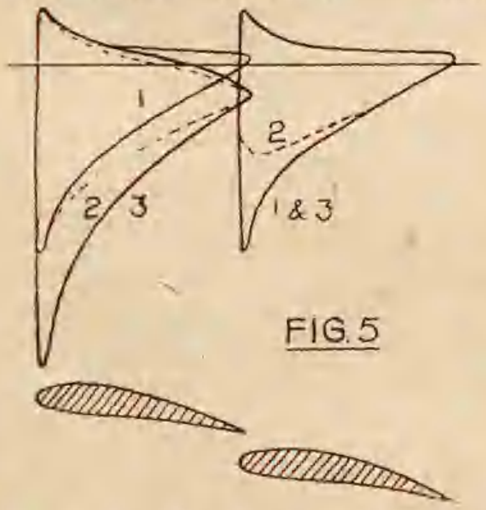


Fig. 4.—Flow about a wing section at an angle of attack of 19 degrees.

Such are the general outlines of the phenomena which produce lift and which also limit its magnitude. Unfortunately, these phenomena cannot be treated quantitatively by theoretical methods. We must therefore content ourselves with qualitative illustrations, and will now endeavour to explain, on this basis, the action of the slotted wing.

For the sake of simplicity, we will assume that there is only one slot. Such a wing section may be imagined as a biplane with a very great positive stagger and a very small distance between the wings. Some justification for this conception proceeds from the fact that, even with an ordinary biplane, the maximum lift is increased by a positive stagger. According to biplane measurements published by myself in the fourth volume of "Zeitschrift für Flugtechnik und Motorluftschiffahrt," the maximum C_L without stagger was 100, with a positive stagger of 30° it was 110 and for one wing alone it was 106. Similar results were also obtained in England (Technical Report of the Advisory Committee for Aeronautics, 1915–16, Rep. 196, Sect. II). Though the differences are not great, they would evidently be greater if the stagger were increased and the interval between the wings diminished.

Fig. 5.—Change in pressure distribution due to mutual influence of both wing sections. 1. Undisturbed pressure distribution. 2. Disturbed pressure distribution with unchanged angle of attack. 3. Pressure distribution with increased angle of attack. For rear wing curves 1 and 3 coincide.



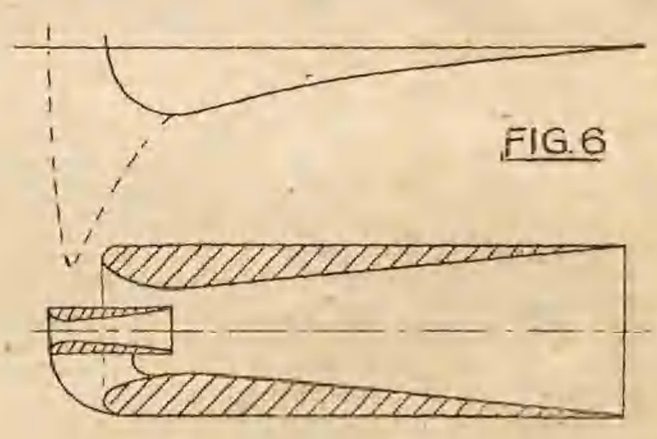


Fig. 6.—Double Venturi tube with corresponding pressure distribution. Pressure in outer tube shown in plain line, in inner tube in dash line.

We will first consider only the front wing, and discuss how its characteristics are affected by the rear wing. From the theory of the biplane, we know that the flow is here obliquely upward. This affects the lift-drag ratio, but not the maximum coefficient of lift, which here alone interests us. We also know that, at this point, the flow is obliquely upwards. This has about the same effect as increasing the wing camber. By increasing the latter the maximum lift may actually be increased, though only to a very limited degree and at the expense of the lift-drag ratio. The rear wing is similarly affected by the curvature effect. It may therefore be assumed that the influence of the curvature of the flow plays a rôle of some importance with a given wing section with a moderately large camber, but nothing further is thereby gained than would be gained by a larger camber. The extraordinarily large increase in the maximum lift cannot therefore be thus explained.

The following consideration may be of more importance. The front wing lies in a region of increased velocity. Now, since the force of the air is proportional to the square of the velocity, it is evident that the lift on the front wing is thereby considerably increased. This argument has but one exception, namely, that the reverse is true of the rear wing, so that for the combination of the two wings the two effects neutralise each other. In calculating the relations for an unstaggered biplane we even obtain a smaller maximum lift than for the two wings alone, and this result is confirmed by experiments. The relations are, however, somewhat changed by staggering. We must go into this more thoroughly.

We will first consider the arrangement with two wings of about the same size, in which the relations stand out the clearest. The front wing, taken alone, would have a pressure distribution somewhat as shown by the fine line on the left of Fig. 5. Now, if we bring the rear wing, which has about the same pressure distribution by itself, into proximity with the front wing, the trailing edge of the latter will lie in a region of great velocity, and correspondingly small pressure, produced by the rear wing. The leading edge of the front wing, on account of its greater distance from the rear wing, lies in air that is much less disturbed, and consequently in a region of nearly normal pressure. The leading edge of the front wing is, accordingly, not much affected by the pressure on the rear wing, while the pressure on the trailing edge of the front wing is diminished. We will therefore obtain, for the front wing, a lift distribution corresponding somewhat to the dash curve in Fig. 5.

Through this modification of the pressure curve, the pressure increase on the suction (upper) side becomes much flatter. On the other hand, we know that the limit of the lift is determined by the steepness of the pressure curve. It is therefore evident that we may now further increase the angle of attack until the inclination of the pressure curve again reaches its limit value (heavy line in Fig. 5). Since the velocity has become greater everywhere, the pressure curve may climb steeper than before.

As is obvious, the lift, which is represented by the area enclosed by this curve, has become considerably greater.

Let us now turn our attention to the rear wing. Here we find corresponding phenomena. The front wing produces on the leading edge of the rear wing a decrease in velocity and a consequent decrease in the pressure diminution or suction. The trailing edge remains practically unaffected. Thus we obtain here, near the leading edge and mainly on top, a decrease in pressure. The strong suction (or negative pressure) is diminished, so that here also there is a flatter pressure increase, as shown by the dash line. By increasing the angle of attack we return approximately to the original curve, while the lift of the rear wing remains practically unchanged. Hence, in this combination the two wings produce a greater maximum lift than when separate, the gain being principally on the front wing.

The phenomena described will perhaps be more intelligible if we take for comparison the perfectly analogous phenomena of a simple and a compound Venturi tube. Fig. 6 shows a double Venturi tube, such as is often used on aeroplanes for measuring air speed. If we first imagine the small inside tube removed, we have a simple Venturi tube. The air flows through the constricted section with increased velocity and correspondingly diminished pressure. In the diverging cone behind it the kinetic energy is again largely transformed into pressure, so that at the rear end the external and internal pressures are again equal. Exactly the same causes which limit the lift in a wing here make it impossible to obtain, by narrowing the throat, a pressure diminution of any desired value. In this case, however, it has long been known how to increase the suction by a suitable combination of tubes. Such an instrument is shown in the figure. The exit of the inner tube is at the point where a diminished pressure is already produced by the outer tube. The latter now forms the starting-point for the further pressure diminution in the inner tube, just as in the case of the front part of the slotted wing section, which we have already considered.

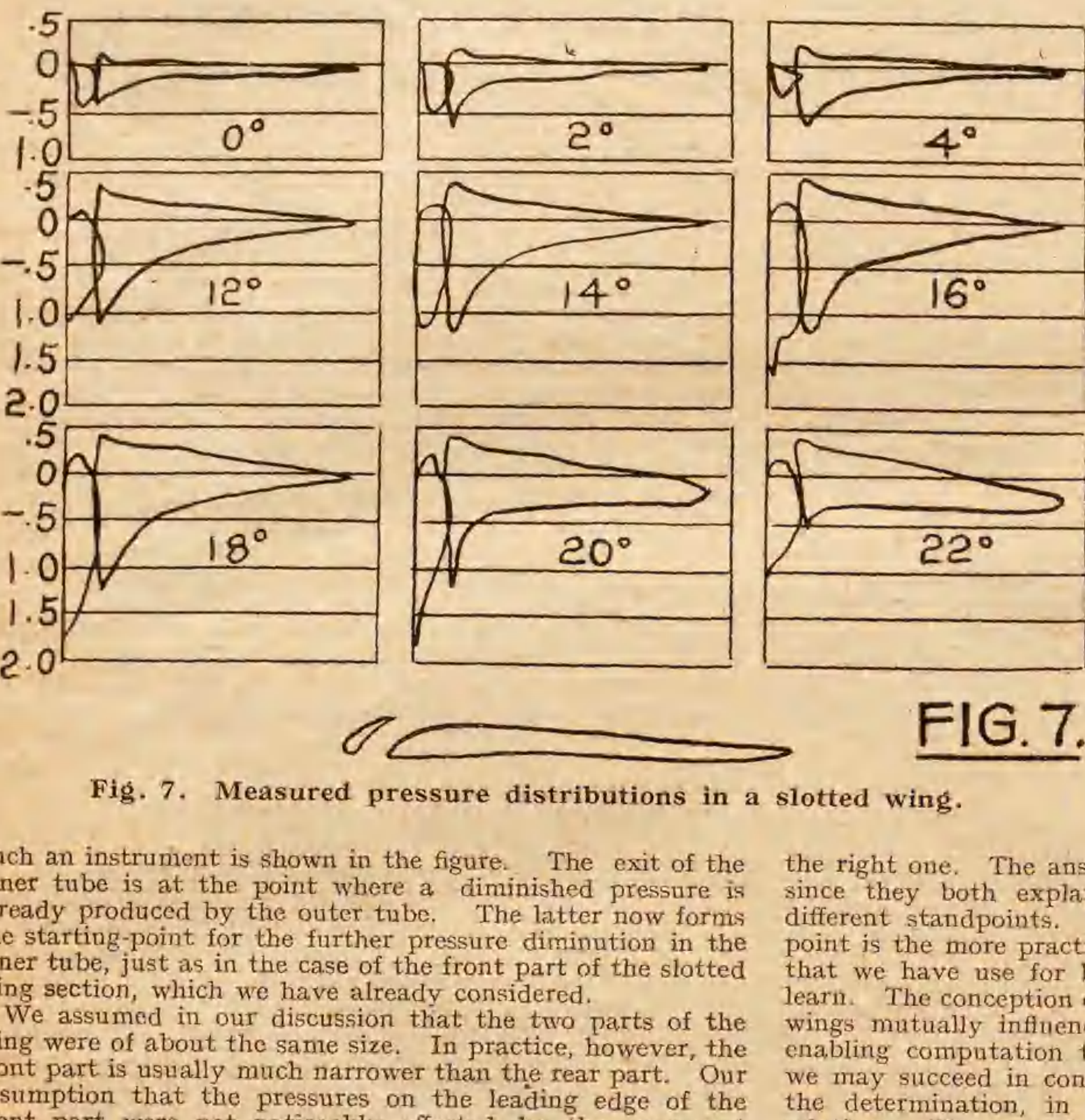


FIG. 7.

Fig. 7. Measured pressure distributions in a slotted wing.

We assumed in our discussion that the two parts of the wing were of about the same size. In practice, however, the front part is usually much narrower than the rear part. Our assumption that the pressures on the leading edge of the front part were not noticeably affected by the rear part no longer holds true. Here the whole of the front section lies in a field of increased velocity, and is thus able to produce a greater lift, since the lift is proportional to the square of the velocity. For the rear section, however, our previous remarks hold good. The disturbance due to the front section is felt principally on the leading edge, which therefore has approximately its normal lift. Accordingly, we even here obtain increased lift for the whole combination.

That the actual pressure distribution is approximately as described follows from the data published by Handley Page in *Engineering*, March 4, 1921. These data are given in Fig. 7. For small angles of attack the rear section shows about normal lift distribution. The auxiliary wing in front gives only a small lift, since its angle of attack is much too small. Only from 12° up does the lift of the auxiliary wing show any considerable increase, while the pressure distribution of the main wing remains almost the same. The increased suction on the trailing edge of the auxiliary wing is also evident. At about 20° the flow separates from the main wing and the lift of the auxiliary wing diminishes.

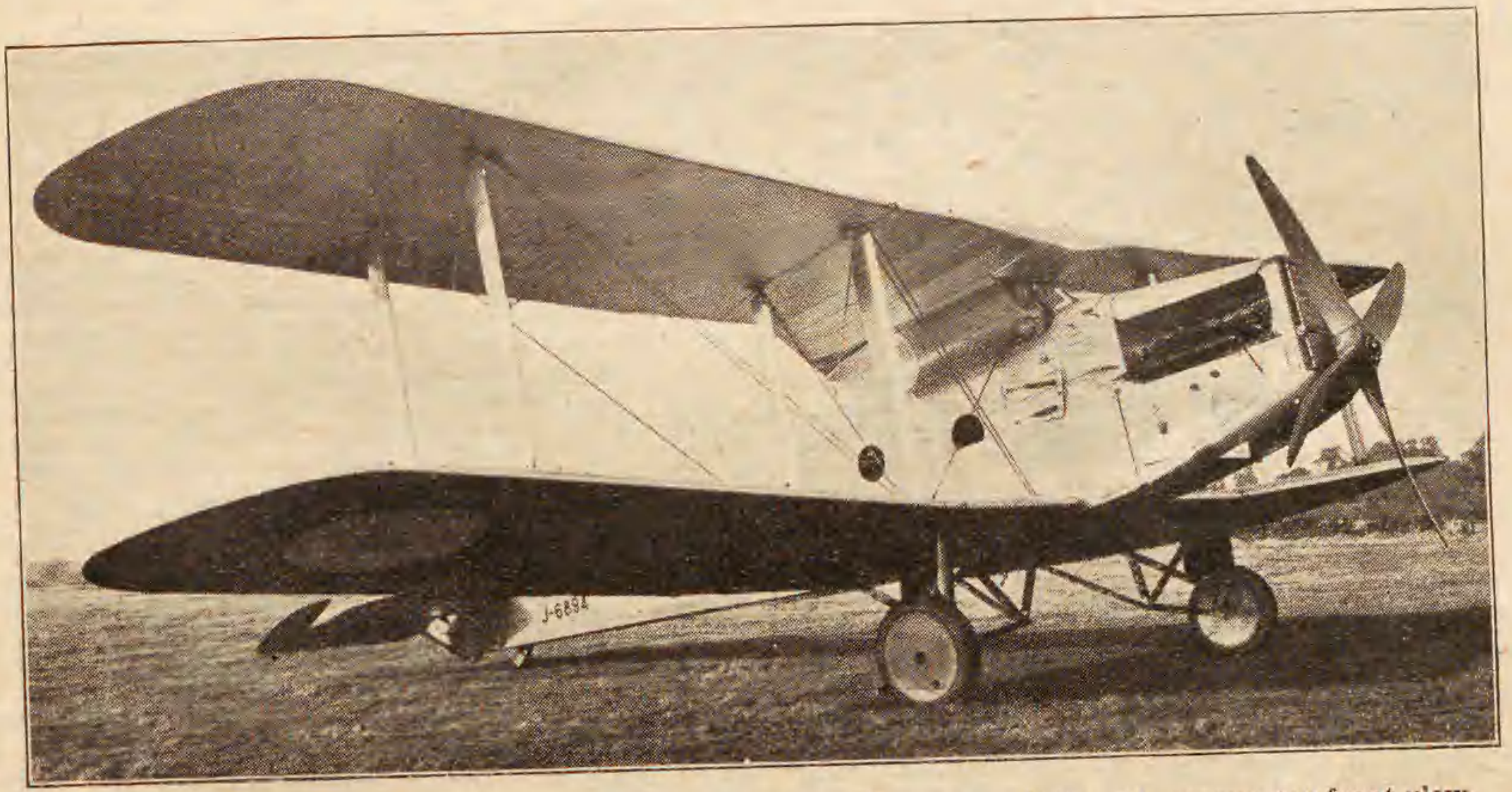
The above conception of the phenomena renders the occurrence of an increased lift-coefficient somewhat more comprehensible, and even offers the prospect of making it possible to compute the relations. On the other hand, the following consideration may be presented. If the slot is continuously narrowed, the arguments pointing to a higher maximum lift continue to hold good, but the phenomena vanish when the slot is closed altogether. This was to be expected from the first, since the wing is transformed by closing the slot into one of a practically normal shape. In any event, a slot of a certain minimum width is essential. Since the theory just presented says nothing about this, the phenomena must also be considered from a different standpoint.

In explaining the phenomena of lift production, I called attention to the fact that the clinging of the air stream to, or its separation from, the upper surface of the wing depends on whether the dead air is carried off fast enough. When we consider this phenomenon on the rear section of a slotted wing, it is obvious that the work (which may be called pump-work or suction) must be performed at the expense of the kinetic energy of the thin air stream flowing through the slot. If the latter is made too narrow, the ribbon of air finally becomes so thin that its kinetic energy no longer holds out to the trailing edge of the rear section, but is itself transformed into dead air by mixing with the dead air above and below it. When considered from this standpoint the phenomena of the slotted wing appear in quite another light. We can now think of this wing section as an entity derived from an ordinary wing section by connecting its upper and lower surfaces by slots, which is, in fact, the conventional conception. The slots convey new energy to the marginal layer of air retarded by friction on top of the wing, thereby increasing its velocity and thus preventing the accumulation of dead air. The air stream flowing out of the slot acts like the jet from a syringe and reinforces the air stream on top of the wing in carrying away the dead air. Since the production of lift depends on the efficiency of this pump-work and the maximum lift is conditioned by the limited possibility of carrying off the dead air, it is apparent that any increase in the pumping efficiency increases the maximum lift.

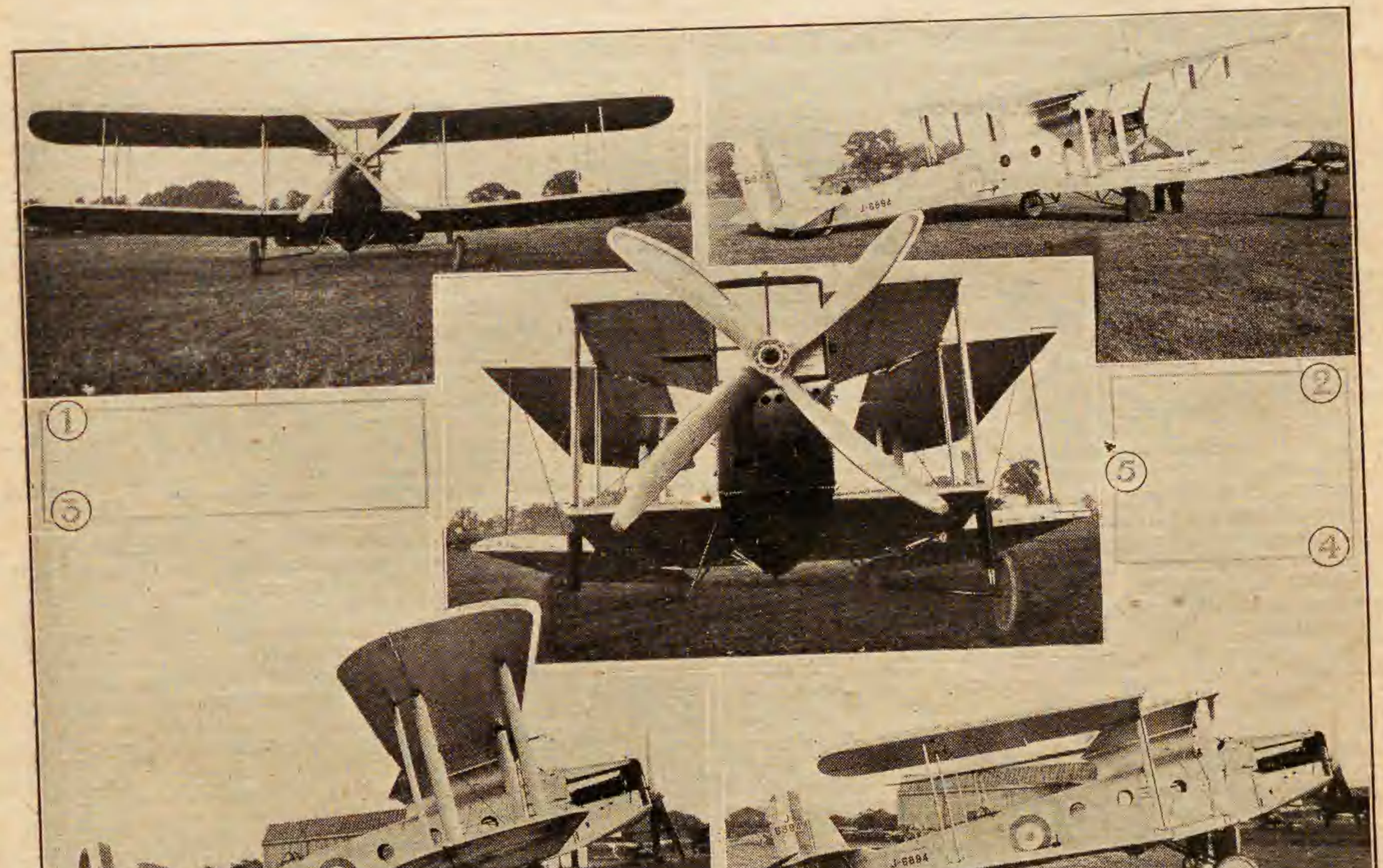
We are now inclined to ask which of these two theories is the right one. The answer is that both are equally correct, since they both explain the same phenomena, but from different standpoints. We should rather ask which viewpoint is the more practical. To this question I would reply that we have use for both, according to what we wish to learn. The conception of the slotted wing as a biplane whose wings mutually influence each other has the advantage of enabling computation to a certain extent. With its help, we may succeed in constructing formulæ which will enable the determination, in some measure, of the quantitative relations. The second view-point is essential when it is desired to form an idea of the requisite width of the slot. I would add a word of warning against too great optimism. The relations are much more complicated here than, for example, in the theory of the monoplane or biplane. Much work must still be done before these theories are developed into practical rules. With the limited means now available, much time will be required for this work. The immediate task is to determine whether the theories just presented really explain the essential features of the phenomena, or whether other circumstances of decisive influence will come in. This cannot be conclusively determined from the experimental data now available. If the theory, however, agrees with the facts, this is already a great gain, even though we do not succeed in working out convenient computation formulæ. We then know, at least, what the essentials are for obtaining the right shapes, and can thus save ourselves much useless work.

THE NEW DE HAVILLAND BOMBER "DERBY"

Type D.H.27



THE NEW DE HAVILLAND BOMBER, TYPE D.H.27, "DERBY": Three-quarter front view.



THE NEW DE HAVILLAND BOMBER: Known as the D.H.27 "Derby," this Machine is fitted with a Rolls-Royce "Condor" engine. The Air Ministry has sanctioned publication of these photographs, but no details may be given. 1. Front view. 2. Three-quarter rear view. 3. Side view with wings extended. 4. Side view with wings folded. 5. Close-up view of machine with wings folded.

THE CO-RELATION OF MODEL AND FULL-SCALE WORK

"MODEL tests are capable of a wide usefulness in aeronautical engineering if the model work can be satisfactorily co-related with the full scale." The "if" in above sentence formed the subject of an interesting paper read by R. McKinnon Wood before the Royal Aeronautical Society on November 16, 1922. The lecturer pointed out that unless we can establish some relation between the model work and the full scale, the former must be of very uncertain value. We may, he said, endeavour to do this theoretically or experimentally, and proceeded to outline the theoretical method first.

After defining the three physical properties of air (fluidity, viscosity, and compressibility), the lecturer stated that only the first two were of importance in aeronautical work, as, except in the cases of shells, bombs, and airscrew blades, the pressures caused by the speeds attained by aircraft were not large enough to cause important changes in density. The lecturer then gave the equation expressing the law of dynamic similarity, pointing out that this law does not indicate the manner in which the pressure may vary if the quantity $vl\rho/\mu$ is not the same for the model as for the full-size machine. In order to conform to this law it would be necessary to test a one-tenth scale model at ten times the speed of the full scale machine, and not only would this require great power expenditure, but the pressures attained at such speeds would be such as to cause compressibility of the air.

"This Law of Dynamic Similarity," the lecturer continued, "cannot, therefore, be conformed to in the wind channel as we use it. But there is another possible method by which models might be tested at the full scale value of $vl\rho/\mu$. If a model to a scale of 1/10 be tested in a channel built inside a strong steel chamber filled with air at 10 atmospheres pressure at atmospheric temperature, the value of $vl\rho/\mu$ is the same as that of the full scale at the same speed. The forces to be measured will be ten times as great per unit area as on the full scale, and this introduces difficulties in supporting the model which would make it desirable to work at lower velocities with a compensating increase in density and so reduce the pressures to a convenient value. I believe that the not inconsiderable difficulties which would arise in constructing a high-pressure channel and designing suitable balances can be overcome. The cost of this method of experimenting would be greater than that of an atmospheric channel, but still much less than that of full-scale work."

The lecturer then started the discussion of the nature of viscous flow by considering the flow past a body consisting only of a surface moving in its own plane, and indicated the manner in which the layer in actual contact with the body is at rest relative to the surface, while the velocity increases as we pass outwards from it. The resistance of thin smooth flat plates edge-on to the wind has been found by experiment to follow the law $k = (vl\rho/\mu)^{-0{\cdot}15}$ over a wide range.

For the more practical case of bodies having a certain thickness, the lecturer pointed out that the total drag is composed of two parts: (1) the resultant of the pressure normal to its surface, and (2) the resultant tangential to its surface. The effect of viscosity is two-fold: (1) it modifies the form of the flow so that the normal pressures have a resultant, and (2) tangential forces are exerted on the body. The resultant drag is composed of these two parts in proportions depending on the shape of the body. The streamlines do not follow the body to the extreme tail, but break away at a greater or smaller distance, according to the fineness of the body, and enclose a "dead water" region. The lecturer here showed a slide of a curve obtained in a wind channel, showing the scale effect on a strut. The curve indicated considerable scale effect at low values of $vl\rho/\mu$, but at high values the scale effect was quite small, and from this the lecturer concluded that although tests on small models at low speeds may be of little value, it may be possible to carry out model tests at sufficiently high values of vl to give a close approximation to the full scale.

Turning his attention to unsymmetrical bodies, the lecturer pointed out that such bodies experience both drag and a cross-wind force, or lift, and that the principle of conservation of energy leads to Bernoulli's equation connecting pressure and velocity, $p + \frac{1}{2}\rho v^2 =$ const., except to the extent to which energy is degraded into eddies and heat by the action of the viscous forces. This degradation is small at high values of L/D, and Bernoulli's equation is closely true for the streamlines which do not pass very close to the surface of a wing. In the language of hydrodynamics, the flow is composed of a translation (or linear motion) and a circulation around the wing. Diagrams were then shown of the form of flow which should theoretically exist past a wing moving in a fluid having no viscosity, the span being assumed infinite. A second slide showed the fluid circulating around the wing, while on a third the two motions were shown superimposed.

"It seems," the lecturer continued, "that a good approximation to the lift of a wing might be obtained by a calculation by non-viscous theory if we could determine what governs the strength of the circulation which is produced through viscosity; and in relation to scale effect the question of interest is whether this depends upon the magnitude of the viscosity or only upon the existence of viscosity. In the latter case we have a reason for expecting no scale effect upon lift."

After referring briefly to the work of Joukowsky, the lecturer made reference to German work on the subject, notably that of Prandtl, about whom the lecturer said: "Starting from the two-dimensional viscous flow round a wing of given section and of infinite aspect ratio, Prandtl has deduced valuable theorems about the three-dimensional flow round a wing of finite aspect ratio, so that from a test of a wing of any one aspect ratio the characteristics of wings of the same section and of other aspect ratios may be calculated. Other theorems deal with multiplane systems, with the influence of the proximity of the ground and of the walls of a wind channel.

"The layer of fluid in contact with a body is at rest relative to the body, and the velocity gradient close to the body is steep in comparison with gradients elsewhere in the fluid. Measurements of velocity in air flowing along a surface show the very small distance at which there is a sensible reduction of velocity in comparison with the length of surface traversed. The tangential stresses in the fluid due to viscosity are, therefore, relatively great close to the surface of the body, and while viscosity may be responsible for the lift by producing a circulation, the flow at a little distance from the wing may be calculable by arguments which ignore the viscosity if they include the circulation to which it gives rise. We may summarise the argument by saying that the action of viscosity is concentrated towards the surface of the body. This constitutes the justification of Prandtl's application of non-viscous hydrodynamics to aeronautics. Another well-known application of non-viscous hydrodynamics is the theorem of Froude relating to screw propulsion, which has been subsequently combined with the Aerofoil Theory of Airscrews, most successfully, I think, by H. Glauert's recent development of Prandtl's work.

"I can only give here a brief outline of Prandtl's work. Consider a finite wing experiencing a uniform lift along its span. There will be a uniform circulation along the span which cannot cease at the tip, as by a theorem of hydrodynamics vortices cannot have a free end. A vortex must, therefore, trail from each tip. (In practice the lift will not be uniform to the tips, and the wing will, therefore, trail a sheet of vortices, the strength of the vortices from each portion corresponding to the fall of lift.) Comparing the finite wing with a hypothetical wing of infinite span, it will be seen that the trailing vortex system gives a downwash trend to the stream within the span and an upward trend beyond the tips. Whereas the flow before and behind the infinite wing is symmetrical (on the basis of non-viscous flow with circulation), the downwash behind the finite wing is greater than the upwash ahead, and the air at the wing has a downward trend. The wing moves in a downwash of its own producing.

"This downwash at the wing can be easily calculated with sufficient accuracy. The method of estimating the lift and drag of the finite wing from those of the infinite wing is shown by the table in which ϵ represents the downwash at the wing:—

Aspect Ratio.	Infinite.	Finite.
Lift coefficient	k_L	k_L
Incidence	a	$a + \epsilon$
Drag coefficient	k_D	$k_D + \epsilon k_L$

"This shows the incidence at which the two wings give the same lift and the drag coefficients which then obtain. Infinite aspect ratio is the datum of the theory, but, of course, in practice the datum will be a test upon a wing of some finite aspect ratio.

"Prandtl calls this increment of the drag at given lift by the trailing vortex system the 'induced drag,' and the drag of the wing of infinite aspect ratio and of the same section he calls the 'profile drag.' If there is no scale effect on lift, we may expect scale effect on drag to be confined to the 'profile drag,' and the variation to be greater in proportion to the whole drag at the smaller angles of incidence.

"These circulation theorems have received considerable experimental verification. They are found to give with good accuracy the effects of change of aspect ratio and the direction of flow at points not too close to the wing. Unfortunately, the most useful calculation of direction of flow, the downwash at the usual position for the tailplane, is complicated by the rolling up of the vortex sheet, and has not so far been accurately made.

"In so far as reliance might be placed upon this form of calculation, it is clear that a solution obtained by a model experiment should be independent of scale, and a class of problems exist in which wind channel results apply without doubt to the full scale. As an illustration there should be no scale effect upon the relation between lift and downwash, whatever scale effect may exist between lift, drag and incidence.

"To summarise the conclusions of the theoretical discussion:—

"(1) There is a law of dynamic similarity to which we do not conform in our model experiments.

"(2) Until the mathematical theory of the flow of a viscous fluid is further advanced we cannot arrive at a precise or certain theory of scale effect when this law is violated.

"(3) Our experience leads us to believe that by experimenting with models to the larger scales which we use we obtain a good approximation to the full-scale conditions.

"(4) We have some reason to believe that scale effect upon lift will be less than upon drag (until the stalling angle is approached).

"(5) Certain applications of non-viscous theory to aeronautics are justifiable, and these are independent of scale."

Having thus outlined the theoretical method, the lecturer proceeded to indicate the conditions under which model tests in wind tunnels are made. As these will already be well known to readers of FLIGHT, we can confine ourselves to certain aspects which are not, perhaps, so generally appreciated.

"The walls of the channel," the lecturer said, "exercise a constraint upon the flow, and influence the results to an extent which depends upon the relative size of the model and the magnitude of the air forces. The Froude propulsion theorems have been extended to provide a theory for correcting tests of airscrews in a channel, and the work of Prandtl provides a theory for correcting tests of wings. The latter deserves some discussion here.

"If the walls of the channel were optical mirrors, series of images of the model would be seen. The model in the channel is more or less aerodynamically equivalent to a model flying in formation with these images. By the circulation aerofoil theory the influence of these images on the model may be calculated. The corrections are:—

$$\Delta\alpha = 16\ Sk_{L}/h^2$$

$$\Delta k_{D} = 0{\cdot}27\ Sk_{L}^{2}/h^2$$

where S is lifting area of model and *h* the breadth of a square channel.

"The following table shows the percentage correction applicable to the lift/drag ratio of biplane wings 6 in. × 36 in. of R.A.F. 15 section, tested in a 7 ft. wide channel and in a 4 ft. channel.

Lift coefficient ..	0·15	0·275	0·40	0·475
Seven-foot channel	4	7	9	7 per cent.
Four-foot channel ..	12	21	27	21 per cent.

"Such a model would probably never be tested in a four-foot channel, and some doubt may be felt as to the reliability of a correction of such magnitude; but the correction for the seven-foot channel is large enough to receive attention, and I think that the theory may be relied upon for corrections of this size, as it has been found to bring tests of a 6 in. × 36 in. monoplane in four and seven-foot channels into good agreement.

"The interference of the channel walls increases the rate of change of lift with incidence and reduces the stalling angle; reduces the drag by an amount proportional to the lift, giving the drag curve a less steep slope; it also reduces the downwash and so increases the stability and makes the model relatively 'nose-heavy.'

"We have also to recognise that the model tests which we make are generally tests upon isolated components which must be applied to complete aircraft with caution. The completest model tests which we are accustomed to use do not represent the aircraft flying under its own power. The action of the airscrew slipstream upon the tail unit is important and highly complex, and I should hesitate to estimate it. The mutual interference of parts is often large, especially when the parts are of low resistance form."

Regarding full-scale experiments, the lecturer pointed out that one source of error was the unknown vertical currents in the atmosphere, which might introduce serious errors. The experimental investigation of scale effect was dealt with next, but as our space is limited and this aspect of the problem will be fairly well known from published Reports and Memoranda, we must pass it over.

"These results," the lecturer continued, "are typical of others, from which, in my opinion, we may conclude that carefully-conducted wind channel tests at sufficiently large values of VL give a very good prediction of full-scale performance for the most common type of aeroplane, the thin wing biplane; but we must be cautious of generalising this conclusion."

Reference was then made to the way in which deeply-cambered aerofoils, such as R.A.F. 19, may show higher lift coefficients at low values of *vl* than at high values; in other words, the scale effect "goes the wrong way." The lecturer pointed out in this connection that one should not from this fact form the conclusion that slotted wings will behave in a similar manner. "Moderately thick wings," he said, "such as section 64, do not exhibit this scale effect, and thicker wings than 64 may attain the lift given by the model."

"*Conclusion.*—I have endeavoured in this paper to give a survey of the subject at the risk of some loss of lucidity in the attempt to cover a wide field. Two factors in the relation between wind channel tests and the full scale seemed to require discussion: the differences between the conditions of the wind channel and those of free flight, and the possible results of the failure to conform to the Law of Dynamic Similarity. I have dealt at some length with theories which I think help towards an understanding of the use of model tests, and this has prevented me from examining the experimental evidence at all extensively. Ultimately, we may achieve a complete theory of viscous flow; but this is far off, and at present theory does not take us far. In the meantime we must be prepared to find departures of the full scale from predictions based upon the model; but as the experimental evidence has accumulated, the use of model tests has acquired a basis of considerable certainty. Scale effect is seen to be evanescent upon most of the forms which we wish to use, and it is practicable to conduct the model tests upon a scale sufficient to give accurate predictions. On the other hand, we wish at times to use forms, typified by R.A.F. 19 wing, of which this cannot be said, and I am anxious to see a compressed air wind channel built as the most rapid means of advancing the investigation of these shapes; but in any case the comparative full scale and model work should be vigorously continued by the most accurate means we can devise.

"Although the relation between model and full scale is not fully understood, and the wind channel is not infallible, it is, I think, generally agreed that it has a wide sphere of usefulness, is a method of good reliability, and valuable both as an aid to design and as a means of rapid experimental investigation."

* * *

Low Flying over Leeds

THE first prosecution at Leeds under the Air Navigation Act of 1920 took place on November 14, when Derrick A. Shefferson, pilot, and the De Havilland Co. were summoned for flying an aeroplane lower than 4,000 ft. above the city. The aeroplane was being used to take photographs from the air on the day of the offence. The pilot explained that his engine failed and he had to descend on Woodhouse Moor. As he did so, he saw a nurse and baby sitting on the grass. He swerved in order to miss them, and in doing so his machine caught some trees. The aircraft company were fined £25 and 10 guineas costs, and the pilot was fined 40s.

Mr. Tilghman Richards Disengaged

WE learn that Mr. G. Tilghman Richards is shortly severing his connection with Martinsyde, Ltd., of Woking, whose general manager he has been for more than a year, and that he would like to return to the aircraft industry. Mr. Tilghman Richards received his early training in the motor-car industry, but became attracted by aviation quite early, joining the late Mr. Cedric Lee in his experiments on the circular monoplane at Shoreham. In 1914 Mr. Richards was commissioned lieutenant in the R.N.A.S., and was appointed inspector of naval aircraft at Beardmore's. In 1915 he joined Beardmore's as designer and assistant manager of the aviation department, which position he held until the closing down of Beardmore's aircraft department in 1921. Mr. Tilghman Richards has, although it may not be generally known, had very considerable experience with gliders and gliding, the "circular" plane being tried in model and full-sized glider form before and in between flights with the full-size power-driven machines.

PROF. WILLIAM NEWELL'S ACCIDENT.

WE regret to learn that the late Prof. William Newell, who met his death during a parachute descent in Denmark on October 24, has left his wife and his five boys, aged from 1 to 15 years, totally unprovided for. It is felt that an effort should be made to help them in their distress, and a fund has been opened for this purpose. We trust our readers will assist in this direction by sending subscriptions to one or other of the following :—

THE REVD. PREBENDARY F. W. JOYCE,
The Vicarage, Harrow.

MESSRS. E. R. CALTHROP'S AERIAL PATENTS, LTD.,
423 and 423A, Edgware Road, London, W. 2.

MESSRS. C. G. SPENCER AND SONS,
56A, Highbury Grove, London, N. 5.

From the report on the searching investigations as to the cause of the accident, which we have received from Mr. Calthrop, it would seem that this regrettable accident is clearly a case of familiarity breeding contempt on the part of the unfortunate parachutist. From the evidence sent to us it appears that Prof. Newell neglected to see that the reaction tapes had been connected up with the rigging tapes by the standard "breaking cords," with the result that the rigging tapes were not extended and the pull of his falling weight came at once upon the periphery of the parachute body. Thus the latter was pulled out lopsidedly, so that the launching ring got jammed and wedged the upper part of the silk body in the container.

Although the pilot, Mr. Johansen, managed to get low down over the water, enabling Newell to release himself when at a height of about 60 ft., and drop into the water, Newell was unable to swim for more than 20 yards or so, and eventually, although help reached him within six minutes, he succumbed to the extreme cold, and exhaustion.

It is certainly unfortunate—not to say inexplicable—that the late Prof. Newell, with his vast experience and knowledge of parachuting, should have neglected certain vital operations in the folding, etc., of the parachute, when he must have known the great risk he was running in consequence. Our fullest sympathy is extended to Mrs. Newell—herself a parachutist and therefore able to understand the facts—and her family.

* * * *

SIDE-WINDS

MR. H. SPENCER NAYLOR, Managing Director of Naylor Brothers (London), Ltd., varnish and paint manufacturers, of Slough, Bucks., has been elected Chairman of the London Association of the National Federation of Associated Paint, Colour and Varnish Manufacturers of the United Kingdom.

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WE are not surprised to hear that the A.C. car, which has so many users in the aviation world, is steadily building up a remarkable reputation, thanks to the policy of the governing director, S. F. Edge, which is to prove by R.A.C. trials and other public tests that everything claimed for the car can and will be done by any A.C. car sold for the purpose to any buyer. This was demonstrated recently by an interesting R.A.C. test, in which a list of 47 A.C. agents was supplied to the Club, who selected from one of these one of the 11·8 h.p. model *de luxe* two-seaters from stock for the test. The engine was then run continuously for 48 hrs. 9½ mins., during which time the car was voluntarily stationary for 1 hr. 22 mins. A distance of 1,436½ miles (between Hounslow, Reading, Hook, Hounslow and on Brooklands Track) was covered at average speeds of 20 m.p.h. on the road and 41·4 m.p.h. on the track. The petrol consumption was 29·2 m.p.g. and the oil consumption 655 m.p.g. After the car was obtained from the agent it was kept under R.A.C. observation, and the driver only went over the various points of the car in the ordinary way. Occasional sticking of the throttle barrel was the only trouble experienced. In short, it gave a very good account of itself!

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AN opportunity occurs to secure the services of an experienced publicity specialist who is presently making a change. Any of our readers interested we shall be pleased to place in communication with him. He is an experienced organiser, writer of copy and catalogue compiler, and for preference would like to arrange part time with any firm which does not really need a full-time man, to control the advertisement section. A line to "Progress," c/o of the Editor of FLIGHT, will at once reach its destination.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association)

THE debate held at Headquarters last Friday, opened by Messrs. Burchell and Rippon, on "Large Models and Small Models" proved so interesting that it is found necessary to continue same on Friday, December 1. On Friday next Dr. Hankin will give a lecture on "The Evolution of Animal Flight," illustrated by lantern slides. On Friday, December 8, a smoking concert has been arranged at Headquarters, under the direction of Mr. Louch and Mr. Levy. We are again indebted to Mr. Louch for kindly providing the artistes.

The Competition Secretary reports that the competition for the Pilcher Challenge Cup held on Hackney Marshes was disappointing, on account of the number of entrants being less than contemplated. No member qualified with the 20-secs. R.O.G., Mr. C. Hersom being nearest with 17 secs., Mr. F. de P. Green coming next with 15 secs. On the other hand, there was a good exhibition of general flying; all the enclosed models flew well hand-launched.

Mr. Rippon instituted an improvement on Pavely's system of "Kite launching" model gliders, by which method when the model has attained its greatest height, limited by the length of the towing line (about 150 ft.), the model is automatically released and a free glide follows. Mr. Howse was especially successful, the best of his glides being 57, 54 and 51 secs. Mr. Rippon tested a new light-weight glider, obtaining 23 secs. on 100 ft. of line.

Mr. M. Levy reports that on Saturday at Sudbury Flying Ground—Messrs. Rippon, Johnson, Green and himself being present—the conditions were bad for gliding, the wind being across the hill, Rippon's best flight being 25 secs. and Levy's 20 secs. Mr. Johnson had a large tractor.

Members are specially requested to be present on Wimbledon Common on Sunday morning next, when the Glider Competition for Dr. Hankin's prizes will be held. The Secretary of the Dutch Model Aeroplane, Mr. J. H. Van der Muelin, hopes to witness some good flying and gliding.

A. E. JONES.
Hon. Sec.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : cyl. = cylinder ; I.C. = internal combustion ; m. = motor.
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(Continued from p. xiv.)

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METALS (Anti-Friction)—
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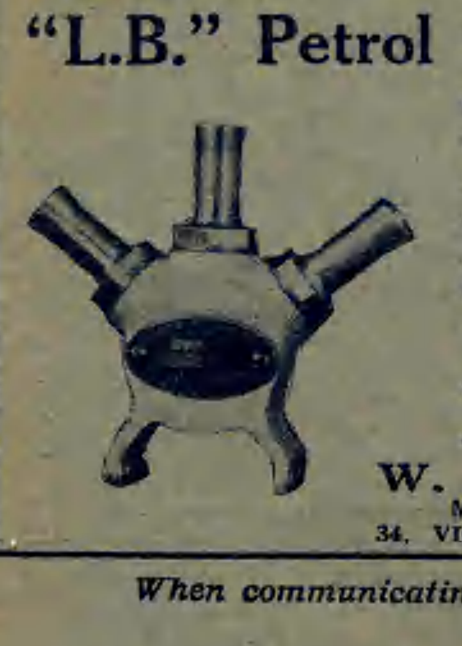

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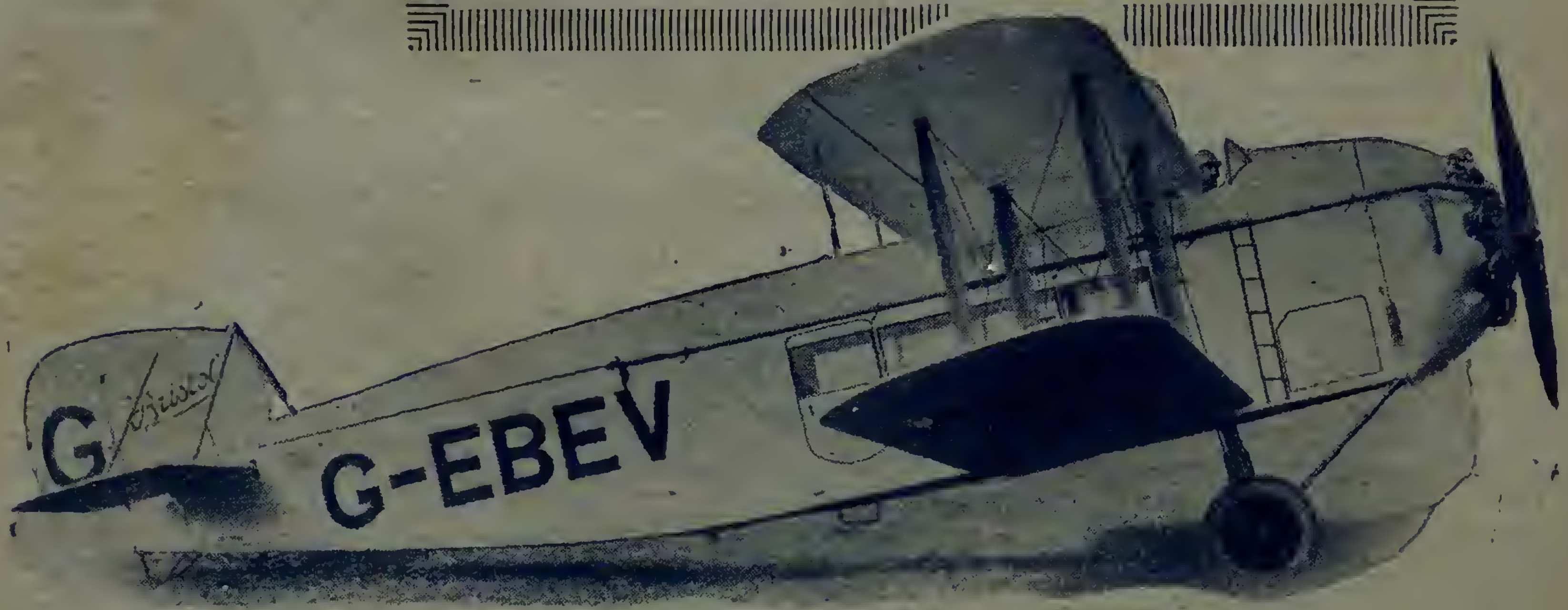

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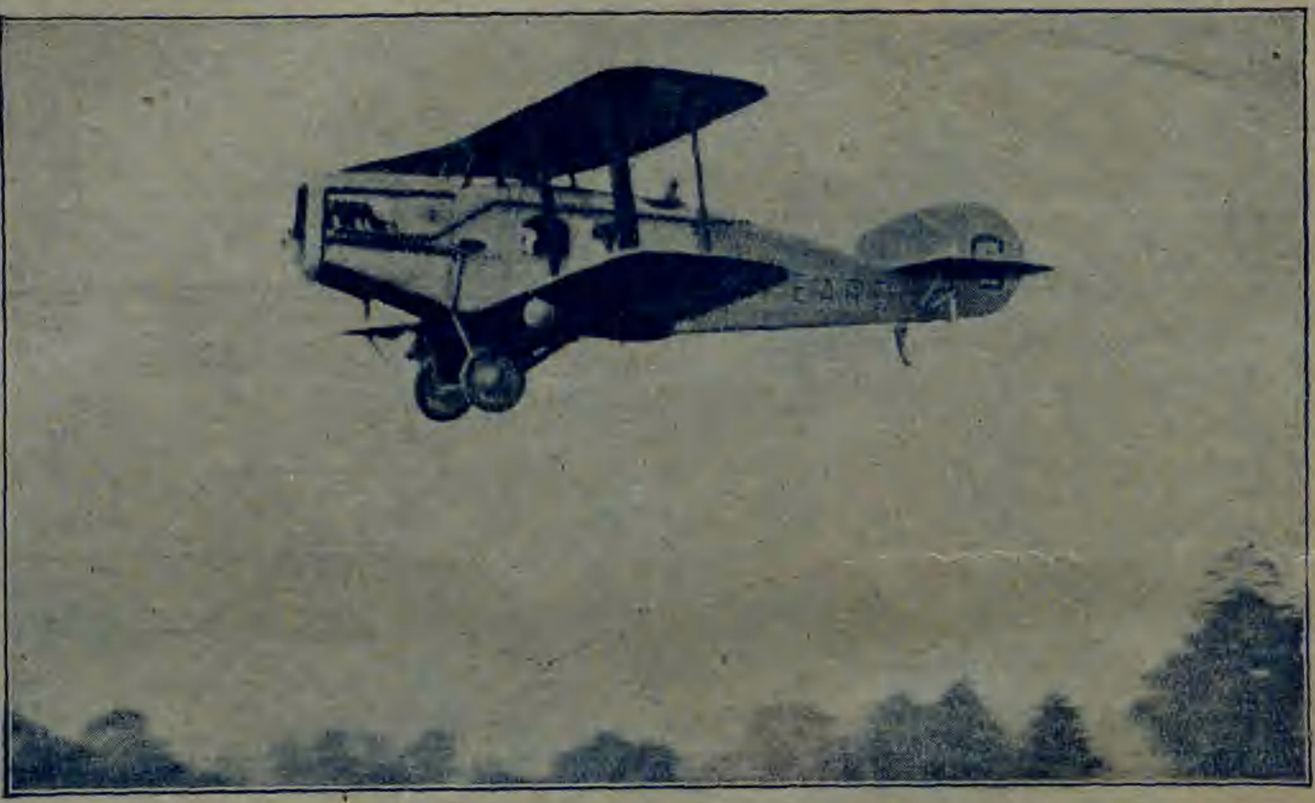

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Nov. 30	**Closing date for FLIGHT Glider Designing Competition**
Dec. 1	**Lecture, "Constructional Design of Aeroplanes," by C. W. Tinson, before I.Ae.E.**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
Mar. 15	**Entries close for Dutch Height Indicator Competition**
June	**International Air Congress, London**
Dec. 1	**Entries close for French Aero Engine Competition**
1924.	
Mar. 1	**French Aero Engine Competition**

EDITORIAL COMMENT.

Hendon Redivivus

We are extremely glad to learn that we were misinformed in the matter of the future of Hendon, as stated under the heading "Exit Hendon" in last week's issue of FLIGHT. The source from which our information came was such as to give us no reason for questioning its accuracy, and consequently the paragraph was published. It has now been pointed out to us by the Grahame-White Co., Ltd., proprietors of the London Aerodrome, that so far from contemplating the cutting-up of the ground into building plots, it is intended, at no very distant date, to re-open the London Aerodrome on a scale far larger and more important than has hitherto been possible. Needless to say, we are delighted to hear that this is the case. We have consistently advocated the return to Hendon as the scene of aviation meetings, pointing out that it is, even now, far more easily reached from the centre of London than is Waddon.

Moreover—and this is a point which is not, perhaps, always recognised—Hendon was before the War the recognised aerodrome for London, and there was something more than a mere name in the appellation "London Aerodrome." In fact, Hendon and flying became synonymous terms. Nor has this fact, we are quite certain, been materially altered, and as soon as an aviation meeting is again announced for Hendon it will be found that visitors will flock to the 'drome in numbers which Waddon can never hope to see.

The extension of the tube to Edgware, with a station in Colindale Avenue, about 100 yards from the main gates of the aerodrome, will place the London Aerodrome within 30 minutes of Piccadilly Circus, with no change anywhere, and no long walk at the end of the journey. What this will mean as an additional inducement to visitors can easily be imagined. It would indeed be difficult to improve, from the point of view of facility of access, upon Hendon, and add to this the association which the London Aerodrome has with flying in the good old days, and it will be realised that when flying, both sporting and commercial, gets really going again, Hendon cannot very well be ignored.

And Increasing Enterprise

By way of showing that the proprietors of the London Aerodrome have no intention of abandoning the site as an aerodrome, it may be mentioned that an additional piece of land—approximately 150 acres—has been acquired, and can be made part of the old aerodrome. This piece of land lies some little distance to the north of Colindale Avenue, between Edgware Road and the old aerodrome, and adjoins the old aerodrome for a considerable distance. In addition to the Midland Railway, which passes the aerodrome, there is a private railway running almost all round the property, right up to the Edgware Road, so that it will be seen that, what with the tube extension, the Midland Railway (with a halt at Hendon) and the private railway, it should be possible to take care of practically speaking any number of visitors. Trains could probably be run out on the Midland Railway and straight on to the aerodrome siding, thus supplementing the tube and 'bus services.

With the well-equipped works, hangars with electric light and power, easy access by rail or road for goods traffic, the aerodrome is also particularly well equipped, and it might be mentioned that a great deal of work has been done on the aerodrome itself in the way of drainage, etc., so that the surface is, or could very quickly be made, smooth enough even for racing machines.

It is, perhaps, open to question whether or not Hendon could and should be made the London Air Port. Against it might be advanced the objection that, for continental traffic, machines would have to make a considerable detour to avoid flying over London, while the distance would be somewhat greater than from Waddon. Nor is it all certain that it would be an unmixed blessing to have the Air Port there. Experience at Waddon appears to indicate that it is not desirable to mix the two sides of flying.

In this case this objection might be overcome by having the "Sports" Aerodrome on the piece of ground adjoining the Edgware Road (where another station, near by, on the tube extension is being built) and keep the "serious" air traffic on the old aerodrome, where already large permanent buildings are in existence. At any rate, when the internal air services grow, as they certainly will, the lines from the north and west would naturally terminate at Hendon. This could be done with a minimum of new organisation, as such passengers who wished to go on to the continent could be flown over to Croydon (assuming that aerodrome to be retained for the continental traffic) in a very short time.

Another development which it is not difficult to imagine would be the establishment at Hendon of a base for airship lines, if and when such come into being. One section of the ground could then be used by the lighter-than-air traffic and the other for aeroplane work. The two would be close enough together for co-operation, but need not be in one another's way in the slightest.

Altogether we are glad to be able to say that we were wrong when, last week, we lamented the demise of Hendon, and personally we tender our apologies to Mr. Claude Grahame-White and the Grahame-White Co., expressing at the same time our satisfaction with and admiration of the policy, under many serious handicaps, which, in spite of tempting offers for purposes which would once and for all spoil the ground for an aerodrome, has been far-sighted enough to visualise the enormous possibilities of making Hendon, both in name and in deed, the London Aerodrome. Good luck to it, and may the revival come soon.

◆ ◆ ◆

New Course for Speed Records

At the Rome Conference of the *Fédération Aeronautique Internationale*, which was held from October 8 to October 13, 1922, it was decided to increase the length of the course over which world's records must be flown from 1 kilometre to 3 kilometres. This announcement will be received with satisfaction by all interested in accurate timing of aeroplane speeds, as it has long been evident that over a short distance of only just over half-a-mile it is well nigh impossible to get accurate results. A slight dive towards the first post will increase the speed of a modern fast machine very considerably. In fact it is probable that, where strict observation is not kept, it may be possible for a pilot to gain sufficient momentum in this way to increase the speed of his machine not only over the first part but over the whole of the speed course.

One very unsatisfactory phase of the present speed tests is that they give rise to a great deal of uncertainty, and, knowing how easily a small error may creep in, there has been too much tendency during the last few years for one country rather to doubt the accuracy of the timing of records established in another. It is unnecessary to go into details, the position being well known, and it suffices to express the wish that the new regulations, requiring as they do a distance of roughly 1¾ miles, will remove, or at any rate tend to reduce to a minimum, the unsportsmanlike distrust which has existed of late years where speed records are concerned.

◆ ◆ ◆ ◆

Aircraft at the British Empire Exhibition

A GROWING demand for space at Wembley is reported by the British Empire Exhibition authorities. As the Exhibition is being planned on a scale far greater than any hitherto attempted (the Machinery Hall and the Industrial Hall cover an area of 884,000 sq. ft.), it has not yet been possible to allocate any definite area to a particular trade. That the aircraft section will be well looked after is ensured by the composition of the Aviation Committee, the members of which are as follows: Maj.-Gen. Sir W. Sefton Brancker, K.C.B. (Chairman); Brig.-Gen. R. K. Bagnall-Wild, C.M.G., C.B.E., R.A.F.; Lieut.-Col. Mervyn O'Gorman, C.B., D.S.O.; Col. F. Searle, C.B.E., D.S.O.; Lieut.-Col. Alec Ogilvie, C.B.E.; Mr. G. Holt Thomas; and Maj. C. C. Turner, F.R.G.S., A.F.R.Ae.S., M.I.Ae.E.

Sky-Writing in America

MAJ. J. C. SAVAGE and Capt. Cyril Turner, his pilot, are at present in America, with the object of introducing the "sky-writing" invented by Maj. Savage. They have taken two aeroplanes with them, so that should any mishap occur to one machine there will still be one available with which to carry on. On November 28 there was a great craning of necks in New York, when Capt. Turner wrote in large letters across the sky, "Hullo, U.S.A.!" We shall be very surprised if Maj. Savage's invention is not readily taken up on the other side. It seems to be particularly suited to American conditions, most of the States being blessed with a much greater proportion of blue sky than are we in this country. In France also the invention has been introduced recently, the Parisians being delighted with the new form of advertising.

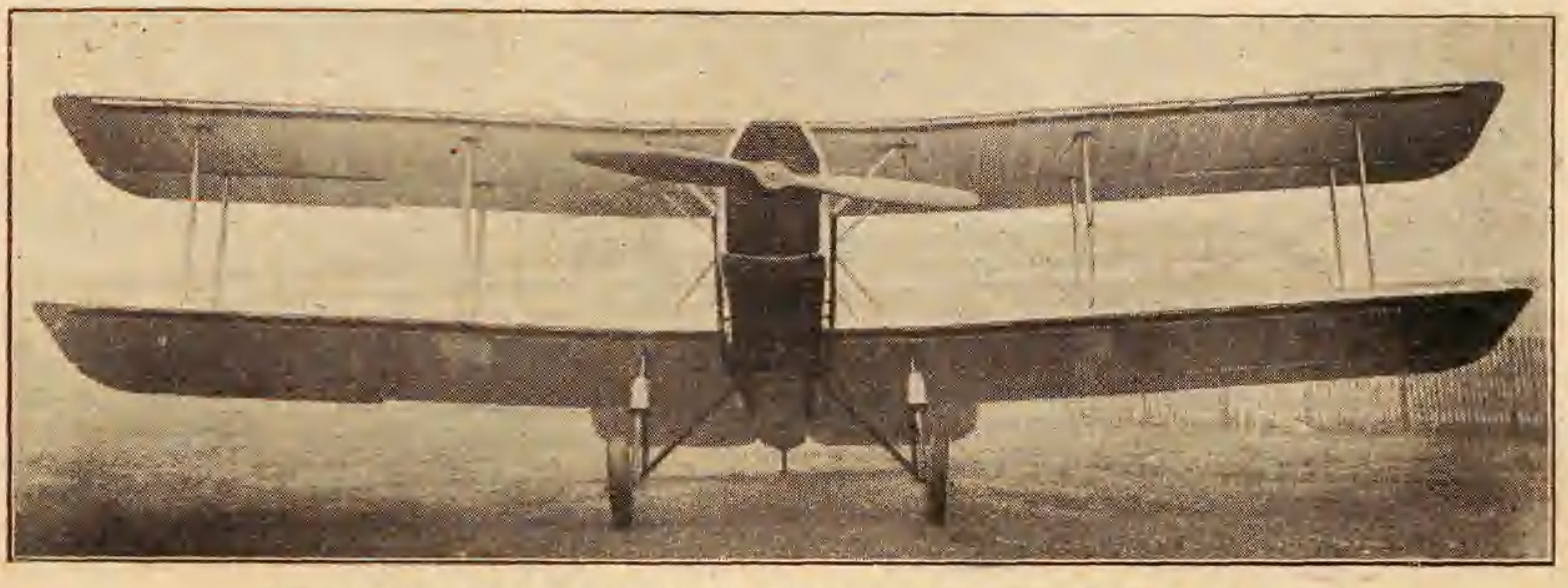
The W.R.A.F.O.C.A.

THE Women's Royal Air Force Old Comrades' Association will hold a Christmas Fair and Carnival on December 2 at St. Peter's Hall, Lower Belgrave Street, Victoria Station. It will be opened at 2.30 by Lady Trenchard. The price of admission (including tax) will be 6*d*.

THE HANDLEY PAGE "HANLEY" TORPEDO 'PLANE

450 H.P. Napier "Lion" Engine

As the first aeroplane to be built for some specific purpose other than the testing of slotted wings, although incorporating this feature as an essential part of the design, very exceptional interest attaches to the Handley Page "Hanley," photographs of the first of which appeared in our issues of November 2 and November 16, 1922. By the permission of the Air Ministry it is now possible to give a detailed description of this machine, with the restriction that no mention is made of the size and weight of the armament which the machine was designed to carry. The particular form of "frightfulness" which the "Hanley" is meant to hand out includes a torpedo, but beyond mentioning this fact as the *raison d'être* of the divided undercarriage we are not permitted to go into details as to mounting, form of discharging, etc., of the torpedo.



THE HANDLEY PAGE "HANLEY" TORPEDO 'PLANE : Front view.

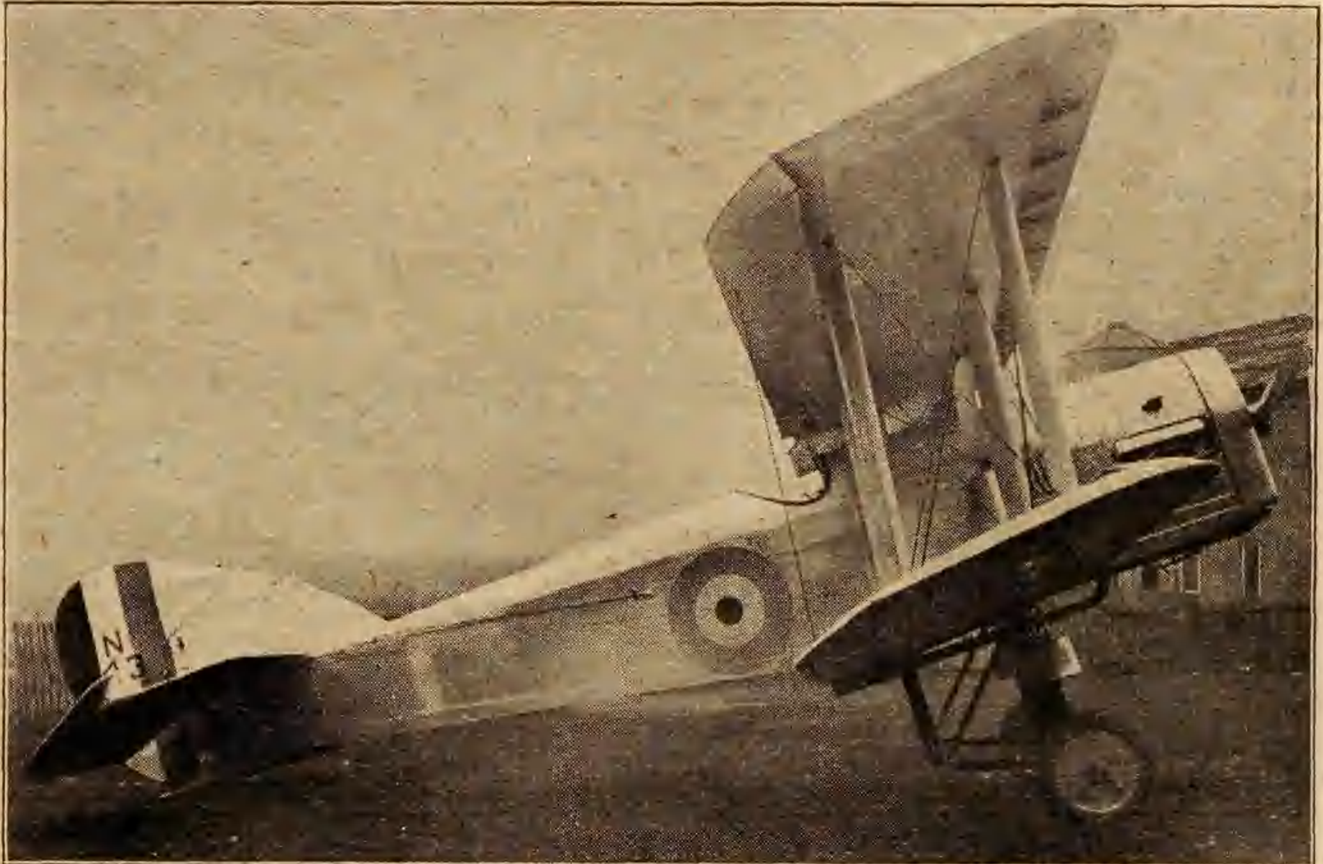
General Design

Having been designed for work from a ship, the "Hanley" had to incorporate certain features, such as low landing speed, small overall size, and folding wings. The first two desiderata form the reason for the use of slotted wings, while the last was a necessary evil (from the aircraft designer's point of view), which at first threatened to complicate to a very considerable extent the mechanism for opening and closing the slots. It will be shown presently, however, that these complications have been reduced to a minimum, and that—apart from the number of "gadgets" necessitated by the work for which the "Hanley" was designed, and which have nothing to do with the use of slotted wings—the control mechanism of a slotted wing need not be either complicated or heavy. The general lines of the "Hanley" are well illustrated in the accompanying scale drawings, which form a useful supplement to the photographs which we have already published. The undercarriage looks needlessly complicated, and as a matter of fact, a more recent model (the present notes refer to the first of the type) shows much cleaner lines, as will be seen from the accompanying photographs.

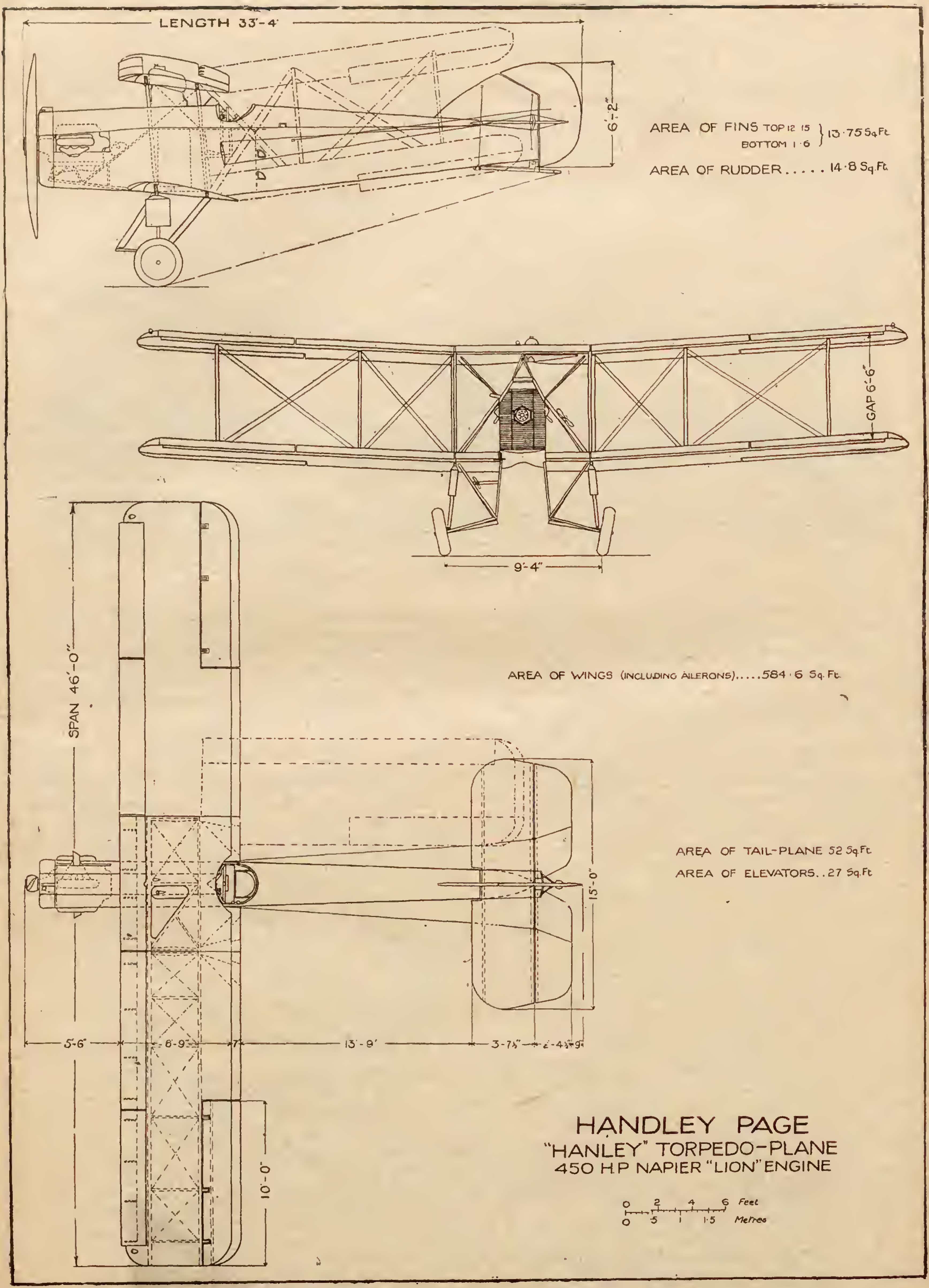
Owing to the restrictions already indicated, we propose in the following description to treat the "Hanley" solely as an interesting aeroplane, without too much reference to features which are connected with the special purpose for which the machine was designed. In other words, we shall deal with such aerodynamic and structural features as might be incorporated in any machine, no matter of which type. In this way our description may prove disappointing to a few who are interested in the machine chiefly as an instrument of war; but it should appeal no less on that account to those with whom the machine as an aeroplane is of first importance and the use to which it might be put a secondary consideration.

The Fuselage

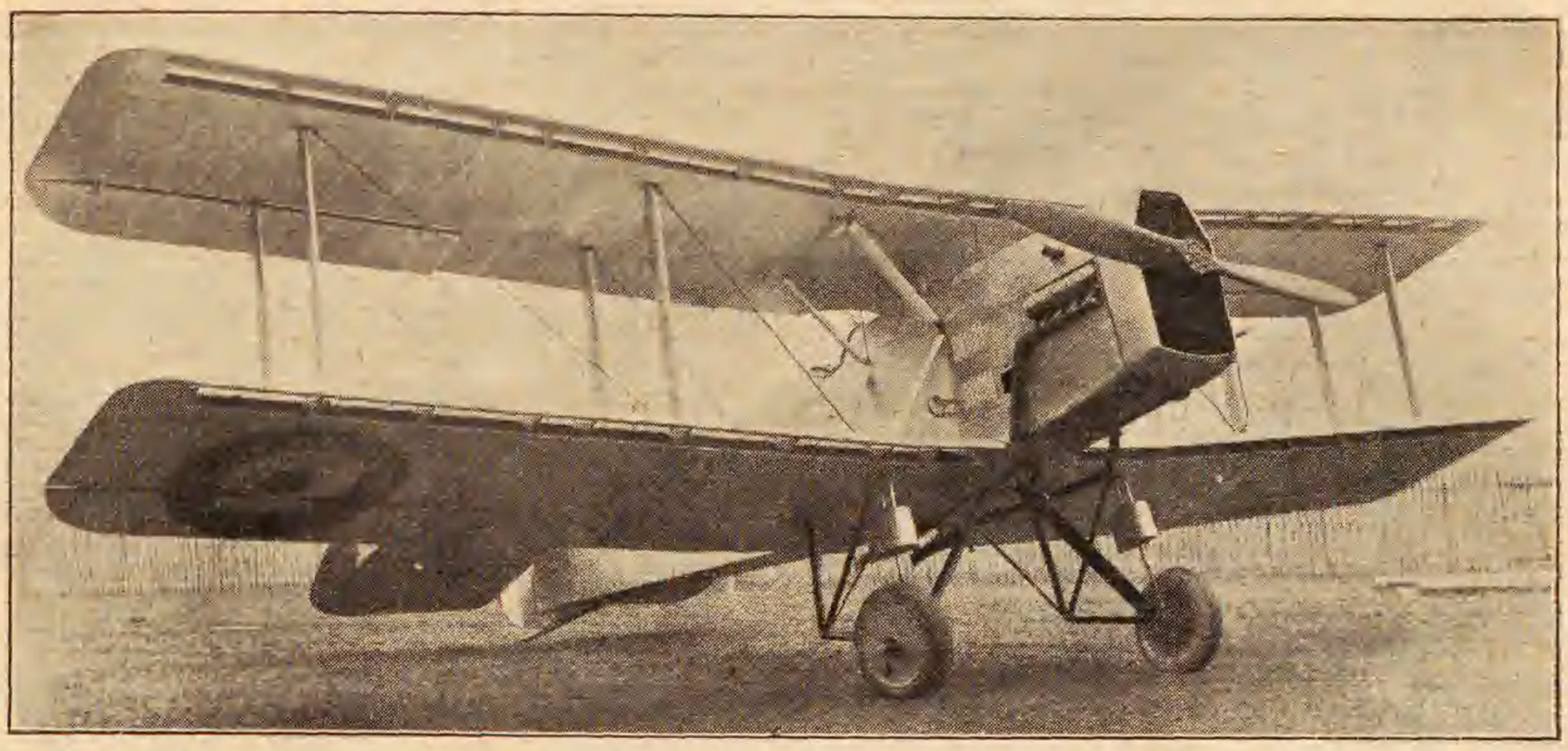
In the main, the fuselage of the "Hanley" is of orthodox design, being a girder built up of spruce longerons and struts,



THE HANDLEY PAGE "HANLEY": Side view.


LENGTH 33'-4"
6'-2"
AREA OF FINS TOP 12·15 BOTTOM 1·6 } 13·75 Sq.Ft.
AREA OF RUDDER..... 14·8 Sq.Ft.
GAP 6'-6"
9'-4"
SPAN 46'-0"
AREA OF WINGS (INCLUDING AILERONS).....584·6 Sq.Ft.
AREA OF TAIL-PLANE 52 Sq.Ft.
AREA OF ELEVATORS..27 Sq.Ft.
15'-0"
5'-6"
6'-9"
13'-8"
3'-7½"
2'-4½"
9"
10'-0"
HANDLEY PAGE
"HANLEY" TORPEDO-PLANE
450 H.P NAPIER "LION" ENGINE
0 2 4 6 Feet
0 ·5 1 1·5 Metres

THE HANDLEY PAGE "HANLEY" TORPEDO 'PLANE: General arrangement drawings of the original machine. The latest type has been altered somewhat, notably as regards the undercarriage.



THE HANDLEY PAGE "HANLEY": Three-quarter front view. These photographs show the latest type, which has been considerably "cleaned-up." Our description and scale drawings refer to the original model, but except for the undercarriage and slotted ailerons, our detail sketches refer to the new model as well.

and braced by streamline wire and tie-rods. Certain of the members and fittings are, however, of considerable interest, and will therefore be dealt with in some detail. The longerons, which are of uniform dimensions, *i.e.*, do not taper from front to back, are made up from two halves glued together. The two halves are spindled out so that the finished longeron, although being of square section externally, is in reality tubular, with packing pieces glued in where the strut attachments occur.

The fact that the longerons do not taper has enabled uniform fittings (except, of course, where local requirements call for a departure) to be used. The form which these take is shown in one of the accompanying sketches. It will be seen that the fitting rests on the longeron, and is not passed around it. It is secured in place by small wood screws, and as the tendency for the fitting to shift, when the bracing is in place, is very small, this is probably quite a satisfactory method, while giving the advantage that in case of damage a longeron can be replaced without interfering with the wire bracing. The attachment of the wires in the transverse panels is interesting. Streamline wires or tie-rods are used, and the threaded ends of the wire are simply passed through the longeron from corner to corner, and locked in place by the usual nuts, locking on a washer bent over the edge of the longeron. In order to retain a smooth edge for the fabric, the extreme edge of the longeron is chamfered off, where this washer occurs, sufficiently deeply to let the nut and end of the wire sink to the level of the unchamfered portion of the longeron.

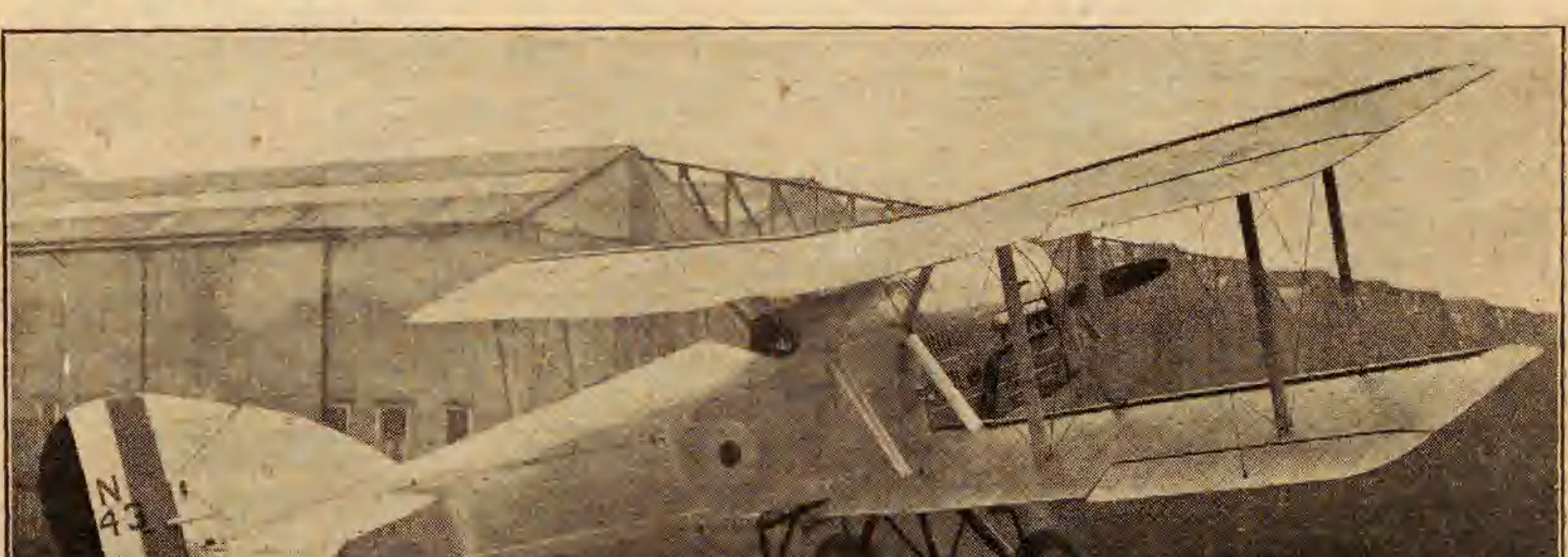
The vertical and horizontal struts vary somewhat, according to location, but, generally speaking, they are spindled out to an I section; here and there one occurs which, requiring greater stiffness, is of a section similar to that of the longerons.

On top the rectangular section fuselage has a deck fairing of light formers and stringers, covered, as are also the sides of the fuselage, with fabric. The bottom of the fuselage, on the other hand, is covered with three-ply wood.

The mounting for the Napier "Lion" is a tubular structure, entirely separated from the main portion of the fuselage by a metal-covered bulkhead. It has been so designed as to give easy access to the engine, although it has not been designed for removal as a complete unit. The engine bearers themselves are of ash, but are supported on steel tubes braced longitudinally, laterally and diagonally by steel tubes and cables. The oil tank is mounted behind the engine, but the petrol tank, a large cylinder standing on its end, is housed in the front portion of the main fuselage. The fuel is led to the engine from a service tank in the top centre-section, the supply pipes passing through the fireproof bulkhead behind the engine. Provision has been made for the rapid emptying of the main petrol tank in an emergency, the discharge of the petrol considerably lightening the machine. A nose radiator is fitted, and is provided with a shutter of usual type.

In the after portion of the fuselage a number of rubber-proofed flotation bags are housed. These bags are tied to the longerons, and extend, with one bag in each bay, from just behind the cockpit to the last bay but one. In the extreme stern there is no bag, as the tail skid is mounted here.

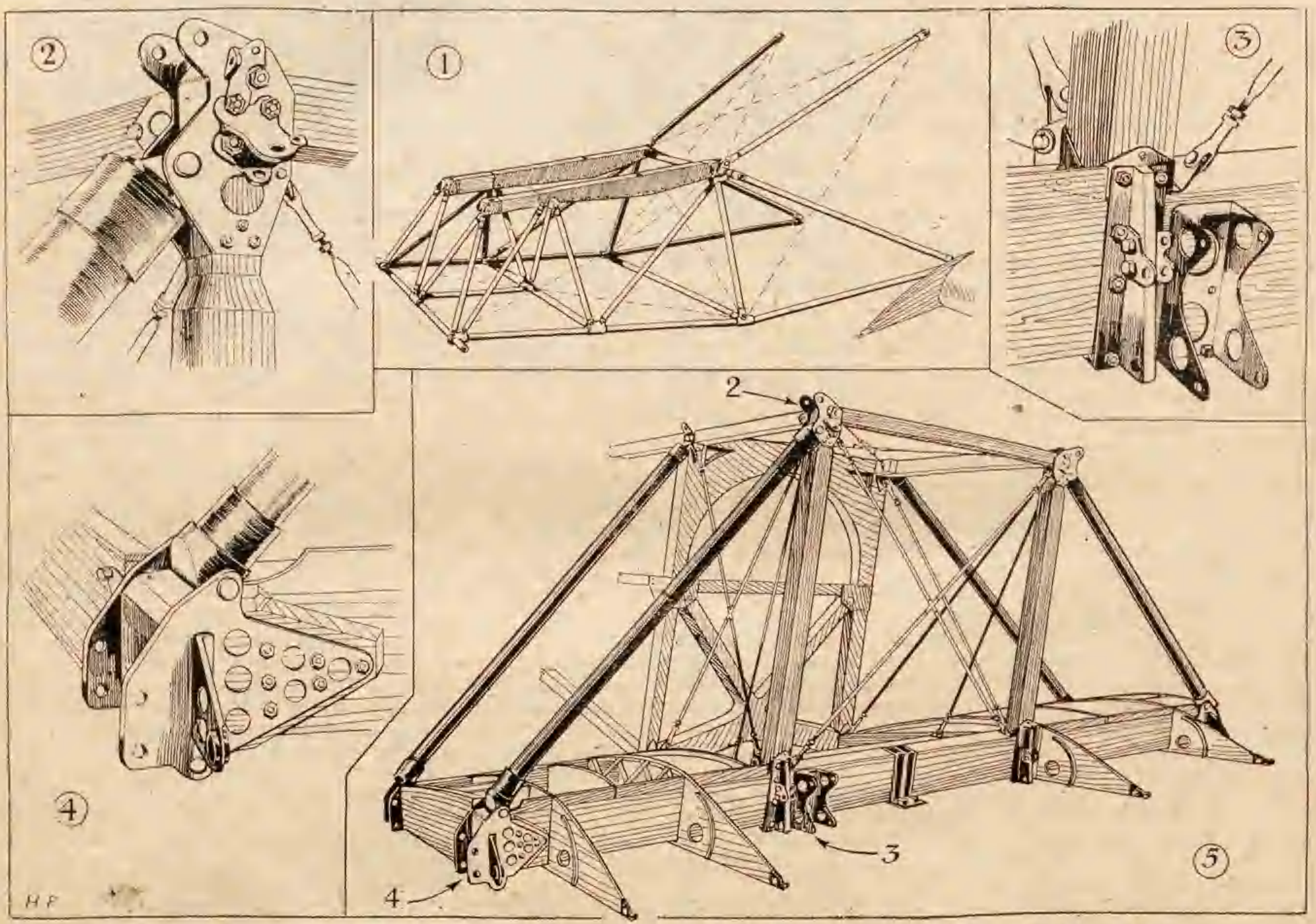
Built as an integral part of the fuselage are the short wing roots of the lower plane. These extend outwards for a short



THE HANDLEY PAGE "HANLEY": Three-quarter rear view.

distance, and are braced to the fuselage by sloping tubes. On the rear spar are the hinges around which the wings pivot when folding, while on the front spar is the fitting for locking the wing in place, as well as the worm and wheel gear (on the starboard side) by which the pilot operates the slot of the lower plane.

The top plane centre-section is carried on sloping struts, and the fittings for folding the wings and operating the slots are generally similar to those of the bottom plane wing roots. The subject of the slot control will be dealt with under the wings.



THE HANDLEY PAGE "HANLEY": Some constructional details. 1, View of the engine mounting. 2, Attachment of sloping strut to vertical strut and longeron. 3, Brackets for attachment of engine tubes and slot control gear. 4, Lower attachment of sloping strut to wing root spar. The lug projecting forward carries the slot control tube. 5, General view of front portion of fuselage with lower wing spar roots, sloping tubes, etc.

The Wings

Incorporating as they do the slotted aerofoil invented by Mr. Handley Page, the wings of the "Hanley" are of more than ordinary interest. Regarded purely as aeroplane wings, the planes are of usual construction as regards their main members—spars and ribs. The spars are of spruce, built up to form a rectangular box, and in order to increase the glued area, triangular section strips are glued into the corners of the hollow rectangle. It is of interest to note that the spars are placed at a considerable angle in relation to the chord line. This has probably been done on account of the large angle at which, with a slotted wing, the maximum lift occurs. The result is, however, that the ribs do not lie with their flanges following the upper and lower surfaces of the spar, but form an angle with them. On the top of the front spar a strip runs along so as to make a continuous support for the three-ply covering of the nose of the main aerofoil. This strip can be seen in one of our sketches.

The ribs are of the lattice type, single lattice for the ordinary ribs, and double lattice for those which have forward extensions serving as supporting brackets for the auxiliary aerofoil. The ribs are extremely light, and yet the lattice form of construction appears to render them very rigid.

The auxiliary aerofoil, which is in section very like a Joukowsky, is covered with three-ply wood, as it is of the greatest importance that it should retain its shape well, quite small changes in the size and shape of the slot formed between it and the nose of the main aerofoil having a considerable effect upon the behaviour of a slotted wing. The general method of construction employed for the auxiliary aerofoil is indicated in one of our sketches. The leading and trailing edges are formed of solid strips of wood spindled out to U and V sections respectively. The ribs fit into these, and the whole is covered with thin three-ply.

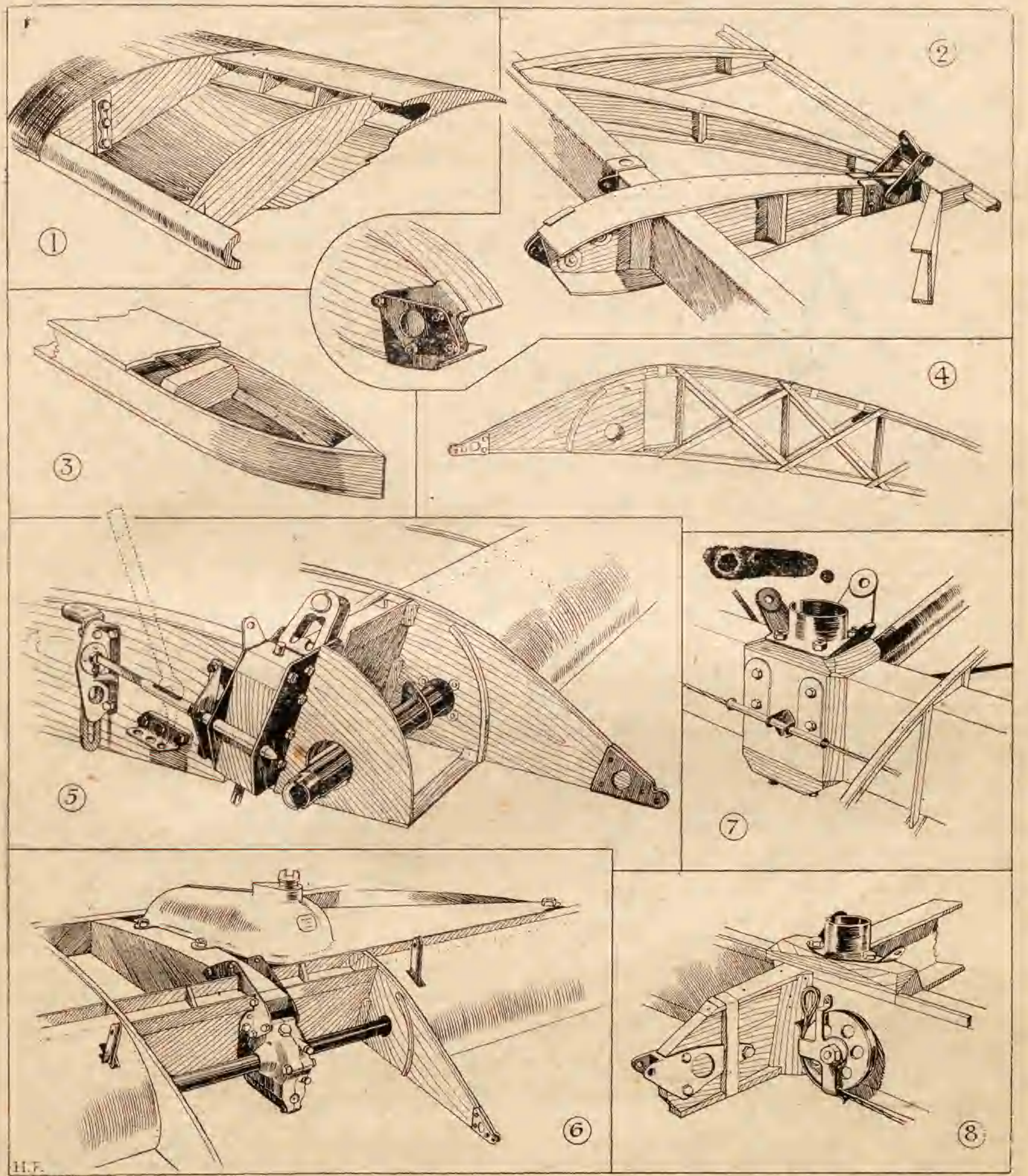
The auxiliary aerofoil is hinged at a number of points lying on a line a short distance back from the leading edge, while the levers by which the auxiliary aerofoil is operated to open or close the slot are secured to points near the trailing edge.

The Slot Control

At this point it may be of interest to discuss the manner in which the slots are opened and closed. To begin with, it should be stated that in the "Hanley," which is of course a biplane, the slots of upper and lower plane are operated independently, there being separate handles for the two sets of slots. The auxiliary aerofoils are, as already mentioned, hinged at points along their length, near their leading edge. The brackets which support these hinges are forward extensions of the wing ribs. The nose of the main aerofoil is covered on its upper surface with three-ply wood, as this surface forms one wall of the slot. Passing along inside the nose of the main aerofoil, underneath the three-ply covering, is a tube, which is carried in phosphor-bronze bearings on the nose ribs of the main aerofoil. This tube can be rotated from the cockpit (by means to be described presently), and carries at intervals lugs welded to the tube. These lugs have small projections, to which are hinged short L-shaped levers of U-section. The upper ends of these levers engage with eyebolts placed in line near the trailing edge of the auxiliary aerofoil. When, therefore, the tube is rotated in one direction, the levers rise, and in doing so open the slot. Rotation of the tube in the opposite direction closes the slot.

As regards the method of operating the slots from the pilot's cockpit, this is accomplished in a very simple manner. As the methods employed for upper and lower slots are the same, we will use as an example the control for the slots of the upper plane. One of our sketches shows the top centre-section, with the gravity petrol tank. In front of the front spar, is mounted a worm and worm-wheel gear. The worm is mounted on the forward end of the pilot's slot control tube, which runs in a fore-and-aft direction underneath the centre-section. On the end nearest the pilot is a short crank handle, turning of which turns the worm and, through that, the lateral tubes operating the levers of the slot control.

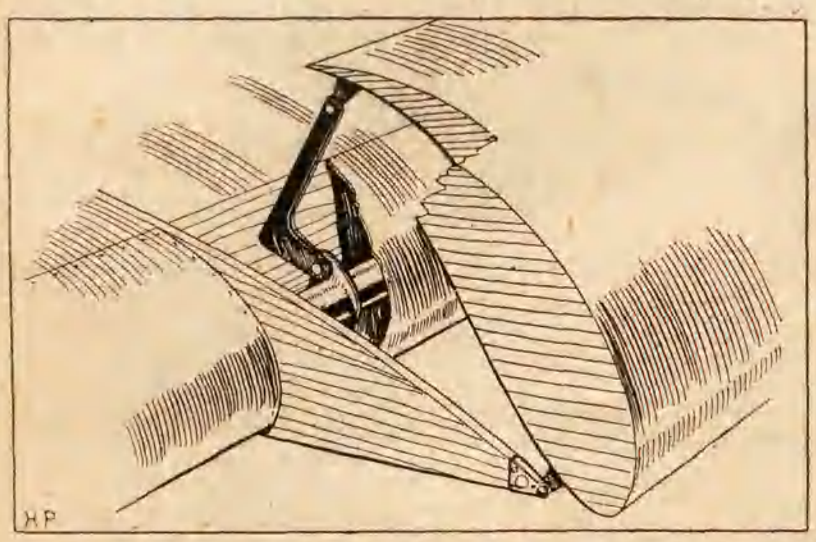
A short section of the transverse tube remains in position



THE HANDLEY PAGE "HANLEY": Some constructional details of the wings. 1, partly-sectioned view of a portion of the auxiliary aerofoil. In shape this resembles the famous Joukowsky wing section. 2, shows the construction of an aileron. Note the triangulated construction. The shackle near the trailing edge receives the wire to the top aileron, while the fitting on the nose of the rib, shown in more detail in the inset sketch, is for the return cable. 3, section of the end portion of a built-up box spar. Note the triangular section corner strip, which provides large glued area. In 4 is shown one of the double lattice ribs which carry the brackets on which the auxiliary aerofoil is mounted. The nose of the main aerofoil is formed by thin three-ply, bent over the small curved strip screwed to the bracket. 5, details of the locking pin and spar fitting on the lower plane at the point where the wing is joined for folding. A lever is used for pulling back the locking bolt when the vertical slide at the back has been raised. 6, details of the slot-operating mechanism. The tube from the pilot's controls carries on its front end a worm, which engages with a worm wheel on the transverse tube in the leading edge. Rotation of this tube raises or lowers the auxiliary aerofoil through levers hinged to lugs on the tube, thus opening or closing the slot. 7, inter-plane strut socket on the lower plane rear spar. 8, lower spar, with bracket for aileron hinge.

in the centre-section, and terminates at each end in a ball joint. The socket portion of this joint is formed in the ends of the wing tubes, and is slotted as shown in one of our sketches. The ball in the centre-section tube has a pin through it, the ends of which engage in the slot in the wing tubes, thus transmitting the torque. When the wings are folded the ball comes out of the socket, and on spreading the wings again all that is necessary is to ensure that the wing tubes are so placed as to allow of the slots engaging with the pins.

The slots in the lower plane are similarly operated, but the control for these runs from the starboard side of the pilot's cockpit down to the bottom centre-section, and upper and lower slots are separately controlled. The gearing between the worm and worm-wheel is such that it requires about 20 turns of the control handle to change from slot fully open to slot fully closed. Means are provided for preventing the pilot from "overwinding" the slot gear.



Slot-operating mechanism of the Handley Page "Hanley."

The method of locking the wings in place when spread for flight is interesting. The locking bolt extends aft for a distance of several inches from the front spar. Its rear portion has flats machined on it, and works in a guide mounted on a small bracket, as shown in one of our sketches. Behind this bracket is a slide, in which is a slot of just sufficient size to let the rear end of the bolt pass through. When the slide is raised until this opening coincides with the bolt, and not until then, the bolt can slide back and unlock the wing. While the slide is down it effectively prevents the bolt from coming out accidentally. As it has been found that the bolt is likely to bind somewhat in the wing spar fittings, means have been provided for facilitating the sliding backwards and forwards of the bolt. This takes the form of a short lever, normally carried in the cockpit, which is inserted in a slot in the bolt, and, using as a fulcrum one of the three holes in the small bracket shown on the sketch, the bolt is easily shifted. The object of the flat on the rear end of the bolt now becomes apparent. It prevents the bolt from turning into such a position that the slot in it is no longer vertical, in which case the lever could not be inserted. We have, perhaps, devoted an unnecessarily large space to a description of this fitting, but it appears to us that it is just in the care of the design of such details that the daily use of a machine will show the difference between practical and impractical design.

The ailerons of the older machine are of the balanced type, with brackets supporting the ailerons some distance from their leading edge. Thus the balance is provided by the portion which lies between the rear main spar and the front spar of the aileron. Both the control cables and the cables connecting the leading edges of upper and lower ailerons pass inside the fairing of the rear inter-plane struts, the former being shown passing over a pulley in one of our sketches. On a later model, slotted ailerons, similar to those described and illustrated in our description of the Handley Page W. 8 C. in the issue of November 16, 1922, are used. These combine the slot effect with the balanced aileron, and have been found very effective in use, even at large angles of incidence.

The Tail

Both in outward shape and in internal construction, the tail of the "Hanley" is built on orthodox lines. The tail plane is of the trimming type, to which the divided elevator is attached. The rudder has a triangular balance working in a cut-out portion of the fixed vertical fin. The controls also are of standard type, with a foot bar for the rudder and a vertical column for the elevator control.

The Undercarriage

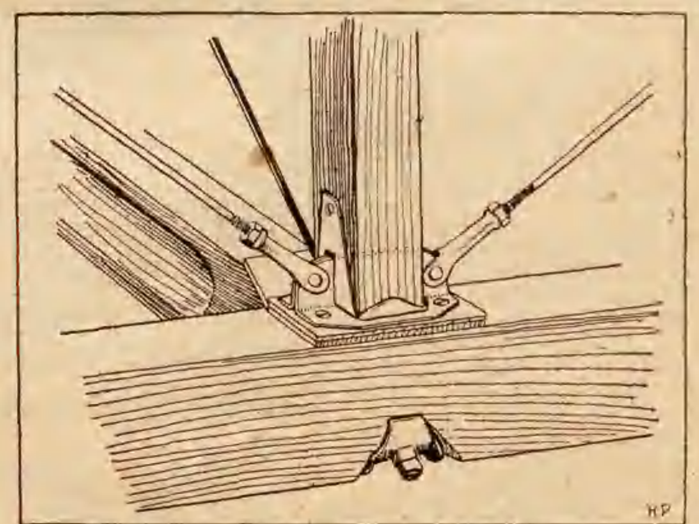
As will be seen from the general arrangement drawings, the under-carriage is of the divided type, necessitated, of course, by the fact that the machine is designed to carry a torpedo. Regarding the latter and its mounting, nothing may be said; but it is permissible to point out that in a later type of machine, photographs of which we also publish this week, the undercarriage structure, which is somewhat complicated in the original model, has been very considerably "cleaned up." The wheel track is wide, and landing shocks are transmitted through the sloping struts to the fuselage. The tail skid is a long straight tube, sprung by rubber cords inside the fuselage.

The Pilot's Cockpit

Owing to nature of the machine, a certain amount of restraint is necessary in describing the "office." The pilot's seat is placed just aft of the trailing edge of the top plane. In front of him he has an instrument-board with an unusually great number of "gadgets." Apart from the instruments necessary for flying, such as air speed indicator, altimeter, clock, compass, revolution indicator, radiator thermometer, etc., there are others whose functions are connected with the "freight" for which the machine is designed. The handles for operating the slots are placed, one in the top centre-section and one on the starboard side of the cockpit coaming. Then there is the handle for trimming the tail plane, and a wireless set with aerial, etc.

The controls, as already mentioned, are of usual type, with a wheel for the ailerons, fore and aft movement for the elevators, and a foot bar for the rudder. The cockpit is electrically lighted, with a number of small lamps illuminating the various instruments, and each capable of being switched on or off as required. The necessary current is generated by windmill-driven generators, placed outside the fuselage, in the slip stream from the propeller.

At the moment it is not thought advisable to publish figures relating to the weight and performance of the Handley Page "Hanley," except to state that the total loaded weight is about 6,400 lbs., which, with a wing area of 584, gives a wing loading of nearly 11 lbs./sq. ft. It is also of interest to note that the "cleaning-up" of the latest model has resulted in an astonishing gain in maximum speed. For this no doubt the simpler undercarriage is mainly responsible, although a good deal of the credit should probably be ascribed to the new Watts-Lang two-bladed propeller.



Standard fuselage fitting of the Handley Page "Hanley."

The ailerons of the first machine were found to give rather inadequate control at large angles of incidence. This meant that it was difficult to take full advantage of the low landing speed which the slotted wings made possible. In the new model the slotted ailerons have been found, during a number of recent test flights, to be extremely effective right up to the angle of maximum lift, with the result that it is possible to land the machine as slowly as the extra lift obtained with the slotted wings will allow. It thus appears that a necessary complement to the Handley Page slotted aerofoil is slotted ailerons. The manner in which these work has already been described in our recent article on the W. 8 C., in which they are to be used. It might be pointed out, however, that even on ordinary wings the slotted ailerons have been found very effective, and as the majority of machines could be landed considerably slower if the controls were effective at large angles, there would appear to be excellent reason for a wider adoption of ailerons of this type. Apart from the extra effectiveness, the slotted ailerons have the advantage that they are balanced, and consequently easy for the pilot to operate.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

RACING COMMITTEE

A Meeting of the Racing Committee was held on November 16, 1922, when there were present Maj.-Gen. Sir W. S. Brancker, K.C.B., in the Chair; Commander James Bird; Lt.-Col. W. A. Bristow; Lt.-Col. M. O. Darby; Mr. H. P. Folland; Col. F. Lindsay Lloyd, C.M.G., C.B.E.; Lt.-Col. F. K. McClean, A.F.C.; Mr. W. O. Manning; Mr. T. O. M. Sopwith. In attendance: Lt.-Col. M. O'Gorman, C.B., and the Secretary.

Schneider Cup.—The Regulations for the Schneider Cup were considered with a view to deciding upon the recommendations to be made to the F.A.I. at its Meeting in January.

It was decided to recommend that the seaworthy test, consisting of taxying over two distances of half a mile each, should precede the flotation test of six hours, and that for the speed test the competitors should all be started at the same time.

The question as to where the Race should be held was considered and deferred.

GLIDING COMMITTEE.

A Meeting of the Gliding Committee was held on Thursday, November 16, 1922, when there were present Lt.-Col. M. O. Darby, in the Chair; Lt.-Col. W. A. Bristow; Maj. O. T. Gnosspelius; Lt.-Col. F. K. McClean, A.F.C.; Mr. W. O. Manning; Lt.-Col. A. Ogilvie; Mr. F. Handley Page; Sqdn. Ldr. M. E. A. Wright; and the Secretary.

Selfridge 50-Mile Gliding Competition.—The Secretary reported that Messrs. Selfridge and Co., Ltd., had offered, through the Royal Aero Club, a Prize of One Thousand Guineas for the first flight of 50 miles on a glider, open to British subjects on a British machine.

The Committee proceeded to draft the Regulations.

COMMITTEE MEETING

A meeting of the Committee was held on Wednesday, November 22, 1922, when there were present Lt.-Col. J. T. C. Moore-Brabazon, M.C., M.P., in the Chair; Lt.-Col. W. D. Beatty, C.B.E.; Group-Capt. F. W. Bowhill, C.M.G., D.S.O., R.A.F.; Mr. Ernest C. Bucknall; Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S.; Col. F. Lindsay Lloyd, C.M.G., C.B.E.; Lt.-Col. F. K. McClean, A.F.C.; Lt.-Col. Alec Ogilvie; Lt.-Col. Mervyn O'Gorman, C.B.; Mr. F. Handley Page; and the Secretary.

Election of Members.—The following new Members were elected:—

Franklyn Leslie Barnard.
Lt.-Col. John Barrett-Lennard.
James Laurence Neville Bennett-Baggs.
Harold Butler Wyn Evans.
Maj. Harold Edward Strachan Huth.
Sir Samuel Instone.
Lieut. Leonard Mansfield Robinson, R.N.

Sub-Committees.—Reports from the following Sub-Committees were received and adopted:—House Committee, Finance Committee, Gliding Committee, Racing Committee.

Gliding Record.—The performance of A. Maneyrol on the Peyret Glider at Itford Hill on Saturday, October 21, 1922, when he remained in the air for 3 hours 21 mins. 7 secs., was passed as a British Duration Record under Class "D" of the F.A.I. Regulations. It was decided to submit the performance to the F.A.I. for a World's Record.

Schneider Cup.—The report of the Aero Club of Italy containing the official figures of the performance of the Supermarine Napier Flying Boat in winning this year's Schneider Cup Race was received. It was decided to request the Aero Club of Italy to submit the figures to the F.A.I. with a view to World's Records for Speed for Seaplanes being granted to Capt. H. C. Biard, the pilot of the Supermarine Napier Flying Boat.

F.A.I. Rome Conference.—Lt.-Col. M. O'Gorman, who attended the Conference of the F.A.I. held in Rome on October 8 to 12 on behalf of the Royal Aero Club, submitted his report.

A vote of thanks was unanimously passed to Col. O'Gorman, for attending the Conference.

F.A.I. Paris Conference.—The following were appointed to represent the Royal Aero Club at the Committee Meeting of the F.A.I. to be held in Paris on January 3, 1923:—Lt.-Col. M. O'Gorman, Lt.-Col. M. O. Darby, H. E. Perrin.

Vacancy on Committee.—Lt.-Col. M. O. Darby was co-opted to the Committee to fill the vacancy caused by the death of Lord Northcliffe.

Society of Model Aeronautical Engineers.—It was decided to recognise the Society of Model Aeronautical Engineers as the body to control Model Aeroplane Competitions, the appointment to be for one year, and to be reconsidered at the end of that period.

Aviators' Certificates.—The following Aviators' Certificates were granted:—

7932.	Gilbert Edward Nicholetts	August 19, 1922.
7933.	Richard Claude Hancock	September 28, 1922.
7934.	George Carr Rayden ..	June 28, 1918.
7935.	Nils Nilsson (Swedish subject)	August 25, 1922.
7936.	Lieut. Leonard Mansfield Robinson, R.N. ..	October 31, 1922.

F.A.I. ROME CONFERENCE

At the Conference of the F.A.I. held in Rome, October 8 to 12, 1922, it was decided that a competitor of the nationality of a country not represented on the F.A.I. may be granted a competitors' licence by the country represented on the F.A.I. holding the competition. The licence is only to be valid in the country in which the licence is issued.

Entries for International Competitions.—It was decided that dates of entries for International Competitions, once fixed, must not be changed.

Regulations for Gliding Contests.—Class "D," Article 31, of the General Regulations of the F.A.I., was altered to read as follows:—"Aeroplane without motor" shall be taken to mean any machine which is only sustained dynamically without any mechanical power of support or propulsion. Human muscular force is allowed.

Extension of the Straight Line Course for Speed Records.—The Conference decided that after April 1, 1923, all speed records must be made over a straight line course of 3 kms. instead of 1 km. as at present.

Tryptique.—The question of the Tryptique raised by the Royal Aero Club was considered. The form of Tryptique as drawn up by the F.A.I. Legal Committee and the form put forward by the Aero Club de France were submitted, and ordered to be issued to the Aero Clubs represented on the F.A.I. with a recommendation that each Club should obtain the approval of their Governments. The French Customs had already given its approval to the institution of the tryptique. It was urged that the deposit required in the first place should be small.

1923 Conference.—It was decided to hold the 1923 Conference at Gothenburg in August next.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

Waziristan Honours

IT is announced in the *London Gazette* of November 21, that the King has approved of the following rewards in recognition of gallant and distinguished service in Waziristan:—

Bar to the Distinguished Flying Cross

Flying Officer C. McC. Vincent, D.F.C.

Distinguished Flying Cross

Flt.-Lieut. W. A. Coryton, M.V.O.
Flt.-Lieut. A. L. Fiddament.

Guynemer Memorial in Paris

A MEMORIAL to Captain Guynemer, the famous French military airman, who was killed in the War, was unveiled last Thursday at the Collège Spanislas, Paris, of which he was an old pupil.

The memorial is a *bas-relief* portrait showing Guynemer in airman's uniform, with an aeroplane propeller in the background. M. Léon Bérard, Minister of Education, presided at the ceremony, and made a speech in which he celebrated the amazing adventure of this young Frenchman who passed from college to the Panthéon.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

AMONG the German gliders developed for this year's Rhön competition were a few in which longitudinal and lateral control was effected by pivoting the main planes, the two halves of which moved together for longitudinal control and independently for lateral control. This type of control was found in several instances to be superior to the more usual type, and such authorities as Professor Prandtl of Göttingen and others, incline to the opinion that, when we come to experiment with true "gust-soaring" as distinct from gliding in an upward air current the pivoted wing has even more to recommend it, owing to the rapidity with which its angle can be changed in order to take advantage of a gusty wind.

* * *

SOME of the German gliders, notably the von Loessl, constructed by the Caspar works of Trawemünde, had their wings pivoted in such a way that they automatically changed their angle of incidence according to the relative velocity of the air over them. Owing to certain shortcomings in the design, the Sb–3, as the machine is called, did not quite come up to expectations, but it offered certain very interesting features which will be further developed during the next few months.

* * *

IN connection with this "gust-soaring" or dynamic gliding, it appears to us that due notice has not as yet been taken of the possibilities of the use of variable wings such as the Fairey hinged trailing edge variable camber wing, and the Handley Page slotted wing. Both these forms, affording as they do a rapid variation in lift, and the possibility of fairly heavy wing loading, would seem to be capable of very useful application to gliders.

* * *

BROADLY speaking, what is required in order to be able to take advantage of the speed variations in a wind, assuming such wind to be turbulent and not steady, is to glide at a flat angle, but not at a particularly low speed, while the air is fairly steady, or in the lulls. When the machine meets a gust head-on, the lift should be rapidly increased so that the momentum of the machine is used for overcoming the extra resistance which accompanies the increase in lift. Now with the Fairey variable camber wing, or the Handley Page slotted wing, it is possible to provide a good L/D ratio at fairly low lift coefficients, *i.e.*, at relatively high speeds. The high speeds mean high momentum, so that, when the trailing edge in the Fairey and the slots in the Handley Page wing are operated to give increased lift, the machine has sufficient momentum or kinetic energy to overcome the increased resistance, with the result that the machine climbs, *i.e.*, the kinetic energy is transformed into potential energy. Theoretically the same could be done by the ordinary glider, but it would appear that the time required, owing to the moment of inertia of the machine, would be considerably longer than the time required to open the slots of the Handley Page or pulling down the flaps of the Fairey wing. The subject is one which seems worth while going into more fully, and we rather imagine that if anyone should be interested to the extent of wishing to build gliders incorporating these features, neither Mr. Fairey nor Mr. Handley Page are likely to prove over strict in the matter of royalties for the use of their patented devices.

* * *

IT is obvious that in the case of either wing, the operation of the variable gear should be as rapid as possible. This means that the flaps of the Fairey or the slots of the Handley Page wing should be controlled by a lever, and not by wheels or handles, which would make the operation too slow. The question then arises, would the load on the control lever be too heavy, and would the stresses imposed on the wings be too great? As a glider would, in any case, be fairly lightly loaded, as compared with a power-driven machine at any rate, probably the stress question need not be very serious, and the force required to operate either flaps or slots should not be very great either, so that there would not appear to be any great practical difficulties in the way. The weight of either flap or slot gears should not be excessive either, so that, superficially, there would seem to be little against their use, while a considerable gain might easily result.

* * *

APART from the use of slotted wings for dynamic gliding, the use of slotted ailerons might be a considerable advantage on all gliders, as it has been found that the slotted ailerons are very effective. Thus it might be possible to increase very materially the controllability of gliders, and the experience of all competitors at Itford was that the controllability was rather poor. Even for "sitting on a jet of air" considerable controllability is necessary, so that experiments with variable wings should be interesting at least, and might also provide full-scale data of value in the design of power-driven machines. As we have already mentioned, we do not suppose that either Mr. Fairey or Mr. Handley Page would raise serious objections, provided any information which became available as a result of gliders with variable wings was placed at their disposal.

* * *

UP to the present no decision has been reached regarding the rules and regulations for next year's competition for the Selfridge Prize of 1,000 guineas. Owing to the fact that the competition will be open throughout the year, the framing of rules which will give all competitors a fair chance, without imposing too great demands upon the Royal Aero Club in the matter of sending out official observers, is naturally a difficult matter, and we are pleased to note that the Gliding Committee of the Club are not allowing themselves to be hurried in this matter. So long as the rules are announced before the end of the year, potential competitors should have no cause for complaint, and it is obviously far better to devote a fair amount of time to the drafting of rules than to get them out in a hurry, only to discover later that if such and such a thing had been done better results would have been achieved.

* * *

IN this connection it is not without interest to examine what the Germans are doing as regards the organisation of the competition for the prize of 100,000 Marks, presented by the *Berliner Tageblatt.* This prize is also, like our own Selfridge prize, for the greatest distance covered in one flight on a motorless aircraft. It is confined to German pilots on German machines. The distance covered will be measured on an official map to a scale of 1 : 25,000 in a straight line from point of departure to point of landing.

* * *

EVIDENTLY the Germans were also somewhat puzzled as to ways and means of observing the flights officially. In the end it was decided that the start of each attempt should be officially observed by two officials representing the Automobil- und Flugtechnischen Gesellschaft and the Aero Club of Germany. These observers will be required to state on oath the exact point of departure, the time, identification of the machine and occupants, that the barograph (which is to be carried in a position inaccessible to the pilot, and sealed) was functioning properly at the time of departure, take photographs of the machine from two sides, showing identification marks or numbers, and a portion of the 1 : 25,000 map showing the exact point of departure.

* * *

FOR observing the landing, two official observers, with the same qualifications, suffice, but should it happen, as it very easily might, that official observers are not near enough to see the actual landing, four persons, who saw the machine actually landing, and whose integrity is vouched for by the local police, may serve as official observers. They must declare on oath that the machine landed on the spot indicated, that the barograph was functioning, and they must ascertain the time by the pilot's watch in order that this may be used as a check on the barograph time. They must also convince themselves that the spot marked by the pilot on the 1 : 25,000 map is the exact spot on which he landed.

* * *

THIRDLY, the pilot may send in the barograph chart, previously marked by the official observers of the start, and bearing the stamp of any local police or military authority, with a declaration to the effect that the chart was taken out of the sealed barograph at a certain time and place in his presence.

* * *

IN all this there is precious little that would be suitable for use in this country. From what we know of the casual observer of an aircraft, the accounts given by eye-witnesses would carry little weight, and by the time a pilot had found a local police constable, got him by hook or by crook to the machine, and got him to stamp the chart (if indeed he could be persuaded to do so) all sorts of things would have happened. However, it is possible that there may be, in these German regulations for next year's *Tageblatt* competition, the germ of an idea. The swearing-in of witnesses hardly appeals to us, and a plain statement would carry as much weight.

LONDON TERMINAL AERODROME

Monday evening, November 27, 1922

Traffic has suffered from the aftermath of the foggy spell last week. It is a noteworthy fact that not only does fog prevent the smooth running of the services, but it has an adverse effect on advance passenger bookings. Would-be passengers seem to steer clear of booking by air, for several days ahead, even when it is almost certain that the fog will have cleared; and after a spell of fog there is quite a time-lag before bookings resume their normal flow.

The efforts of both the Air Ministry and the Marconi Company to improve the wireless telephones fitted to the "air expresses" are now being justified in the much longer range, and in the clearness of the messages. During this last week Daimler pilots have been exchanging messages with Croydon when they were actually circling above the Amsterdam Aerodrome prior to alighting there, while one of the Grands Express Goliaths has been heard operating when above Dijon; and Mr. Bouderie speaks mysteriously of one of their pilots being in touch with Lausanne within a few minutes of leaving Croydon.

Manchester-London "Air Express" Record

The fastest journey yet made between Manchester and London was accomplished on Friday, when one of the Daimler 34's flew from Manchester to Croydon in 80 minutes. The machine arrived over the aerodrome at a height of 6,000 ft., and another four minutes was occupied in losing height and landing, making the time from leaving the ground at Manchester to alighting at Croydon 84 minutes. Capt. Hinchliffe also made a rapid return flight from Amsterdam to London and back during the week, being only 5½ hours away from Amsterdam, including the time taken to change machines and passengers at Croydon.

The Instone Air Line have made arrangements for landing at Tirlemont to refuel their machines on the London-Brussels route, and are now alighting there instead of at Lympne. On Saturday they carried as passenger the Lord Bishop of Bangor, who is now in his 78th year, and who was travelling to Cologne to preach to the troops of the Army of Occupation in Cologne on Sunday.

The C.M.A. air-lines have begun an early-morning newspaper service between Lympne and Paris, the first machine on this service leaving Lympne at 7.40 this morning, and arriving at Paris at 9.35 a.m. They intend to make the return trip to Lympne, carrying fresh fruit and vegetables from Paris for the London market, and these will be sent on from Lympne by train. This has been arranged in order to prevent any Customs' delay, as no dutiable goods will on any account be carried on these machines.

The traffic-movement board that delights all schoolboys who make the aerodrome a regular rendezvous, has been taken down, and I understand it is to be enlarged to take in all the new lines, such as Manchester, Cologne, and possibly Berlin. The weather report board remains in its original form, and the additional weather reports for the new routes are displayed in full on a notice-board near by. This is, after all, a fuller method of exhibiting reports, as they contain very important information which, for some reason or other, is omitted from the big board.

Speaking of meteorology makes one hope, by the way, that means will be found to increase the frequency of such reports from the Manchester air-station. When there is fog to be considered, they should come in far oftener than they do.

The wonderful Daimler 34, G-EBBS, which has now nearly 800 hours' flying to its credit, returned from Stag Lane yesterday, after having been fitted with an adjustable tail.

Firework Display for Passengers

During one or two recent days "air expresses" arriving above the aerodrome when it is mist-enshrouded, the passengers, looking out of the windows, have seen a fine display of "fireworks." Rockets sent up from the 'drome, to indicate its location to the pilot, have been penetrating right through the bank of mist, and then exploding brilliantly in the clear atmosphere above.

Vice-Admiral Mark Kerr, veteran air enthusiast, has just been surprising us again. Going up in a dual-control "Avro," the other day, with Capt. Muir, the Admiral (who is now in his 59th year) astonished everyone by "looping" the machine most dexterously, after which he put it into a "spin," and got it out again in a manner which was masterly in its skill.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN NOVEMBER 19 AND NOVEMBER 25, INCLUSIVE

Route (including certain diverted journeys)	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m		
Croydon–Paris	14	33	5	11	13	2 40	H.P.W.8BG-EBBI (2h. 21m.)	B. (2), G. (6), H.P.W.8B (3), Sp. (2).
Paris–Croydon	13	46	5	13	12	2 55	H.P.W8B G-EBBI (2h. 32m.)	B. (2), G. (6), H.P.W.8B. (3), Sp. (1).
Croydon–Brussels–Cologne	4	9	4	—	4	4 18	D.H. 34 G-EBBV (3h. 54m.)	D.H. 18 (1), D.H. 34 (3).
Cologne–Brussels–Croydon	5	11	4	—	4	3 54	D.H. 18 G-EAWW (3h. 37m.)	D.H. 18 (2), D.H. 34 (3).
Croydon–Rotterdam ...	6	2	6	6	4	2 35	Fokker H-NABN (2h. 35m.)	F. (6).
Rotterdam–Croydon ...	6	10	6	6	6	2 47	Fokker H-NABI (2h. 40m.)	F. (6).
Manchester–Croydon–Amsterdam	6‡	22	—	1	6	5 29	D.H 34 G-EBBQ (5h. 29m.)	D.H. 34 (2).
Amsterdam–Croydon–Manchester	6§	5	5	—	5	6 30	D.H. 34 G-EBBY (6h. 23m.)	D.H. 34 (2).
Total for week ..	60	138	35	37	54			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Man.–Stg. Lane 1, Croy.–A'dam. 2, § A'dam.–Croy. 3, Croy.–Man. 1.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.)
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad.
Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes.

Incidental Flying.—Mr. Perry tested two Bristol Fighters and two Sopwith Snipes at Croydon for the Aircraft Disposal Co., and together with Mr. Piercey left for Dublin on the 24th, both on Bristol Fighters.

NOTICES TO AIRMEN

Standardisation of Terms Defining Visibility

1. The scale for the specification of visibility has been revised, and the plain language terms used in meteorological reports now have the significance shown in the following scale :—

Descriptive terms for visibility.	Description of fog intensity.	Objects not visible in daylight at a distance of :—	
Very bad	Very dense fog ..	25 metres or	27 yards
	Dense fog	50 ,,	55 ,,
	Thick fog	100 ,,	110 ,,
	Rather thick fog ..	200 ,,	220 ,,
	Fog	500 ,,	550 ,,
Bad ..	Moderate fog ..	1,000 ,,	1,100 ,,
Very poor	Mist or thick haze	2,000 ,,	1¼ miles.
Poor		4,000 ,,	2½ ,,
Moderate ..	Slight mist or haze	10,000 ,,	6¼ ,,
Good ..	—	20,000 ,,	12½ ,,
Very good ..	—	50,000 ,,	31¼ ,,
Excellent ..	—	Objects visible at 50 kilometres and beyond.	

2. An object is regarded as being visible if it can be distinguished by the eye, *e.g.*, if the object is a tree and it can be distinguished as a tree, it is considered to be visible.

3. The size of the objects selected for use with the scale given in paragraph 1 depends upon the distance; at 2 miles the object may be a tree or a house; at 10 miles it may be a tower or a large chimney stack, or a small wood, or an outstanding feature on a hill.

4. If the visibility is stated in yards or miles, the statement means that certain objects are visible at the stated distance.

5. At night, the descriptive terms will be used to denote as nearly as possible the same degree of atmospheric obscurity.

6. Notice to Airmen No. 82 of 1921 is cancelled.

(No. 128 of 1922.)

Norway : Prohibited Areas

1. The following is substituted for the first six lines of paragraph 3 of Notice to Airmen No. 70, of 1921 :—

> "No aircraft may fly over the following areas, or approach their borders within a distance of *five* kilometres, except along certain routes determined by the Ministry of Defence."

(No. 130 of 1922.)

British Aircraft Personnel : Visas

THE arrangements under which the operative members of the crews of British aircraft no longer require a visa when flying to certain countries, as notified in Notice to Airmen No. 110 of 1922, have been extended to include Spain.

(No. 132 of 1922.)

NOTICE TO GROUND ENGINEERS

W/T Installation and Earth System in Aircraft : Standard Requirements

1. THE attention of Ground Engineers licensed in Category E (10), Electrical Bonding, is directed to the Air Ministry standard requirements in respect of the W/T Installation and Earth System in aircraft.

2. Ground Engineers responsible for signing daily certificates of safety for aircraft in which W/T apparatus is installed may obtain copies of these requirements on application to the Secretary (D.C.A.), Air Ministry, London, W.C. 2.

(No. 12 of 1922.)

R.A.F. MEMORIAL FUND

A MEETING of the Executive Committee of the Fund was held on November 22. There were present Lord Hugh Cecil (Chairman), Dame Helen Gwynne-Vaughan, Mrs. Barrington-Kennett, Sir Charles McLeod, Air Vice-Marshal A. V. Vyvyan, Air Commodore H. R. M. Brooke-Popham, Air Commodore C. A. H. Longcroft, and Mr. H. E. Perrin.

The amount of grants sanctioned by the Grants Sub-Committee between the date of last meeting on October 18 and the present meeting, amounting in all to £456 3*s.* 3*d.*, was approved by the Committee.

The War Memorial was very fully discussed, and the Committee were assured by the Architect that the Memorial would be completed and ready for unveiling on any date subsequent to March 31 next year.

The wooden model, it was decided, should be sent to the care of the A.O.C., R.A.F. Cadet College, Cranwell, Sleaford, Lincs. The model is to be despatched to Cranwell early in December, it being in the meantime loaned to the Women's Royal Air Force Old Comrades' Association Christmas Fair and Carnival, which is being held with a view to raising funds for that Association at St. Peter's Hall, Lower Belgrave Street, Victoria, S.W., on the afternoon of December 2 next.

It was reported to the Committee that the full total of 25 boys had been practically reached at Vanbrugh Castle School.

The Air Ministry Musical and Dramatic Society (which is under the patronage of the Air Council) have very kindly offered to hand over to the Fund practically the whole of their profits from two entertainments—one being a performance of "Iolanthe," on Jan. 11, 12 and 13, 1923, and the second a performance of "The Schoolmistress" on March 15 and 16, 1923.

IN PARLIAMENT

The R.A.F. in Iraq.

CAPTAIN BERKELEY, on November 27, asked the Prime Minister whether the Royal Air Force, or any part of it, or any force of aircraft under the control of British authorities, is or has been engaged in enforcing or attempting to enforce upon any part of the population of the mandated territory of Iraq the payment of taxes, either by bomb-dropping or otherwise; if so, whether the British Government has concurred in the taking of such measures; if not, whether, under the existing constitution of that territory, it would be possible for such measures to be taken without the knowledge of the British Government; whether he is in a position to make a full statement upon the matter; and, if not, whether he will order a full enquiry and lay the results upon the Table of this House?

The Under-Secretary of State for the Colonies: There is no foundation for any suggestion that bomb-dropping or other offensive action by aircraft is resorted to in Iraq or any other area for the purpose of enforcing payment of taxes or in punishment for non-payment. The normal duties of aircraft in Iraq are those of patrol and communication. Offensive action is in no case undertaken except in reply to open and armed defiance of the administration or to attacks upon the native police forces of a kind which would otherwise necessitate expeditions by ground units. Such action, when undertaken, is under sole control of the British authorities, acting at the request of the Arab Government. In order to give every opportunity to the tribes concerned to submit to the Government, explicit warnings are habitually issued to them before any air action is taken, and these warnings even when they do not lead to immediate submission, enable the inhabitants to withdraw from the area selected. The result is that casualties have been few.

I am assured that the use of aircraft under these conditions has achieved results at least equal to those obtainable by ground expeditions and at a smaller toll of life and property. The reports received show that the number of cases in which the mere threat of air action is sufficient to bring about the desired result far exceeds the occasions where offensive air action is found to be actually necessary, and the High Commissioner reports that it is no exaggeration to say that air action amongst the Euphrates tribes has saved far more human lives than it has destroyed by restoring order and preventing inter-tribal fighting.

The Secretary of State is in communication with the High Commissioner on the whole subject, and as soon as full details have been received the matter will be exhaustively reviewed by His Majesty's Government.

Air Territorials

PLANS for the establishment of a Territorial Reserve to the Royal Air Force include the inauguration of instruction centres at Glasgow, Edgware, Bristol, Coventry, Weybridge, and Manchester. It is not proposed to construct new aerodromes or training workshops, but those already in existence, either as a part of the Royal Air Force itself or as Schools of Instruction in connection with an established firm, will be used. The instruction will be such as will make the Force as efficient as possible. In addition to members having compulsorily to attend for training at specified centres for certain definite periods annually, it is hoped to arrange for pilots and observers to fly during week-ends or other such times as they may be able to. This will enable them not to lose their flying touch. A large number of officers and men have already stated their desire to join this Force.

Wound Stripes and Silver War Badges

HIS MAJESTY THE KING having signified his approval, it is notified that the wearing on uniform of wound stripes and silver war badges is to be discontinued.

Note.—The wearing of chevrons in the R.A.F. was discontinued in July, 1920.

THE ROYAL AIR FORCE

London Gazette, November 14, 1922

General Duties Branch

Sqdn.-Ldr. E. W. Norton, D.S.C., is granted perm. commn., retaining present substantive rank and seny.; Aug. 1, 1919 (*Gazette* June 8, 1920, appointing him to a short service commn., is cancelled.

The follg. are granted perm. commns., with effect from the dates indicated, retaining present substantive ranks and seny., except where otherwise stated (*Gazettes* of those dates, appointing these officers to short service commns., are cancelled) :—

Flight-Lieutenants.—T. E. B. Howe, A.F.C., W. H. Mackenzie, A.F.C., R. L. Stevenson, M.B.E.; Oct. 24, 1919.

Flying Officers.—L. C. Wynne-Tyson; Sept. 12, 1919. D. V. Carnegie, A.F.C. (since promoted); Oct. 24, 1919.

The follg. are granted perm. commns., with effect from the dates indicated, retaining present substantive ranks and seny. (*Gazettes* of dates indicated in brackets, appointing these officers to short service commns., are cancelled):—

Flying Officers.—S. Graham, M.C., Oct. 24, 1919 (Oct. 24, 1919, and Aug. 26, 1921). S. E. Adams, Jan. 31, 1921 (March 1, 1921, and May 3, 1921), (since promoted).

The follg. are granted short service commns. in ranks stated, with effect from, and with seny. of, dates indicated :—

Flying Officers.—H. A. Anson; Nov. 3. R. F. Overbury; Nov. 2.

Pilot Officer on Probation.—F. R. Lines; Nov. 1.

The follg. are granted temp. commns. as Flying Offrs., on seconding for four years' duty with R.A.F. : —Lieut. H. A. Crommelin, D. of Wellington's Regt.; Nov. 6. Sec. Lieut. H. P. F. Fagan, Somerset L.I.; Oct. 31. Flight-Lieut. J. L. L. Duffus relinquishes his short service commn. on account of ill-health contracted in the Service, and is permitted to retain rank of Capt.; Oct. 24 (*Gazette* Oct. 24, transferring this officer to Reserve, is cancelled). Flight-Lieut. E. A. E. Wood relinquishes his short service commn. on account of ill-health contracted in the Service, and is permitted to retain rank of Capt.; Nov. 15. Sqdn.-Ldr. (hon. Wing-Comdr.) S. J. Goble, D.S.O., O.B.E., D.S.C., resigns his permanent commn. on appt. to Royal Australian Air Force; March 31, 1921.

Stores Branch

Flying Offr. H. G. Jones is granted permanent commn. as Flight-Lieut. for accountant duties; June 17. His name will be placed on gradation list immediately follg. that of Flight-Lieut. A. W. P. Phillips, O.B.E. Flight-Lieut. E. N. E. Waldron is transferred to Stores Branch for accountant duties from General Duties Branch; May 22. His name will be placed on gradation list immediately follg. that of Flight-Lieut. J. L. Robertson.

Medical Branch

J. G. Russell, M.B., B.A., is granted short service commn. as Flying Offr., with effect from, and seny. of, Oct. 30. Flying Offr. J. Prendergast to be Flight-Lieut.; Nov. 14.

Nursing Service

The follg. ladies are confirmed in their appts. as Staff Nurses, with effect from dates indicated :—Miss G. Rees Jones; April 15. Miss A. B. O'Niell; June 1. Miss E. Spensley, Miss B. Rutledge; June 9. Miss A. M. Angus; June 15. Miss P. K. Pearce, Miss C. C. Kirkpatrick; July 3.

Memoranda

Maj. A. W. Northover, M.C., R.A.R.O., R.E., is granted temp. commn. as Sqdn.-Ldr. for duty under Directorate of Works and Buildings; Nov. 6. Flying Offr. H. G. Jones relinquishes actg. rank of Sqdn.-Ldr.; June 17.

London Gazette, November 17, 1922

General Duties Branch

Flt. Lieut. A. G. Taylor, A.F.C., to take rank and precedence below Flt. Lieut. W. A. Skeat; Oct. 26. Flyg. Offr. H. C. Peirce is transfd. to Reserve, Class C; Sept. 12 (correction). *Gazette*, Nov. 14, concerning Flyg. Offr. L. C. Wynne-Tyson is cancelled; Oct. 10, 1922, stands.

Memorandum

The permission granted to 2nd Lieut. D. K. Falkner to retain his rank is withdrawn on his joining T.A.

London Gazette, November 21, 1922

General Duties Branch

The following are granted permanent commns. as Pilot Offrs. with effect from Nov. 1, and with seny. of the dates indicated :—W. C. P. Bullock; Nov. 1, 1921. N. C. O. Forbes; Nov. 1, 1921. E. S. Burns; May 1, 1921. A. E. Scroggs; May 1, 1921.

The following are granted permanent commns., retaining present substantive rank and seny. (Aug. 31) :—Flt. Lieut. W. Helmore, Flyg. Offr. C. W. Busk, M.C. The following are granted permanent commns. as Flyg. Offrs., retaining present substantive ranks and seny. (since promoted). *Gazettes* of dates indicated in brackets, appointing these officers to short-service commns. are cancelled :—J. Duminy; Dec. 5, 1919 (Dec. 5, 1919). The Hon. J. H. B. Rodney, M.C.; Oct. 4, 1921 (Oct. 11, 1921).

The following are granted short-service commns. as Flyg. Offrs., with effect from, and with seny. of, dates indicated :—R. H. Horniman; Nov. 9. S. D. Scott; Nov. 8. H. M. Stringer; Nov. 8. F. A. Swoffer, M.B.E.; Nov. 14. E. J. H. Wright; Nov. 13.

Wing Commdr. F. E. T. Hewlett, D.S.O., O.B.E., is placed on half-pay, Scale A; Nov. 14. Flying Offr. L. W. Lowen is transfd. to Reserve, Class A; Nov. 15. Flyg. Offr. E. G. King is transfd. to Reserve, Class B; Nov. 22. Flyg. Offr. G. E. Randall, D.F.C., resigns his permanent commn.; Nov. 23.

Nursing Service

Miss Constance Abigal Marr resigns her appt. as Staff Nurse; Nov. 10.

London Gazette, November 24, 1922

General Duties Branch

Observer Offr. John Bertram Prouse is placed on retired list on account of ill-health contracted on active service; Nov. 25.

Memorandum

Hon. Sec. Lieut. Arthur Stuart Darlow relinquishes his hon. commission on joining the Army.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

Group-Captains: F. V. Holt, C.M.G., D.S.O., to R.A.F. Depot (Inland Area) (Supernumerary) pending disposal; on cessation of secondment for duty, with the Chinese Government. 1.9.22. C. S. Burnett, C.B.E., D.S.O., from R.A.F. Base, Leuchars (Coastal Area), to R.A.F. Depot (Inland Area). 1.12.22.

Wing-Commanders: A. V. Bettington, C.M.G., from Headquarters, No. 12 Wing, Ireland, to R.A.F. Depot (Inland Area) (Supernumerary). 11.10.22. F. E. T. Hewlett, D.S.O., O.B.E., from R.A.F. Depot (Inland Area), to Half-pay List. 14.11.22. P. H. L. Playfair, M.C., from No. 1 Flying Training School (Inland Area) to command R.A.F. Base, Leuchars (Coastal Area). 15.11.22.

Squadron-Leaders: F. Sowrey, D.S.O., M.C., A.F.C., from No. 100 Squadron (Inland Area) to Basrah Group Headquarters (Iraq Command). 3.11.22. C. C. Miles, M.C., from Central Flying School (Inland Area) to Half-pay List. 10.11.22. F. C. Jobson, from R.A.F. Depot (Inland Area), to Headquarters, Inland Area (Inland Area). 3.11.22. A. S. Glynn, M.B., from Headquarters (Inland Area) to R.A.F. Depot (Inland Area) (Supernumerary). 3.11.22. (Acting Group Captain) H. C. Ellis, C.B.E., from R.A.F. Depot (Inland Area) to Command Accounts Office (Palestine Command) on ceasing to be attached to Air Ministry. 11.8.22. Substituted for the previous notification which appeared in Intelligence Bulletin No. 76, dated 29.8.22, wherein this Officer was posted from R.A.F. Depot to Palestine Wing Headquarters, with effect from 11.8.22. W. Sowrey, D.F.C., A.F.C., from R.A.F. Depot (Inland Area) to No. 1 Flying Training School (Inland Area). 30.10.22. Substituted for the previous notification which appeared in Intelligence Bulletin No 84, dated 1.11.22. The notification concerning this Officer which appeared in Intelligence Bulletin No. 85, dated 7.11.22, is hereby cancelled. I. T. Lloyd from No. 2 Flying Training School (Inland Area) to command No. 56 Squadron (Inland Area). 15.11.22. H. I. Hanmer, D.F.C., from R.A.F. Depot (Inland Area) to No. 2 Flying Training School (Inland Area). 10.11.22.

Flight-Lieutenants: L. E. Taylor, M.B.E., from Seaplane Training School (Coastal Area) to Electrical and Wireless School (Inland Area). 1.11.22. A. Jukes, M.B.E., from Irish Stores and Repair Unit (No. 12 Wing, Ireland) to R.A.F. Depot (Inland Area) (Supernumerary). 12.8.22. W. F. Wilson, M.C., M.B. from No. 60 Squadron (India) to No. 28 Squadron (India). 9.10.22. A. Briscoe, M.B., from No. 28 Squadron (India) to Headquarters, Iraq Command (Supernumerary). 15.10.22. R. Hutton, to Basrah Group Headquarters (Iraq Command), on appointment to short service Commn.; for duty as Officer in charge Inland Water Transport. 1.10.22. H. G. Jones, from No. 4 Stores Depot to School of Photography (Inland Area) (Supernumerary). 24.9.22. T. L. P. Harries, M.B., from R.A.F. Depot (Inland Area) to R.A.F. Hospital, Cranwell. 8.11.22. A. W. C. V. Parr, from No. 1 Flying Training School (Inland Area) to Central Flying School (Inland Area). 8.11.22. E. N. H. Gray, D.P.H., from No. 27 Squadron (India) to No. 31 Squadron (India). 11.10.22. H. W. G. Jones, from No. 28 Squadron (India) to R.A.F. Depot (Inland Area) (Supernumerary). 19.10.22. J. A. G. Haslam, M.C., D.F.C., from No. 7 Group Headquarters (Inland Area) to School of Army Co-operation (Inland Area). 16.11.22. R. S. Topham, M.B., D.P.H., from No. 31 Squadron (India) to R.A.F. Depot (Inland Area). (Supernumerary.) 17.10.22. (Acting Squadron Leader) W. B. Johnstone. The name of this Officer is as now stated, not "Johnston," as described in R.A.F. Intelligence No. 86, dated 9.11.22.

Captain (*Temporary Major*) S. C. R. Crawford, O.B.E. (5th Battalion East Surrey Regt.) (T.A.), Headquarters, Iraq Command. For duty as Deputy Judge Advocate-General (Class BB). On attachment to R.A.F.

PERSONALS

Married

Charles Menten Benjamin, late R.A.F., younger son of Mr. and Mrs. H. N. Benjamin, of 14, Cadogan Square, S.W. 1, was married on November 16, to Maragret (Peggy) youngest daughter of Mrs. and Dr. Wm. Creser, of the Trinity College of Music.

To be Married

A marriage has been arranged, and will shortly take place, between Lieut.-Col. Cuthbert Euan Charles Rabagliati, M.C., A.F.C., Chevalier de la Légion d'Honneur, late K.O.Y.L.I. and R.F.C., and Clarissa Catherine de Hochepied-Larpent, only daughter of the late John Melvill, ninth Baron de Hochepied, and the Baroness de Hochepied.

The engagement is announced between Captain P. E. M. Le Gallais, A.F.C., the Royal Sussex Regt., eldest son of the late Colonel Mark Le Gallais and Mrs. Le Gallais, of Broadlands, Jersey, and Margaret Cecilia, only daughter of Mr. and Mrs. Henry J. Beebe, of Springfield, Massachusetts, U.S.A.

CORRESPONDENCE

[*The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.*]

FLYING IN SWEDEN

[**2066**] In connection with the reference in this week's issue to the forthcoming I.L.U.G. I should like to say that having been a flyer for 2½ years in Sweden, knowing the country thoroughly and speaking the language, and knowing the air route *via* Rotterdam and Kopenhagen, I shall be very glad to give advice or assistance and introduction to prominent people in Göteborg to anyone who is interested in the scheme, some of the conditions to be met with being certainly peculiar.

C. H. R. JOHNSTON, Major

* * *

PUBLICATIONS RECEIVED

Direction and Position Finding by Wireless. By R. Keen, B.Eng., A.M.I.E.E. London: The Wireless Press, Ltd. Price 9*s.*

Stamps of the Flying Post. By W. E. Hughes. Alan Turton, 32, Great St. Helens, London, E.C. 3. Price 1*s.* net (by post, 1*s.* 2*d.*).

Shall the State Throw Away the Keys? An Exposition of what Fine Chemicals mean to the Nation. The Association of British Chemical Manufacturers, 166, Piccadilly, London, W. 1.

First-Aid X-Ray Atlas of Fractures and Dislocations. By H. C. Orrin. London: Balliere, Tindall and Cox, 8, Henrietta Street, Covent Garden, W.C. 2.

The Motor Manual. London: The Temple Press, Ltd. Price 2*s.* 6*d.* net.

How to Form a Company. By Herbert W. Jordan. London: Jordan and Sons, Ltd., Chancery Lane, W.C. 2. Price 1*s.* 6*d.* net, by post 1*s.* 9*d.*

Toy and Model Designs. Evans Brothers, Ltd., Montague House, Russell Square, W.C 1. Price 2*s.* 6*d.* net.

Medical Notes in Connection with Commercial Aircraft. C.A. Publication 3. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 9*d.* net.

Etude sur le Ballon Captif et les Aéronefs Marins. By Commandant Charles Lafon. Paris: Gauthier-Villars et Cie., Quai des Grands-Augustins, 55. Price 20 fr.

Report on Commercial Conditions in the Dominion of New Zealand, to July, 1922. By R. W. Dalton. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 1*s.* 9*d.* net; by post 1*s.* 10½*d.*

Aeronautical Research Committee, Reports and Memoranda:

No. 774 (*Ae.* 34). *Biplane Investigation with R.A.F.* 15 *Section.* By W. L. Cowley, A.R.C.Sc., and C. N. H. Lock, M.A. September, 1921. London: H.M. Stationery Office, Kingsway, W.C. Price 1*s.* net.

No. 787 (*Ae.* 44). Lateral Control of Bristol Fighter at Low Speeds. By F. B. Bradfield. January, 1921. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 1*s.* 6*d.* net. By post 1*s.* 7*d.*

Technical Notes; No. 107. *Structural Safety during Curved Flight.* By Dr. A. Rohrbach. *No.* 108. *The Use of Multiplied Pressures for Automatic Altitude Adjustments.* By Stanwood W. Sparrow. *No.* 109. *The Twisted Wing with Elliptic Plan Form.* By Max M. Munk. *No.* 110. *The Effect on Rudder Control of Slip-Stream Body, and Ground Interference.* By H. I. Hoot and D. L. Bacon. *No.* 111. *Stresses produced on an Airship Flying Through Gusty Air.* By Max M. Munk. *No.* 113. *Report on the General Design of Commercial Aircraft.* By E. P. Warner. *No.* 114. *Supplementary Report of Oil-Scraper Piston Rings.* By H. S. McDewell. National Advisory Committee for Aeronautics, Washington, D.C.

Reports; No. 128. *Aeronautic Instruments: Section IV, Direction Instruments. No.* 141. *Experimental Research on Air Propellers—V.* By W. F. Durand and E. P. Lesley. *No.* 146. *The Six-Component Wind Balance.* By A. F. Zahm. *No.* 148. *The Pressure Distribution over the Horizontal Tail Surface of an Airplane—III.* By F. H. Norton and W. G. Brown. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

Catalogue.

S.K.F. Ball and Roller Bearings. The Skefko Ball Bearing Co., Ltd., Luton, Beds.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

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DR. HANKIN'S lecture on "The Evolution of Animal Flight" was given before a large number of members and visitors. Mr. F. de P. Green, who occupied the Chair, proposed a hearty vote of thanks, which was enthusiastically passed.

On Friday next Messrs. Rippon and Burchell will continue the debate on "Large Models *v.* Small Models."

On Friday, December 8, a smoking concert will be given.

On Friday, December 15, a lecture will be given by Mr. W. E. Evans, whose subject will be "Some Points on Wood." All interested in the subject are invited to attend.

The Secretary of the Paddington Aero Club (affiliated to S.M.A.E.) reports as follows:—Gliding at Sudbury, Saturday. Present: Messrs. Dixon, Evans, Green and Levy. All had gliders out. Mr. Green obtained several good glides of about 20 secs., the best being 23 secs. Mr. Levy's attempt on record was unsuccessful, but he put up many excellent glides of more than 35 secs., his best attempts being 38, 38⅘ and 39 secs. These glides were timed by Messrs. Evans and Green.

Mr. F. de P. Green reports from Wimbledon on Sunday last as follows:—"Several members assembled on Wimbledon Common this morning, but the official observers, Messrs. Houlberg and Hersom, had an easy but somewhat cold time of it in watching several attempts made to tackle the stiff wind which was blowing at the time. Mr. D. A. Pavely made plucky attempts with his big C.A. monoplane, which, after a fairly good flight, alighted rather badly with slight injury. Mr. H. C. Hersom made several flights, but damaged both his machines. Mr. F. de P. Green got off with his originally designed "Farman Tandem Multiplane" (twin screw), which made two short but rather uneasy flights, landing, however, in each case quite safely. Several attempts with gliders were made by Messrs. Rippon, Levy and Johnson, but the weather conditions prevailing rendered any serious attempt quite impracticable.

Meetings are held at Headquarters, "The Red Lion Hotel," 20, Great Windmill Street, Piccadilly, W. 1, every Friday at 7.30 p.m.

A. E. JONES.
Hon. Sec.

* * *

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(*Continued from* p. xiv.)

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Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.
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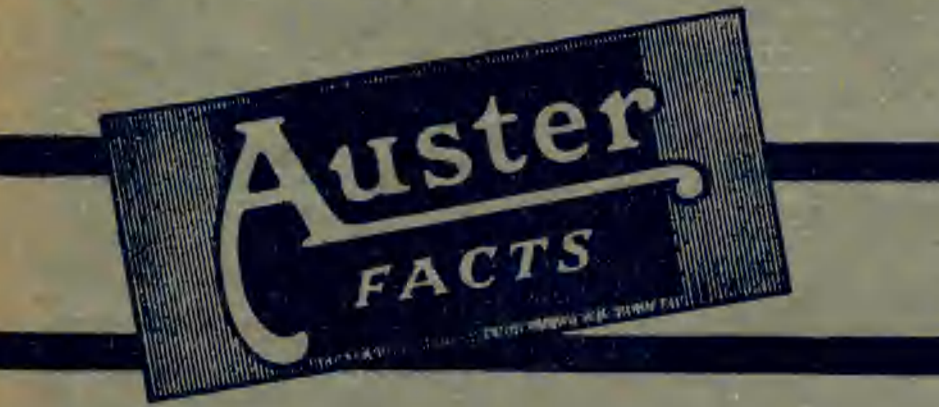

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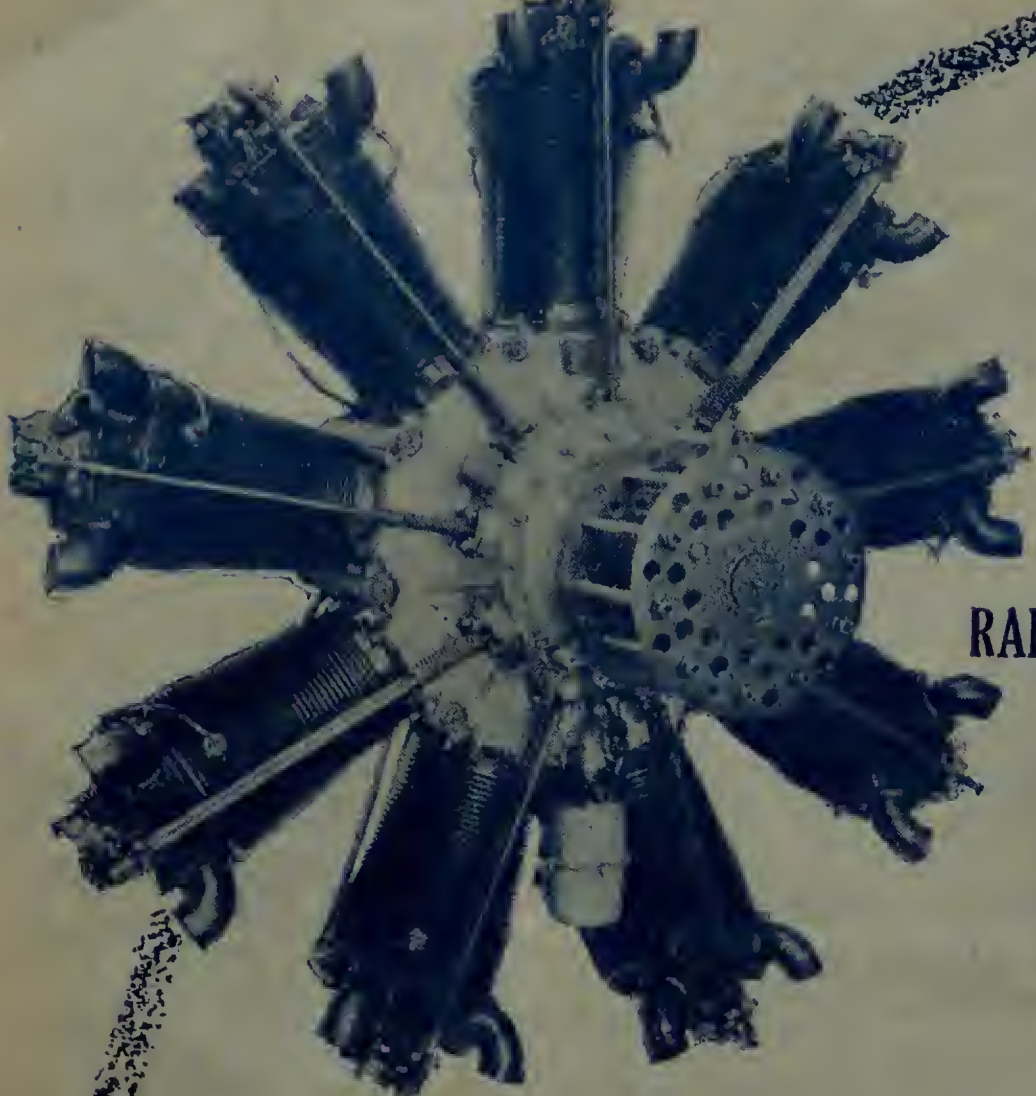

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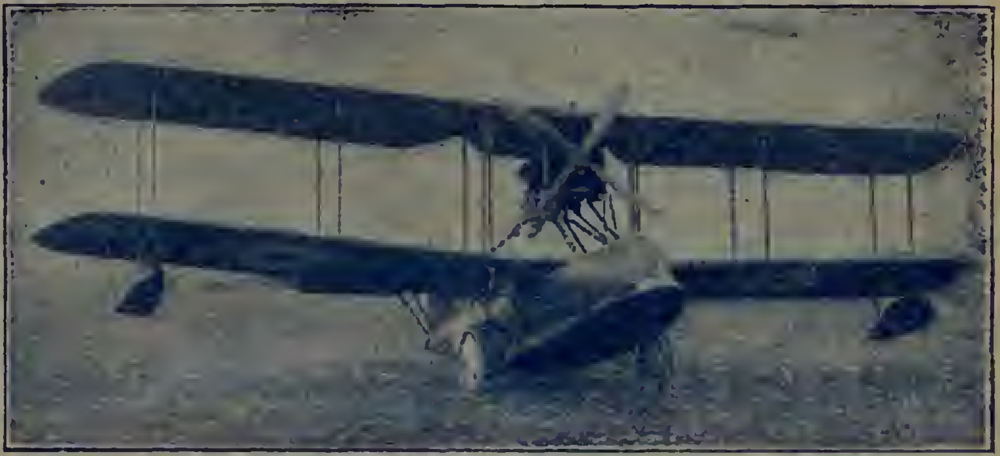

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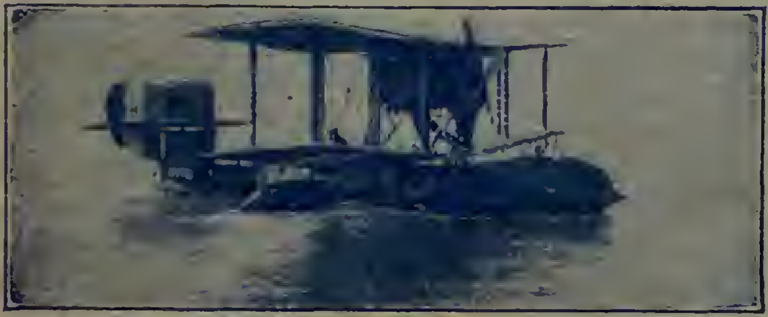

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Society of Model Aeronautical Engineers 722

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Dec. 15	**Lecture, "Experimental Data without Wind Channel," by O. T. Gnosspelius, before I.Ae.E.**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
Jan. 3	**F.A.I. Paris Conference**
Jan. 12	**Lecture, "Seaplane for Commercial Duties," by Maj. D. C. M. Hume, before I.Ae.E.**
Jan. 26	**Lecture, "Wind Tunnel Work at the N.P.L.," by W. L. Cowley, before I.Ae.E.**
Feb. 9	**Lecture, "Seaplane Design," by W. O. Manning, before I.Ae.E.**
Feb. 23	**Lecture, "Aerofoils," by Dr. A. P. Thurston, before I.Ae.E.**
Mar. 15	**Entries close for Dutch Height Indicator Competition.**
Apl. 12	**Lecture, "Some Controversial Points in Aircraft Design, by F. T. Hill, before I.Ae.E.**
May 11	**Lecture, "Experimental Flying," by Maj. M. E. A. Wright, before I.Ae.E.**
June	**International Air Congress, London**
Dec. 1	**Entries close for French Aero Engine Competition.**

EDITORIAL COMMENT

SHOULD the Civil Aviation Subsidy be spent on passenger-carrying machines, or on the air transport of newspapers? This is a question which has been given a good deal of publicity lately, as a result, it appears, of the re-arrangement of the subsidy scheme, by which only one British firm is subsidised on the London-Paris air route. It is argued that statistics show that out of the total number of passengers carried by the British lines three-fourths or so are foreigners, and that therefore the system of paying, out of the tax-payers' pocket, subsidies which are chiefly spent in providing foreigners with "joy-rides," is a sheer waste of money. At present the early morning newspaper service from Lympne to Paris is carried out by a French firm, subsidised by the French Government.

Newspapers by Air

On the face of it, this state of affairs certainly does appear to indicate that there is something radically wrong somewhere. We rather think, however, that the root of the trouble lies deeper, and may have been overlooked by those who are advocating that the subsidy should be devoted to the newspaper service. It is not, to our mind, a question of passenger or newspaper service, but of why London–Paris at all. The real difficulty of the whole position is this—that the London–Paris route is not suitable for an air service established on commercial lines. The route is, as we have repeatedly pointed out in these columns, already so well served by train and boat that aircraft, in order to compete in point of time sufficiently to effect any great saving, must be of fairly fast type. This means high power expenditure per passenger carried, which, with other things, again means uneconomical operation. Add to this the fact that passenger machines have to have large cabins, equipped with comfortable seats, with heating apparatus, with wireless, and with a dozen other things which together form so much dead weight to be carried, detracting from the paying load of the machine.

Thus, without going into great detail, it will easily be realised that fundamentally the passenger machine is considerably handicapped, and that if it is to be kept operating it is likely to require a subsidy. The French are running passenger services on the London–Paris route, and while they are doing so we must do the same. That we can only do, at the present moment, by some form of subsidy, nor is it likely that it will be possible, within the near future, to operate this route without a subsidy. So far as we can see, the only real reason for maintaining the London–Paris route at all is that the French are running services—subsidised services—over it. It does not appear to be a route leading to anywhere in particular, as far as all-British services are concerned. It was originally to be regarded as a sort of full-scale laboratory in which we could learn a good deal about the running of civilian air lines. But it is extremely doubtful whether the last couple of years have taught us anything that we did not know at the end of 1920, for instance. There is one thing to be said for the new subsidy arrangement: Instead of spending all the subsidy money on the London–Paris route we are now only spending a portion of it, the rest being allocated to the firms operating the London–Cologne and London–Amsterdam (Berlin) lines.

Now for the other side of the picture. A newspaper service is undoubtedly of the very greatest value to the country. But a newspaper air service can, and should, be run with machines totally different from those required for passenger work. There is no elaborate passenger cabin to equip, no seats to run away with paying load, no need for two pilots, possibly no need for wireless equipment, and finally the fuselage of such a machine need not be very large, the newspaper load occupying very small space in proportion to its weight. All this means that a machine specially built for the work would be vastly more economical to run, cheaper in first cost and insurance, and more of a commercial proposition all round than the passenger machine. In fact, it seems to us that, with a properly designed machine it should be possible—assuming that the load of close upon 2,000 lbs. per day could be counted upon—to run a newspaper service without any subsidy, other than that already provided indirectly by the existing ground organisation.

It would, therefore, appear that to take away the subsidy from the passenger line and give it to a newspaper air service on the London–Paris route would not result in a better spending of the taxpayers' money, and that the real solution is to get away, as soon as it is possible, from the London–Paris route altogether, at any rate if there is no prospect of extending it beyond Paris. If it can, some day, be made a stage of a route linking us up with the East, it is altogether a different matter.

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Rules for Selfridge Gliding Competition

The regulations governing the gliding competition for the 1,000 guinea prize offered by Messrs. Selfridge and Co. have now been published, and will be found elsewhere in this issue. The competition is, it will be remembered, for the first flight in a straight line of a distance of 50 miles. That this feat will be difficult to accomplish goes without saying. But so appeared the *Daily Mail* competition at Itford, and yet the minimum time stipulated was exceeded on the first day of the competition. We should, therefore, hesitate to say that the Selfridge prize will not be won next year, although it is infinitely more difficult than was the previous competition.

The regulations have been drawn up with the utmost regard for the convenience of competitors, any district in the British Isles being available, the only expenses to which competitors will be put being the entrance fee of £5 and the expenses of the official observers. Even so, in order to reduce expenses, the Royal Aero Club is arranging to appoint official observers resident in the various districts that are likely to be chosen, and except in a very few cases no competitor should, therefore, need to pay any very heavy charges.

We are satisfied that the regulations will be accepted as sensible and fair by all who are contemplating taking part in the competition, and the Gliding Committee of the R.Ae.C. is to be congratulated on the very common-sense spirit in which it has set to work. It will now rest with competitors to show the world that we are not behind in this form of aviation, and certainly nobody could accuse the Royal Aero Club of having placed any avoidable obstacle in their way.

One drawback to a competition of this sort is that the public will not be greatly attracted by the performances. Most of the practice flights, and probably also the majority of the competition flights, will be made without the general public being aware of them until they are over, and even then it is likely that the mere statement that so-and-so has flown 10 miles will not arouse a great deal of general interest. It is possible, however, that if several flights are made within a short period, one slightly longer than the previous one, the interest will be stimulated.

From the point of view of technical interest the competition should be of value in teaching us a very great deal about air currents and how to make use of them, and aerodynamic efficiency will play a far greater part than it did at Itford.

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FLIGHT Glider Designing Competition

The response to the designing competition instituted by the proprietors of FLIGHT has been very gratifying. A great number of designs have been sent in, and elsewhere in this issue we publish a brief reference to some of the more promising designs submitted. The judging will naturally take considerable time, and it is doubtful whether the announcement of the winners can be made until early in the new year. In the meantime we thank all those who have put so much work into their designs, and assure them that, had conditions justified us, we should have remunerated them on a scale more commensurate with the value of the work. As it is, we would ask competitors to consider themselves rewarded, to some extent, by the fact that they have, with ourselves, helped to make progress in the latest form of flying. We hope to publish several of the designs, in addition to the winning ones, in forthcoming issues of FLIGHT.

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Prince of Wales—New Appointment

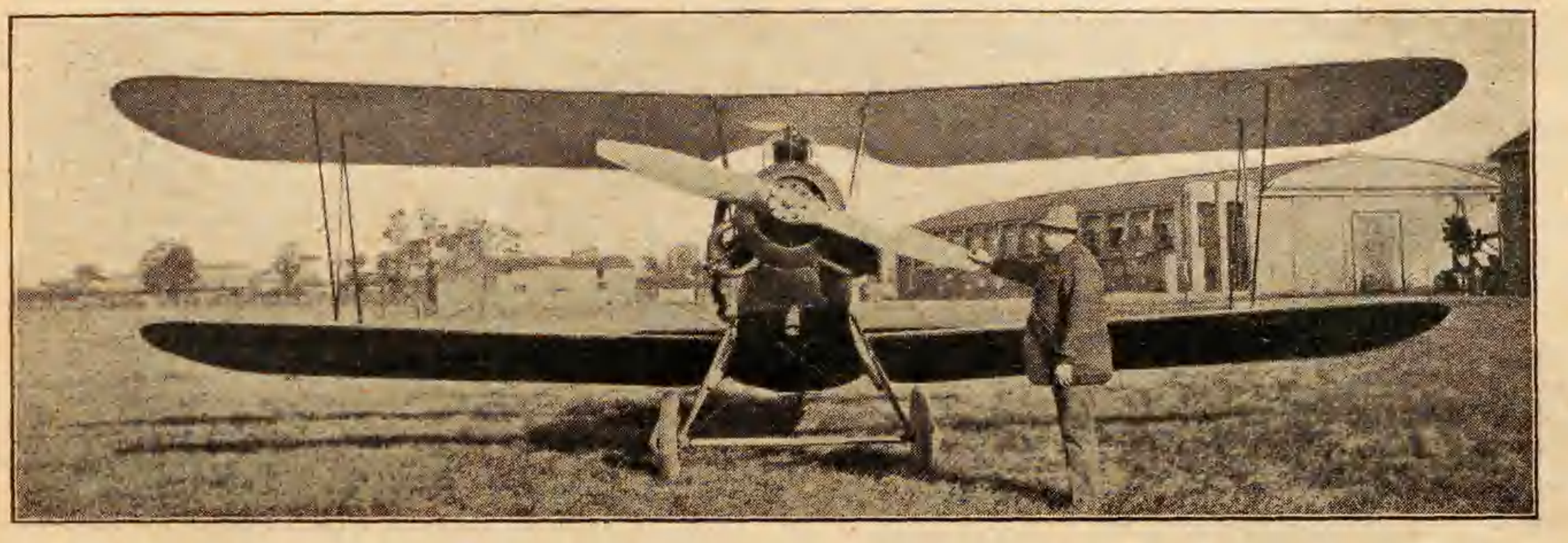
HIS Majesty the King has been pleased to approve the following appointment:—

His Royal Highness Edward Albert Christian George Andrew Patrick David, Prince of Wales and Duke of Cornwall, K.G., K.T., G.C.S.I., G.C.M.G., G.C.I.E., G.C.V.O., G.B.E., M.C., to be a Group Captain in the Royal Air Force.

THE "BRISTOL" THREE-SEATER, 100 H.P. BRISTOL LUCIFER ENGINE

A Machine for the Owner-Pilot

Simplicity of construction and a minimum of parts subject to wear are the special features of the new "Bristol" three-seater biplane which has just been produced by the Bristol Aeroplane Company, Ltd., of Filton, Bristol. In getting out the design of this machine, Mr. Reid, chief designer to the firm, endeavoured constantly to keep in mind the fact that, as the machine was intended for the owner-pilot, it was essential that everything which was likely to require attention should be as simple as possible, and that the number of parts that were at all likely to wear out should be reduced to an absolute minimum. Besides these desiderata, any such machine should, it was thought, be capable of carrying two passengers in addition to the pilot, and should be able to do so with the lowest horse-power consistent with a reasonably good performance. The outcome was the new Bristol three-seater, and in the following notes and illustrations we shall attempt to show the manner in which the designer attacked the problems he had set himself.



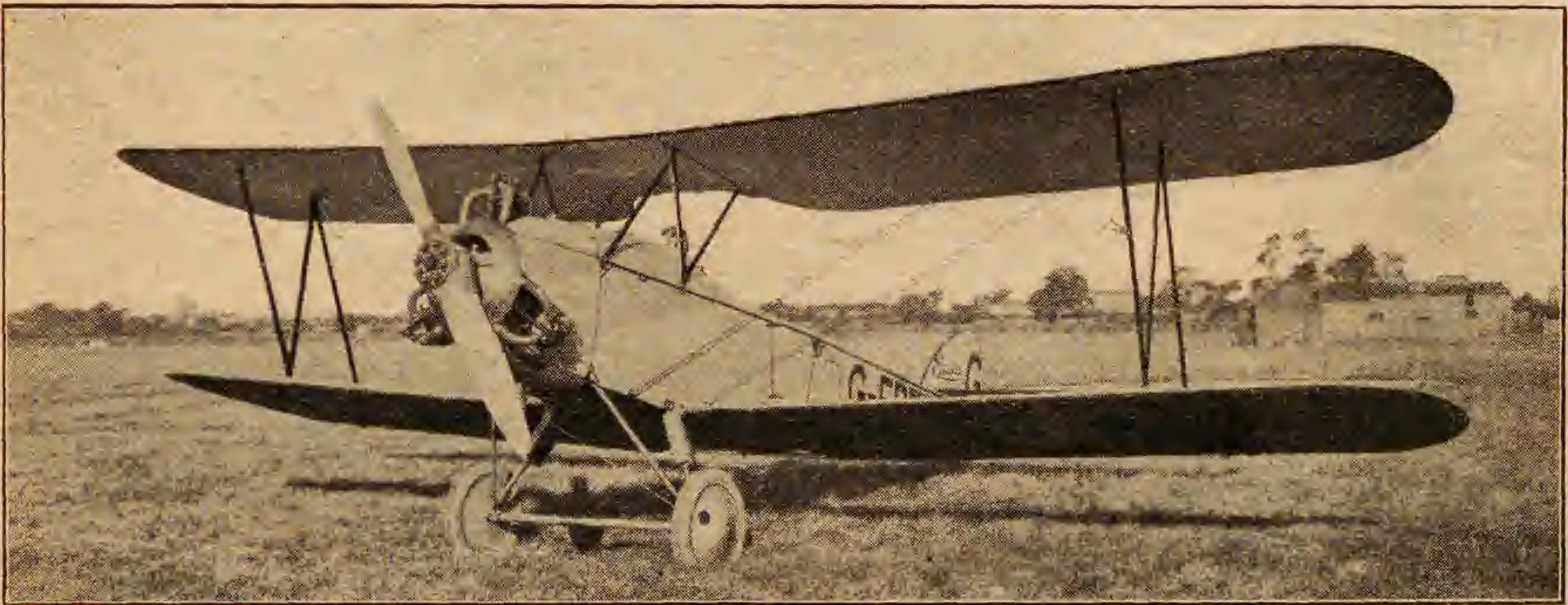
THE "BRISTOL" THREE-SEATER : Front view. The man standing in front gives a good idea of the size of the machine.

Power Plant

As regards power plant, the Bristol Aeroplane Co. already had available, in the 100 h.p. "Lucifer," an engine which, for its power, probably works with a minimum of parts. With but three sets of valves and plugs to look after, this engine should require a minimum of attention, and as, furthermore, it is so mounted that it can be swung out, away from the *fuselage* so as to give access to the back of the engine, the work of looking after the power plant should be no more than that of looking after the average motor-car engine. By mounting the petrol tank in the deck fairing of the *fuselage* it has been possible to provide direct gravity feed, and all the complications of petrol pumps, cocks and piping have been avoided.

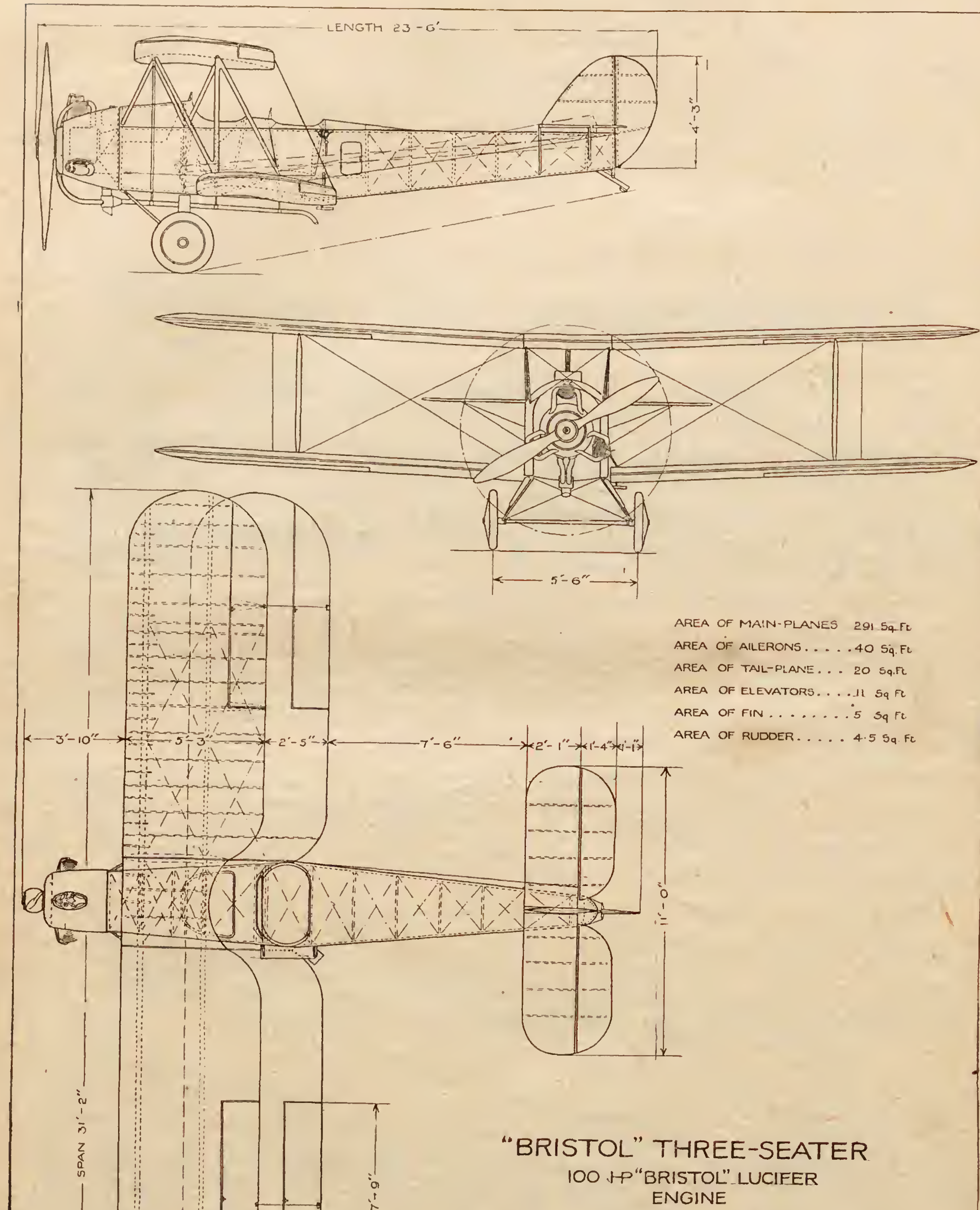
The 100 h.p. "Lucifer" engine is mounted on an engine plate of sheet steel, having four feet which terminate in lugs registering with, and being housed in, corresponding sockets on the front end of the *fuselage longerons*. The hinges are formed on the two port sockets, while locking pins are provided on the starboard side. All that is necessary in order to swing out the engine is to remove the two pins on the starboard side, and the engine with its cowling, etc., is free to pivot on the hinges on the opposite side.

As the petrol and oil pipes are flexible, and are so arranged as to allow the engine to be swung right out without requiring disconnecting, it is possible to get at the back of the engine, with its magnetos, carburettor, etc., without interfering with any adjustments whatever. The engine controls also are so arranged that they are not interfered with in any way by swinging out the engine. One of our photographs shows the engine partly swung out, and it will be seen that the exhaust pipe on the starboard side has a loose-fitting joint in front, the short elbow piece from the exhaust collector moving out with the engine, while the long exhaust pipe itself remains in place on the *fuselage*.



THE "BRISTOL" THREE-SEATER : Three-quarter front view.

The exhaust collector is in the form of a ring, into which the exhaust gases from all three cylinders are carried by two short pipes from each cylinder. This arrangement makes quite a neat job, and has the advantage that the exhaust collector itself forms the front portion of the engine cowling. The oil tank is carried on the fireproof steel bulkhead behind the


LENGTH 23 - 6'
4'-3"
5'-6"
AREA OF MAIN-PLANES 291 Sq. Ft.
AREA OF AILERONS . . . . . 40 Sq. Ft.
AREA OF TAIL-PLANE . . . 20 Sq. Ft.
AREA OF ELEVATORS . . . . 11 Sq. Ft.
AREA OF FIN . . . . 5 Sq. Ft.
AREA OF RUDDER . . . . . 4·5 Sq. Ft.
3'-10"
5'-3"
2'-5"
7'-6"
2'-1"
1'-4"
1'-1"
11'-0"
SPAN 31'-2"
7'-9"
"BRISTOL" THREE-SEATER
100 HP "BRISTOL" LUCIFER
ENGINE
Metres
0
5
1·5
0
1
2
3
4
5
6
Feet

THE "BRISTOL" THREE-SEATER: Plan, front and side elevations, to scale.

engine, while the petrol tank is mounted under the deck fairing, behind the fireproof bulkhead, the petrol connections and engine controls passing through fireproof glands.

In the matter of engine controls great attention has also been paid to simplicity. Thus the throttle and spark advance are connected up so that opening the throttle automatically advances the ignition. Similarly, in the case of the petrol and oil cocks, these are operated by the same movement, this arrangement having the advantage that the pilot cannot accidentally start off without turning on the oil.

General Design

As regards the machine itself, the lines will be clear from the accompanying scale drawings and photographs. It is a heavily-staggered biplane, with only one pair of inter-plane struts on each side. The *fuselage* is fairly wide in proportion to its depth, and the two passengers are seated side-by-side in a cockpit aft of the pilot's. The latter, owing to the heavy stagger and the small obstruction formed by the " Lucifer " engine, has a particularly good view forward and downwards, while the close proximity of the two cockpits makes it possible for the passengers to carry on conversation with the pilot.

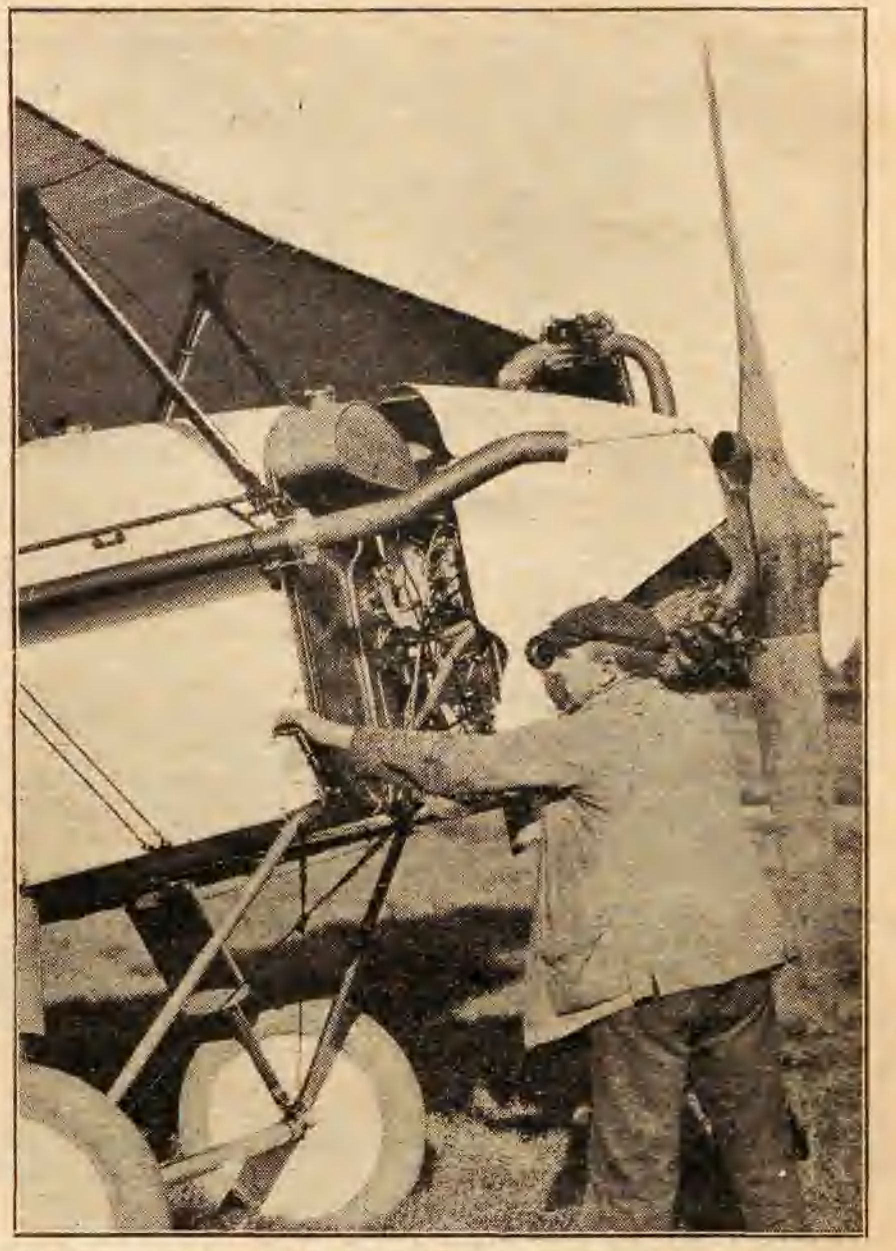
The Fuselage

Fundamentally the construction of the *fuselage* is the usual, with four ash *longerons*, spruce struts, and steel wire bracing. The *fuselage* fittings are of very simple type, consisting, as shown in one of our sketches, of a simple plate passed outside the *longeron*, the fitting being located by the eye bolt of the transverse bracing. This eye bolt passes through the *longeron* from corner to corner, and it might be objected that this weakens the *longeron*. On the other hand, the plate itself probably reinforces the *longeron* to a certain extent. A more valid objection to this fitting is, perhaps, that in case of damage to a *longeron* a new one cannot be fitted without removing all the bracing. In any case, a damaged *longeron* should not be a frequent occurrence.

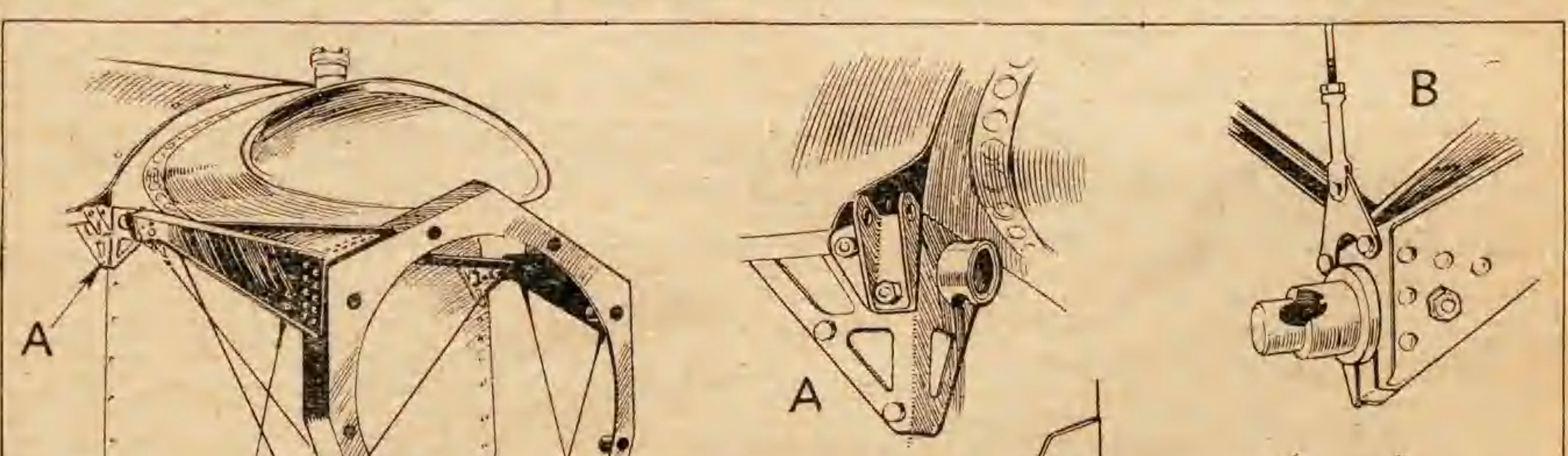
In front the *fuselage* terminates in the steel plate which forms the fireproof bulkhead behind the engine, while at the stern it forms a vertical knife-edge in the usual manner. An interesting feature of the *fuselage* structure is the door in the port side. The hinges of this door are very substantially made, and the handle which locks the door is of a special type, in which a strong hook is made to engage with a roller in the door frame by the turning of the handle. When the handle is locked in place, by means of a spring-loaded catch, the door forms part of the *fuselage* structure, and is probably at least as strong as the corresponding panel on the starboard side. Thus easy access to the cockpit is obtained without weakening in the slightest the structure of the *fuselage*.

The Wings

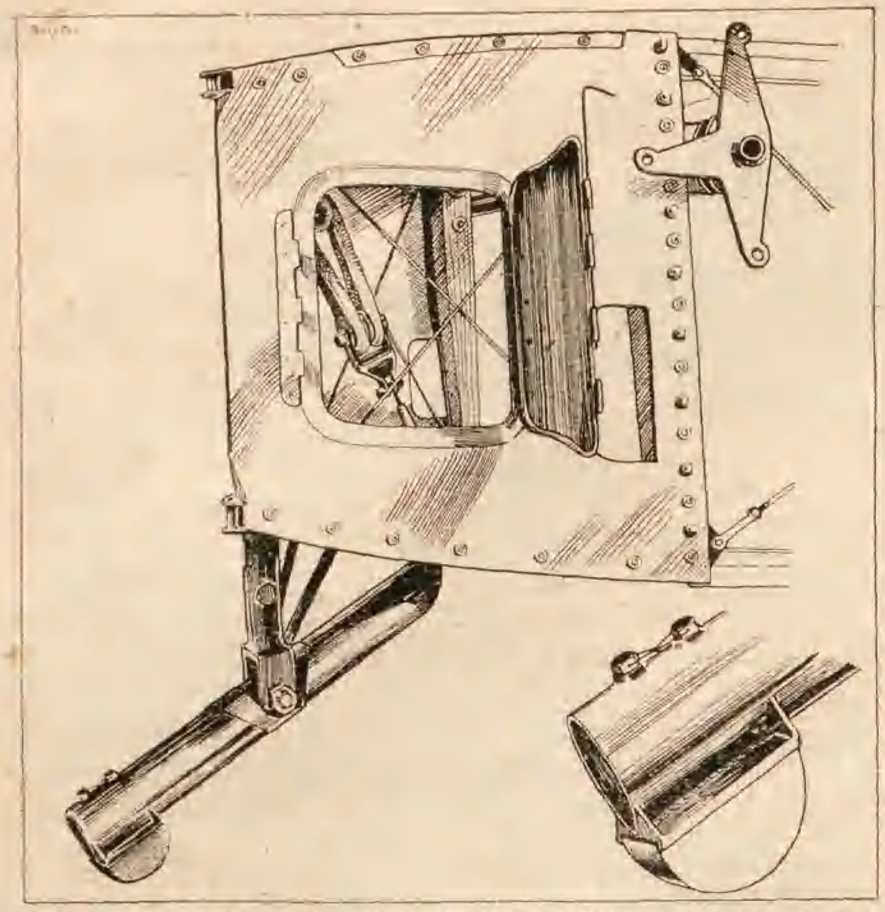
Generally speaking, the wing construction of the " Bristol " is of usual type, with I-section spruce spars and light spruce ribs. Several of the details are, however, of rather novel form. This is the case, for instance, in the arrangement of the *aileron* controls, and also, to a certain extent, in the wing fittings, notably the attachment of the top plane end pieces to the top centre-section. In the case of the latter, the fitting is of interest on account of the fact that the pin which joins the wing to the centre-section is placed, not on the neutral axis of the spar, as is usual, but on the top corner of the spar. The object of this arrangement is two-fold. It makes the pins of the upper plane easy to get at in a place where, ordinarily, it is somewhat difficult to insert and remove the pins. Secondly, the off-setting of the hinge should tend to



THE "BRISTOL" THREE-SEATER: View showing how engine mounting is swung out to give access to back of engine.



THE "BRISTOL" THREE-SEATER: Details of the swivel mounting of the 100 h.p. "Bristol" Lucifer engine.



THE "BRISTOL" THREE-SEATER: Details of the tail skid and its mounting. On the right may be seen one of the horizontal "T" cranks of the tail-trimming gear. Inset shows the renewable shoe of the tail skid.

reduce the bending moment, owing to the compression in the top spar acting below the pin, and thus creating an opposite bending moment to that resulting from the loading of the spar as a beam. On the other hand, the compression has to be taken by the pins in shear, as the spar roots do not touch the ends of the centre-section spars. As, however, the pins are of fairly large diameter they are probably easily capable of withstanding the shear loads.

The Wing Bracing

The biplane wing structure is braced with Rafwire in duplicate, and the bracing is somewhat unusual in that there is but one set of duplicate anti-lift wires on each side. As the stagger is very considerable, the rear spar of the upper wing is vertically above the front spar of the lower wing, and it is in this plane that the anti-lift wires are running, from the rear spar of the top centre-section to the attachment of the front inter-plane strut to the lower wing. Thus there is no anti-lift wire running to the point where the rear inter-plane strut meets the lower rear spar.

The struts, inter-plane as well as centre-section, are streamline steel tubes, welded together to form a letter N. Each set of struts thus forms a unit, and there is consequently no incidence bracing requiring adjustment. The struts are attached to the spar fittings by longitudinal bolts.

The Tail

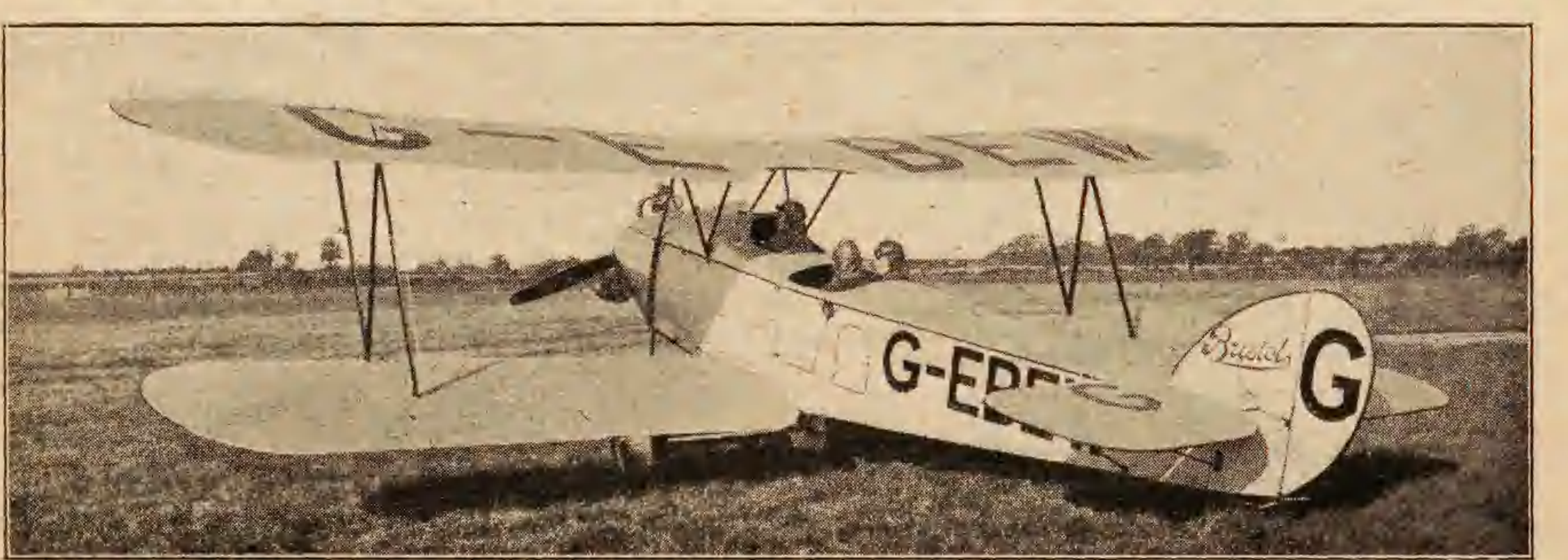
In shape the various tail surfaces are of usual type, the tail plane and elevators being built of steel tubes. As the weight of the passengers carried may vary considerably, the tail plane is of the trimming type, the details of which will be referred to later. The vertical fin is approximately a quadrant, to which the lobe-shaped rudder is hinged. It is of interest to note that all control cables to the tail run either through the *fuselage*, under the passengers' cockpit, or along the outside on the starboard side, so as to avoid getting in the way of the passengers' door. The elevator tube runs right across, and there is only one pair of cranks, placed on the starboard side.

The Controls

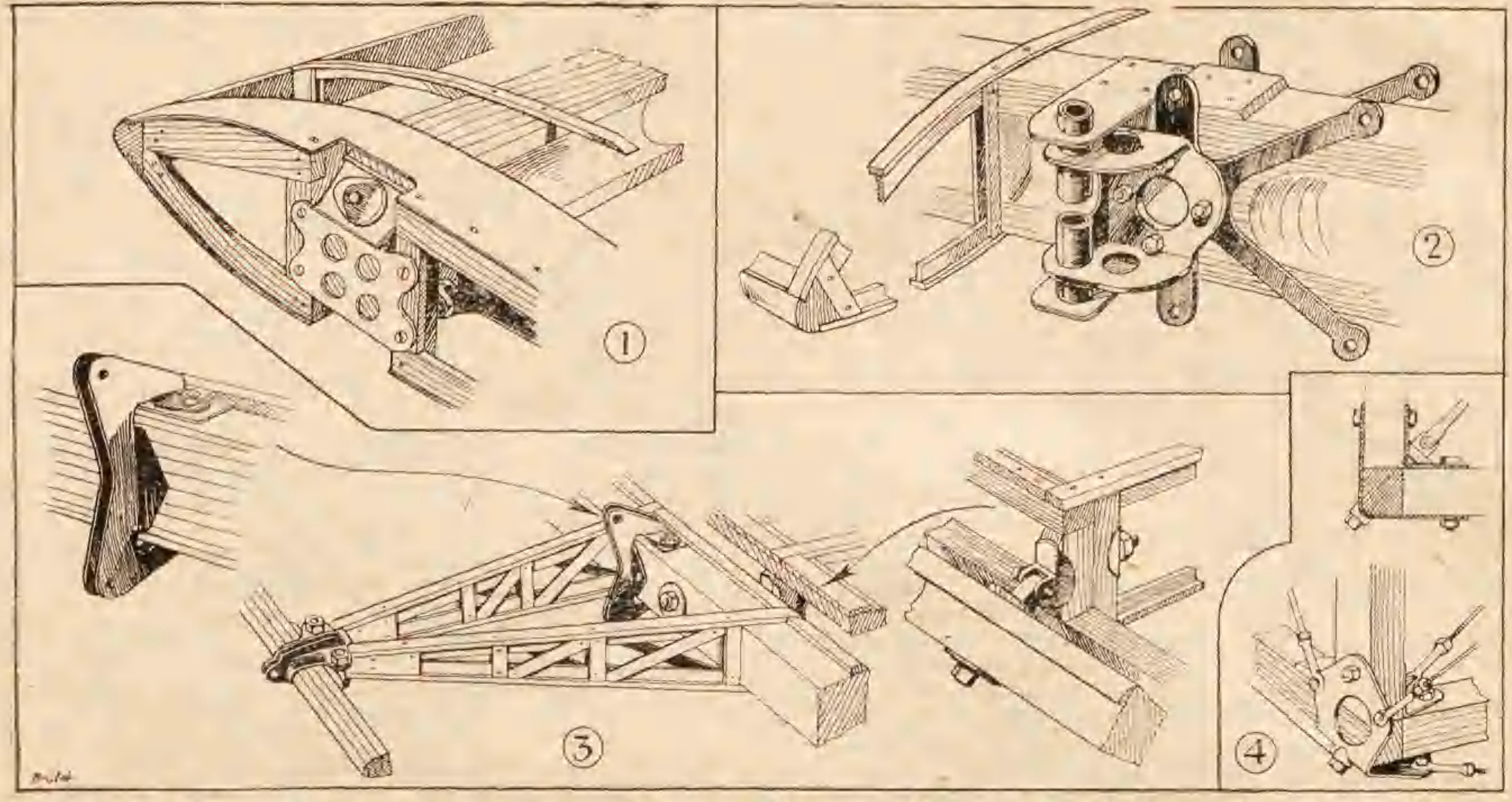
Reference has already been made to the somewhat unusual arrangement of the *aileron* controls. The departure from usual practice is chiefly one of using crank levers in place of pulleys. Thus from the control stick in the pilot's cockpit cables run to cranks in the lower wing. These cranks are housed in the leading edge, and as a matter of fact both the direct cable on the lower plane and the return cable on the top plane run along the outside of the leading edge, where they can be inspected along their whole length, while, owing to the fact that they lie close to the leading edge, they offer no extra resistance. On the same spindle, but just below the bottom plane, is another crank, at right angles to the one housed in the wing, and pointing outward. From the latter crank a cable runs to the *aileron* crank, which is simply a piece of sheet steel, 10 gauge or so. A wire runs from the trailing edge of the lower *aileron* to the trailing edge of the top *aileron*, while from the crank of the latter (which is, of course, placed above the *aileron*) a cable runs to a transverse crank secured to the same spindle as the longitudinal crank in the leading edge. From the latter crank the return cable runs straight across to the crank on the opposite side, following the leading edge.

The control column itself is a tube, terminating at the top in a handle shaped somewhat like an inverted V, not unlike those used on a number of German machines during the War. The control tube is hinged to a rocking shaft running across the floor of the *fuselage*. Thus the "stick" can be swung from side to side for *aileron* control (and owing to the width of the *fuselage* the amount of movement available is considerable), while a to-and-fro movement rocks the transverse shaft. The latter carries on one end, and mounted on the starboard side of the *fuselage*, a crank, from which a cable runs to the elevator. Concentric with and mounted on the same transverse tube as the elevator control crank is the crank for the tail trimming gear. This crank is operated by a lever on the right-hand side inside the pilot's cockpit. This lever works on a notched quadrant, and as there are six notches six tail plane positions are available. As the range of the tail plane setting is about 5 degrees, each notch corresponds approximately to one degree change in the incidence of the tail plane.

At the stern the tail trimming control cables are attached to horizontal T-cranks, the single limb of which is attached to a short tubular strut running to the trailing edge tube of the tail plane. Thus when the T-cranks are rocked the trailing edge of the tail plane is raised or lowered. This arrangement is not, perhaps, quite so refined an engineering job as is the usual worm gear, but it is more rapid in action, and for a small machine with a relatively low-power engine it is probably



THE "BRISTOL" THREE-SEATER: Three-quarter rear view.



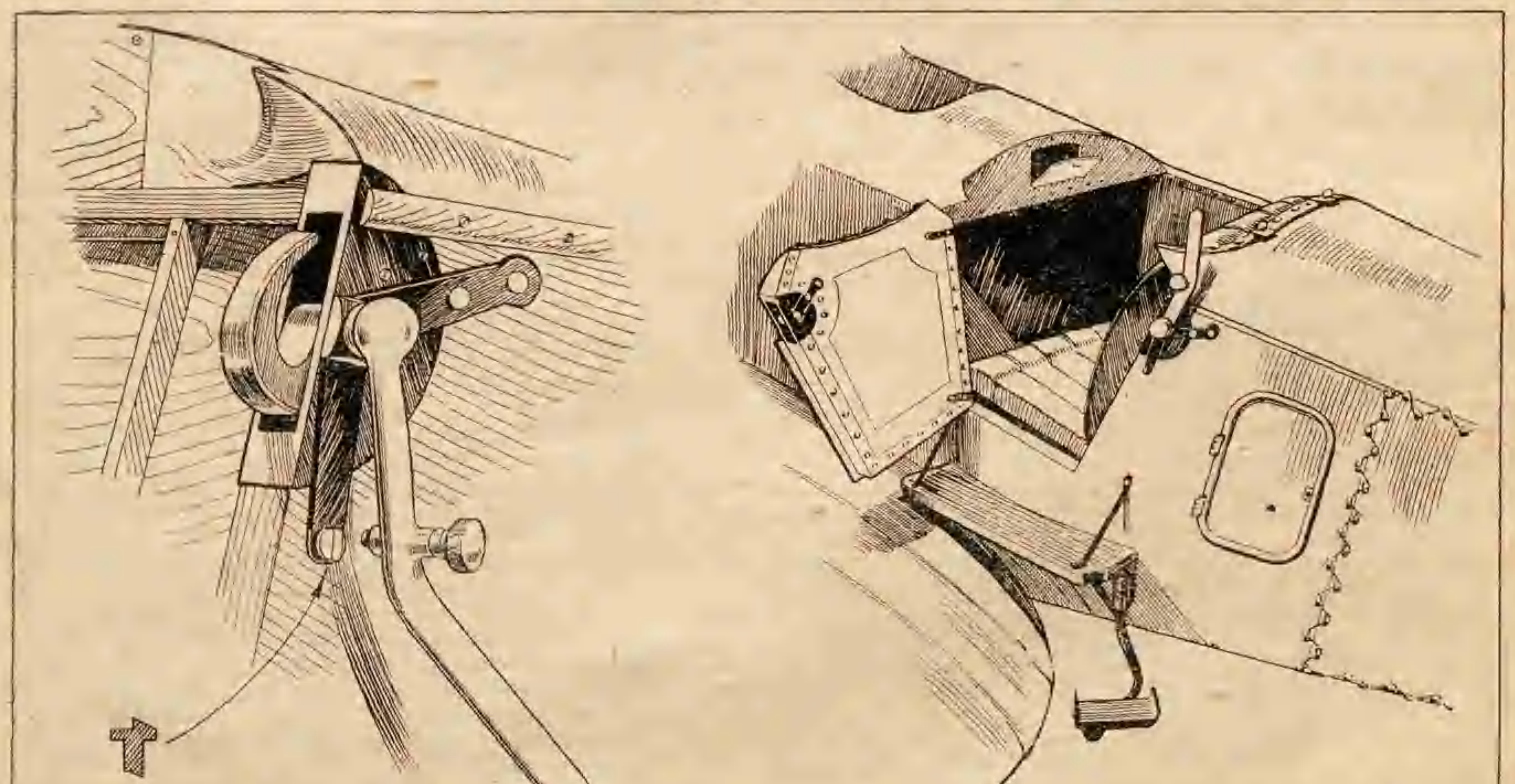
THE "BRISTOL" THREE-SEATER: Some constructional details. 1, Spar fitting on top plane. The eye bolt engages with a forked end on the centre-section spar. 2, The bracket and bearings, on the front spar, for the cranks which are used instead of pulleys. 3, Details of aileron construction and fittings. Inset: Aileron hinge. 4, A typical fuselage fitting.

quite satisfactory. The outer ends of the rear tube of the tail plane are braced by sloping struts (streamline steel tubes). At the inner end these struts are attached to a short vertical tube inside the *fuselage*. This tube is attached to the centre of the tubular rear spar, and a small horizontal V keeps it in a vertical position. The front spar is braced to the lower *longerons* by sloping struts, and no special provision is made in the strut attachments for allowing the tail plane to trim, other than that provided by the slight amount of "play" in the strut fittings, this having been found to be sufficient.

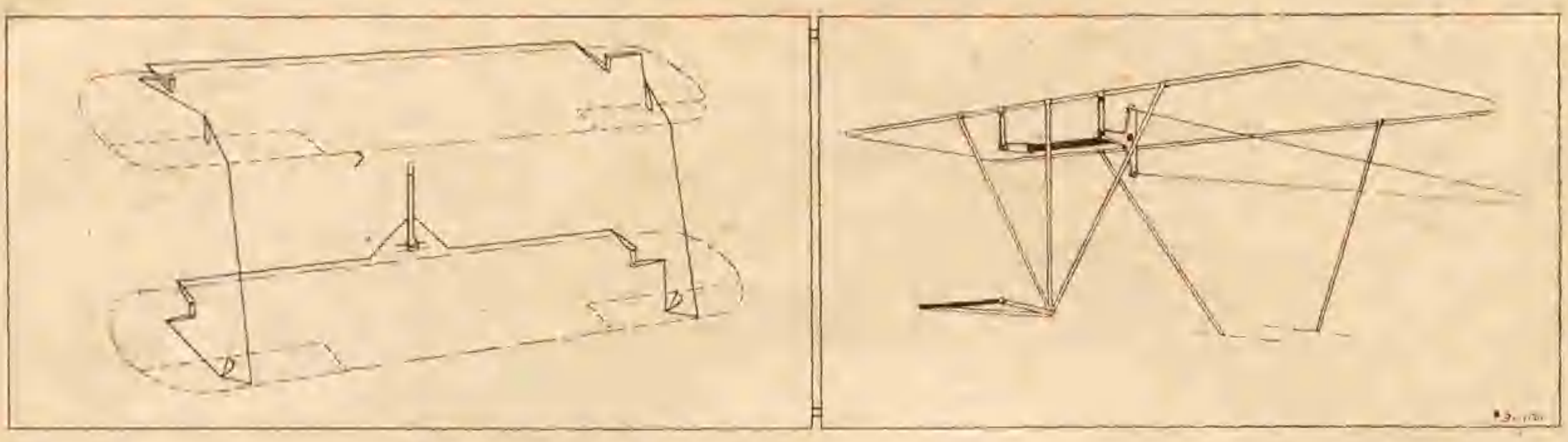
The Cockpits

As already mentioned, the pilot's cockpit is in front, immediately behind the fireproof bulkhead. The view, both when flying and in landing, is excellent. The tail trimming gear already described enables the machine to be flown either solo, or with one or two passengers. The instrument-board in front of the pilot carries revs. indicator, altimeter, air speed indicator, compass, clock, and oil-pressure gauge. The pilot's cockpit is reached by stepping from the passengers' cockpit, over the narrow coaming. A convenient grip is provided in the top centre-section in the form of a small semi-circle cut out just in front of the rear spar. Thus by grasping the spar the pilot can steady himself in getting in or out of his cockpit.

The passengers' cockpit is fairly wide, and there is room for two to sit comfortably side-by-side. At the time we inspected the machine recently, no wind screen had been mounted in front of this cockpit, but it is intended to fit a special form of screen so as to protect the passengers. We understand that, if desired, it is possible to fit a detachable cabin top over this cockpit, thus turning it into an enclosed



THE "BRISTOL" THREE-SEATER: The handle of the door giving access to the passengers' cockpit is so designed as to make, when locked, the door a load-resisting part of the fuselage structure.



THE "BRISTOL" THREE-SEATER: On the left, a diagrammatic representation of the aileron controls, in which use is made of cranks in place of pulleys. On the right, a diagram of the tail-trimming gear. The tail plane is hinged on its leading edge, and the trailing edge is moved up and down by horizontal "T" cranks and short struts.

cabin. Mention has already been made of the fact that access to the cockpit is by a door on the port side. Two steps are provided so that the passengers can step into the cockpit as easily as into a motor-car, and yet when the special locking arrangement is operated the door is securely fastened and forms part of the *fuselage* structure. From the passengers' cockpit also the view is very good, although the lower plane does obstruct it to a certain extent.

Just behind the passengers' cockpit is a luggage compartment, reached through a separate door on the port side. This compartment will hold a couple of suit cases or similar articles, so that the air travellers can carry with them sufficient personal luggage on their tours.

The Undercarriage

A simple V undercarriage of the oleo type is fitted on the new Bristol three-seater. The front legs of the V act as radius rods, while the rear legs are telescopic and incorporate the oleo gear, which consists of a plunger piston through which passes a tapered needle valve, whose function it is to maintain the oil pressure constant throughout the stroke of the plunger. In addition to the oleo gear, there is a stout steel coil spring which takes the place of the usual rubber shock absorbers. Thus the pilot is relieved of any worry as to whether his rubber rings have perished. The function of the coil springs is chiefly to carry the relatively light loads of taxying. The heavier loads of a landing are taken also by the oleo gear.

Specification

The main characteristics of the Bristol three-seater are as follows: Length over all, 23 ft. 6 ins.; span, 31 ft.; height, 8 ft. 10 ins.; wing area, 291 sq. ft.; weight, empty, 1,210 lbs.; petrol (25 galls.) and oil (3 galls.), 215 lbs.; pilot, 180 lbs.; two passengers, 320 lbs.; luggage, 75 lbs.; total loaded weight, 2,000 lbs.; power loading, 20 lbs./h.p.; wing loading, 7 lbs./sq. ft.; speed at ground level with full load, 90 m.p.h. (without passengers and luggage 93 m.p.h.); speed at 5,000 ft., with full load, 88 m.p.h. (without passengers and luggage, 91 m.p.h.); climb to 1,000 ft. with full load, 2 minutes; cruising speed, about 75 to 80 m.p.h.; landing speed, about 40 m.p.h.

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LONDON TERMINAL AERODROME

Monday evening, December 4, 1922.

In spite of the fact that for about eight days in November the fog on the various air routes was so bad that all flying was cancelled, the past month has proved a record for passengers carried in November. As usual, Handley Page Transport head the list, having carried 257 passengers between London and Paris during the month, and this even with many services cancelled owing to inclement weather. The Daimler Airway have had no fewer than 134 passengers on their inland air-line between London and Manchester, and, in conjunction with the K.L.M., have carried 99 passengers between London and Amsterdam; while the Instone Air Line have had something like 90 passengers on their London-Cologne line.

The French Air Lines, although they do not figure to any great extent in the passenger lists, have carried large quantities of freight between London and Paris, it being the rule, rather than the exception, for the Farman Goliaths to have practically full loads of parcels. The K.L.M., of course, continue to fill their outward-bound machines with goods. In fact, Capt. Leverton has, on many occasions, been unable to accommodate passengers owing to the fact that the regular consignments of goods occupied his entire space.

The Winter Newspaper Service

The C.M.A. newspaper service from Lympne to Paris, with a return load of fruit and vegetables, is working admirably. The newspapers get to Paris shortly after 10 a.m., even on these dark mornings, and this means that they are in south of France resorts much earlier than would be the case if they had to go by boat-and-train.

The Instone Air Line converted one of their D.H.18's into an "aerial pantechnicon" the other day in order to carry the personal effects of the entire family of a British officer to Cologne. In the first consignment was a baby's cot, which travelled over the same days as its owner. In fact, although the goods-machine started after the passenger 'plane, it arrived first at Cologne, owing to the fact that it made a non-stop flight, while the passenger machine put down at Tirlemont for petrol.

The Duke of Sutherland, Under-Secretary of State for Air, visited the aerodrome during the week, and, after taking a good look round, went for a short flight in the Napier-Bristol ten-seater, which is owned by the Department of Civil Aviation.

Improving the Aerodrome Roads

The Ministry of Transport roads-section has been busy making some much-needed improvements to the aerodrome roads. In several places the main-road through the aerodrome has been widened a few feet by taking away the mud at the side and transforming it into firm, hard road. There is, however, a lot to be done to both the aerodrome roads, and the most-used parts of the aerodrome itself, before they are in the state befitting London's air-station. It seems that either there is no one at the Air Ministry clever enough to devise some means of eliminating mud on aerodromes, or else there is a shortage of money to carry any scheme proposed into effect.

During the week there have been some strong north-westerly winds, which have lengthened to some extent the flights to Manchester, but, at the same time, have correspondingly shortened the return flights. One day this week a north-bound Daimler overtook a train, and then, apparently getting into an extra strong wind-current, was unable for ten minutes to gain on the train in any way. The air-speed-indicator showed a speed of 105 miles an hour, but still the aeroplane could not beat the train. Finally the pilot swerved away and lost sight of the train, arriving in Manchester 2 hours 50 minutes after leaving Croydon, instead of the usual 2 hours.

The Surrey Flying Services have made one or two joy-ride flights during the week, but winter appears to put an effectual "stopper" on joy-riding. In the meantime the staff of the Surrey Flying Services are very busy erecting new Avros and D.H.9's for the coming season.

The British Petroleum Company have now got their own representative on the aerodrome, and he tells me that they are to have an office alongside that of the Anglo-American Company. The B.P. Company have erected a special filling station outside the Handley Page shed, in order to fill these machines before they are brought round to the departure platform.

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

THE regulations for the Selfridge 50-mile Gliding Competition for a prize of 1,000 guineas have now been published, and will be found on another page of this issue of FLIGHT. We think it will be agreed that the Royal Aero Club has tried to facilitate matters as much as possible for competitors by ruling that the flights for the prize may be made anywhere in the British Isles. Thus competitors will not have to make the attempts over unfamiliar country, but may make them under conditions with which they are well acquainted. This should be a great help to competitors in various ways. For instance, it will be possible for a competitor to practise over ground near his home, and when he feels that he has attained some measure of proficiency he can make his competition flight over the same country, instead of having to start all over again by going to some other, and unfamiliar, locality.

* * *

ANOTHER advantage is that he will be able to live at home and will not be incurring large expenses for housing, etc., while he is practising, while his machine should not have to be sent half-way across the country by rail, as might have been the case had the Royal Aero Club decided upon one particular locality. Furthermore, the expense of having attempts officially observed (which has to be borne by competitors) should be considerably reduced by the appointment of observers resident in or near the various localities selected.

* * *

COMPETITORS must send in, at least seven clear days before their first attempt, a map on which is marked the approximate starting-point selected, and the course which it is intended to follow. At the expiration of the first seven days no further notice is required, but the official observer must, of course, be notified in time for him to be present at each start. Should a competitor decide, after a first attempt, that a different locality might be better suited to his requirements he must, presumably, again notify the Club, sending in particulars as before.

* * *

THE Royal Aero Club will issue special log sheets, which must be carried by the pilot on all flights in the competition. On the starting certificate of this log sheet the official observer will enter such particulars as will enable the Club to locate the exact point of starting. At the completion of a flight a pilot must enter on the landing certificate such particulars as will enable the Club to locate the exact point of landing, and the pilot must get this certificate signed by two persons, who should, if possible, be present at the landing. Failing that the pilot must obtain the signatures of two persons resident in the district in which the landing was made.

* * *

IT will thus be seen that the rules for the British competition are generally similar to those in force in Germany for the *Berliner Tageblatt* prize, with the exception that the solemnity of oaths is dispensed with. Yet we have not the slightest doubt that the British declarations will be every bit as true and accurate as the German.

* * *

ALL enquiries regarding the competition should be sent to the Secretary of the Royal Aero Club of the United Kingdom, 3, Clifford Street, London, W. 1, from whom also entry forms may be obtained, and to whom the entry fee of £5 should be sent. The special log sheets will be sent to entrants upon receipt of the entry fee.

* * *

A CORRESPONDENT writes to tell us that he has lately completed a glider, but complains that he has, up to the present, had very poor results. He states that his machine is a monoplane composed of a BE fuselage, cut down considerably, and of a pair of Sopwith wings, and that when he tested the machine by towing it behind a car it only got up to a height of about 6 ft., dropping almost instantly as soon as released.

* * *

WE do not know what is the weight of the machine referred to by our correspondent, and the description " Sopwith wings " is rather vague. If, however, they are the top plane of a Sopwith " Camel " we do not wonder at the poor results, as the area would, in all probability, be much too small, giving too high a wing loading. The average wing loading of the machines at Itford was 2 lbs./sq. ft. The " Brokker " was probably loaded considerably higher than this figure, but then it had a very high-lift wing, which would help materially. Also on the day the " Brokker " made its famous flight a very strong wind was blowing, and it is quite possible that this machine would not have got off particularly well if towed behind a car in still air.

* * *

A propos the " Brokker," we learn that Sqdn. Ldr. Gray has taken the machine to Salisbury Plain, where he thinks he will be able to make quite good glides, there being a number of hills which are considered nearly if not quite as suitable as those at Itford. It is reported that Sqdn. Ldr. Gray is to carry out tests for the Air Ministry in order to ascertain whether or not gliding is likely to prove of value in the training of pilots. Personally we think that it may prove very valuable indeed, offering as it does opportunities of getting pupils used to being in the air and to handle the controls. Probably at first two-seater instruction machines might be used, to be followed later by work on single-seaters, much after the fashion of training on power-driven machines. Tuition on gliders should be very cheap, as there are no expensive engines and no petrol to buy. It is to be hoped that Sqdn. Ldr. Gray will succeed in convincing the Air Ministry of the value of gliding.

* * *

IN the meantime the R.A.F. is taking up gliding unofficially already. Thus on a recent visit to Andover, we learned that a gliding club had been formed at the R.A.F. Staff College and Headquarters of No. 7 Group, and that already the club counted 150 members. Gordon England's little monoplane has been acquired, and has been repaired after the smash, in which, incidentally, it was but very little damaged, most of the breakages occurring in getting Gordon England out of the machine. Later on it is intended to build gliders at Andover out of scrap material left over from wrecked aeroplanes. Thus not only will the gliding club be able to get its machines cheaply, but the members will be able to learn a good deal about construction. We trust that a great many other stations will follow this example, and shall be very glad to hear from such gliding clubs, Service no less than civilian.

* * *

HIS many friends will be pleased to hear that Gordon England is rapidly recovering from the effects of his crash on Firle. He is already out, and is able to get about on crutches, although he has not yet quite got used to his new " controls " and " undercarriage."

* * *

FROM Mr. L. F. Leeming, of Hale, Cheshire, we have received the following letter :—

" A note in your ' Gliding Notes ' recently on a German pilot who flew for some way on the flat using no hill, reminds me of some early experiments made in 1911 The glider was a crude affair, a monoplane with a 20-ft. span and a chord of 5 ft. The pilot stood between the main planes, carrying the whole machine by two straps fastened to the two out-riggers, which carried the tail. As in most of the early machines, the only control was by moving the weight of the pilot's body.

" The attempts were made on the flat sands at Southport, Lancs, and after several hours' practice spread over several days, a friend of mine became so expert with this little glider that he could almost make it do anything. In a wind of about 15–25 m.p.h., soaring and glides of two minutes duration were obtained. Our method of taking off was as follows : The pilot stood facing the wind in the machine, and at each wing-tip an assistant stood holding a 20-ft. rope attached to the wing. The assistants then went briskly forward into the wind, pulling on the rope, and the pilot worked the glider off into the air. He soared and rose until the ropes were almost vertical when the assistants cast off, and the pilot then glided down, prolonging the glide as long as possible by soaring. Although not expert myself, and unable to get good glides, my friend could do wonderful things, and made flights of quite big distances. We had the glider for some weeks—it was kept in the open—but eventually I tried it one day in too strong a wind, and being unable to keep it head on (we had no rudder or fin) the machine tipped up, a wing-tip struck the ground, and the whole machine spun round violently, pitching the pilot out at a great speed. The pilot was in bed for some days, and the glider was a total wreck.

"I sometimes wonder what the pilots of today would think of our early machines of those days. On the monoplane mentioned above the covering was single-surfaced with that yellow paper at that time quite common—I remember A. V. Roe's triplane at Blackpool Meeting was covered with this stuff—in fact, I bought the paper from Messrs. Roe, then at Bromsfield Mills. The wood used was ordinary timber purchased from a builder, and was full of knots; one of the outriggers was even made out of a clothes-prop! To get a camber on the planes we cut notches in the two main spars, and bent canes in between these, the canes just too long to fit curving upwards and making the camber. Another weak point was the glue, which proved too weak, and so pieces of the covering were always coming off in the air. When it is thought that we risked our lives in a thing like that don't we seem optimists?

"I am at work at present on a modern glider, my fourth, and intend to make a really sound job of this. When it is finished I propose to make all the first trials on the flat, as I am convinced that by soaring, and later after more experience perhaps by 'gust-flying,' it is possible to obtain long flights with duration of several minutes."

OUR GLIDER DESIGNING COMPETITION

Many Designs Entered

THE Designing Competition for a Prize of £25 and Consolation Prize of £10, offered by the proprietors of FLIGHT is now closed, and we are extremely pleased to be able to announce this week that the response has been most gratifying. A very great number of designs have been submitted, and although a cursory examination has shown that out of these a number do not in the slightest conform to the regulations laid down, there still remain a very fair number which appear to show very serious application to the problems involved, and which will have to be seriously considered by the judges.

As we know that our readers are very interested in this competition, we publish below a very brief indication of the nature of some of the more promising of the designs, although by doing so we do not in any way prejudice the judging of these or other designs. The final judging will take up a considerable amount of time, and will involve a great deal of work, and as Mr. Fairey and Mr. Handley Page are both busy men, it will, we are afraid, be some little time before the announcement of the awards can be made. We can assure competitors that the results will be published as soon as ever possible, but the checking of stress calculations, etc., will necessarily take time, and it is the intention of the judges to go into the designs very thoroughly so as to ensure as far as possible that all features of each design are taken into consideration before passing final judgment. We hope, however, that it will be possible to announce the results early in the New Year. What with the Paris Aero Show and other pressing matters, we doubt if publication of the winning design can be started earlier than that.

"K_L" is a biplane with enclosed fuselage and monoplane tail. There is a slight backward stagger, caused by placing the inter-plane struts at right angles to the chord line. Thus the angle of incidence causes the wings to have a slight backward stagger. This machine has a wheel undercarriage, with the wheels partly enclosed in the fuselage, only a portion of them projecting through the floor. Wing-tip skids are fitted on the lower plane. Differential controls, of the Peyret type, are incorporated in the design.

"Turkey Buzzard" is a semi-cantilever parasol monoplane with tapered wings and enclosed streamline fuselage. The undercarriage is unusual in that it consists of a transverse member projecting from the bottom of the fuselage, and carrying at each end a crank which, on striking the ground, moves back and up against a spring.

"FLIGHT" is a biplane with a gap/chord ratio of approximately 1·5 and a circular section fuselage.

"Orton" has sent in a design for a cantilever parasol monoplane somewhat similar to the German monoplanes, and in some respects, notably as regards shape of body, resembling the Hannover "Vampyr." The wing section used is the Glenn Martin No. 2.

"In Nubibus" is a braced monoplane with tapered wings and large balanced ailerons. It has a wheel undercarriage with single struts sloping up to the sides of the body. The wings are intended to pack flat against the sides of the fuselage for transport.

"Norbet" is a pure cantilever monoplane, with no supports outside the fuselage and straight-taper wings. In side view the machine is a good deal like a Darmstadt, but a wheel undercarriage is fitted. The wing section is airscrew 4.

"Aero" is a braced monoplane, with enclosed fuselage and a biplane tail not unlike that of the Vickers machines. There are two rudders, with a balance working in cut-out portions of the fixed fins, and an extra single fin is placed above the top plane of the biplane tail. The undercarriage is of the skid type, with hoops running over the nose of the fuselage.

One competitor has submitted two designs, called by him "Elisabeth Sesqui" and "Lizzie Twintail" respectively. In addition to drawings of the two machines, this competitor also sends scale models, but whether or not these would be sufficiently accurate for wind tunnel work may be open to doubt. Also their strength might be insufficient, as the forces on a model in the wind channel may be considerable. "Elisabeth Sesqui," as the name implies, is a "sesquiplan," with main wings bent at a considerable angle in front view, the wing roots sloping up from the lower corners of the fuselage at a steep angle (somewhat after the fashion of an L. Clement monoplane exhibited at a Paris Aero Show), meeting the horizontal portion of the wing nearly half-way out to the tip. The outer ends of the dihedral portions of the wing are joined by a large spar enclosed in a wing-section casing so as to give a certain amount of lift in return for its resistance.

"Lizzie Twintail" is a biplane, with the lower plane placed at such a large dihedral angle that its tips all but meet those of the top plane. As the name suggests, there are two fins and two rudders. The fuselage, which is fairly wide, has the form of a wing section in side view, evidently with a view to making it lift a certain amount, although as the aspect ratio is less than unity the efficiency might not be very good (on the fuselage only, of course). A similar idea was used in a large American passenger machine, the Remington-Burnelli, and we believe that fairly good results were obtained.

THE SELFRIDGE 50-MILE GLIDING COMPETITION

(*Under the Competition Rules of the Royal Aero Club.*)

Prize of One Thousand Guineas offered by Messrs. Selfridge and Co., Ltd.

THE Prize will be awarded to the entrant of a machine which first covers a distance of 50 miles, measured in a straight line, in one uninterrupted flight, under the following conditions:—

SUPPLEMENTARY REGULATIONS

Date.—The Competition will be open for a period of one year from 1st January to 31st December, 1923, inclusive.

Organisation.—The Competition will be conducted by the Royal Aero Club.

Competitors.—The Entrant and Pilot must be British subjects.

Machines.—The Competition is open to any heavier-than-air machine, constructed in the British Isles, not provided with any motive power except that produced by the personal exertions of the occupants during flight, and which is not supported either wholly or in part by any gas which is lighter than air.

Entries.—The entry fee is £5. This fee, together with entry form, must be received at the Royal Aero Club, 3, Clifford Street, London, W. 1, at least seven clear days before any flight is made in the Competition.

Official Observers.—The Royal Aero Club will appoint Official Observers to control all starts in the Competition. The expenses, if any, of the Observer must be borne by the Competitor, but in order to minimise such expenses, the Club will, as far as practicable, appoint an Observer resident in or near the locality selected.

Starting Place.—The Competitor may select his own starting place in the British Isles. A map, marking the approximate starting place and course to be followed, must be received by the Royal Aero Club seven clear days before the first attempt is made. At the expiry of the seven days no further notice is required, and the Competitor is at liberty to start at any time from this point, always provided the

Observer appointed by the Club is present. The Competitor is responsible for the Observer being notified beforehand of any attempts, and for his being present at the start.

All flights must be commenced between 6 a.m. and 6 p.m. (Official time.)

Log.—The Royal Aero Club will issue log sheets which must be carried by the Pilot in all flights in the Competition. The Observer will fill up the Starting Certificate on the Log Sheet and hand same to the Pilot prior to the start of any flight in the Competition. This Certificate will contain such particulars as will enable the Club to locate the exact point at which the start was made.

The Pilot, on landing, must fill up the Landing Certificate on the Log Sheet. This Certificate must contain such particulars as will enable the Club to locate the exact point at which the landing was made. The Landing Certificate must be signed as correct by the Pilot and two responsible persons present at the time of landing, or, if none present, resident in the district where the landing was made.

The Log Sheet must be posted to the Royal Aero Club not more than 48 hours after the landing has taken place.

In the event of the Prize not being won, Messrs. Selfridge and Co., Ltd., will present Five Hundred Guineas to the Entrant of the machine which covers the longest distance, of not less than 25 miles, measured in a straight line, in one uninterrupted flight during the year.

* * *

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN NOVEMBER 26 AND DECEMBER 2, INCLUSIVE

Route (including certain diverted journeys)	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h m		
Croydon–Paris	15	58	5	12	10	2 35	H.P.W.8B G-EBBH (2h. 0m.)	B. (1), G. (7), H.P.W.8B (3).
Paris–Croydon	13	37	1	11	7	3 30	H.P.W8B G-EBBH (2h. 59m.)	G. (9). H.P.W.8B. (3).
Croydon–Brussels–Cologne	3	6	3	—	3	3 55	D.H. 18 G-EAWW (3h. 37m.)	D.H. 18 (1), D.H. 34 (2).
Cologne–Brussels–Croydon	3	8	3	—	3	5 26	D.H. 18 G-EAWW (4h. 34m.)	D.H. 18 (1), D.H. 34 (2).
Croydon–Rotterdam ...	7	10	6	6	7	2 8	Fokker H-NABR (2h. 4m.)	F. (6).
Rotterdam–Croydon ...	6	5	5	5	6	3 4	Fokker H-NABJ (2h. 44m.)	F. (5).
Manchester–Croydon–Amsterdam	5‡	15	—	1	5	5 22	D.H 34 G-EBBQ (4h. 52m.)	D.H. 34 (3).
Amsterdam–Croydon–Manchester	8§	9	5	—	8	—	—	D.H. 34 (3).
Total for week ...	60	148	28	35	49			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ Man.–Croy. 1, Croy.–A'dam. 2. § A'dam.–Croy. 4, Croy.–Man. 4.

Av. = Avro. B = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad. Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc. :—Co. des Grandes Expresses Aériennes ; Daimler Hire, Ltd. ; Handley Page Transport, Ltd. ; Instone Air Line ; Koninklijke Luchtvaart Maatschappij ; Messageries Aériennes.

Incidental Flying.—Mr. Perry and Capt. Stoken testing Avros, Bristol Fighter, D.H. 9a and Sopwith Snipes at Croydon for the Aircraft Disposal Co. Capt. Stoken flew the Bristol to Brussels on the 1st.

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CAMBRIDGE UNIVERSITY AERONAUTICAL SOCIETY

UNDER the patronage of H.R.H. the Duke of York, the Cambridge University Aeronautical Society has had a most interesting series of papers read during the Michaelmas Term.

The President of the C.U.Ae.S. for 1922-23 is Flt.-Lieut. W. W. Wakefield, R.A.F., Pembroke, and the Hon. Sec. is J. A. L. Denison, of Trinity College.

On October 25 Mr. Granville Bradshaw read a paper entitled "Oil Cooling." Flt.-Lieut. W. R. Acland, on November 1, read a paper on "Deck Flying," and on November 8 Lieut.-Col. W. A. Bristow gave a lecture on "Commercial Aviation." Mr. Fleming Williams, on November 15, told the Society all about "Gliders," while on November 22 Air Vice-Marshal P. W. Game read a most instructive paper on "Organisation." Finally (November 29) Group Capt. F. W. Bowhill, C.M.G., concluded the lectures of the term with a paper entitled "Royal Air Force Operations in Somaliland, 1919."

It will thus be seen that the C.U.Ae.S. has not lacked variety in its lectures, and has been fortunate in securing lecturers who were specialists in their subjects. It is hoped, if space permits, to publish some of the papers, in abbreviated form, in subsequent issues of FLIGHT.

* * *

Irish Rebels Bombed from the Air

THE Irish Free State is at last finding its aeroplanes useful. After an ambush of National troops by 60 irregulars near Drimoleague (W. Cork) on Sunday last, a Free State aeroplane located the rebels and dropped bombs on them with, it is stated, considerable effect. The survivors took refuge in a wood, which was raked with machine-gun fire from the aeroplane, and further casualties resulted. This is the first time the Free State has made use of the aeroplane in this way, and no doubt they will profit by the experience. It seems to us that the aeroplane should help considerably in obtaining peace and order in Ireland.

Experimental Data Without Wind Channel

WHAT should prove to be an extremely interesting paper is to be read before the Inst. of Aeronautical Engineers, by Mr. O. T. Gnosspelius, A.C.G.I., A.F.R.Ae.S., at the Engineers' Club, Coventry Street, W. (6.30 p.m.), on Friday, the 15th inst. The title of the paper is "Experimental Data Without Wind Channel," and the lecturer is publishing for the first time his method of obtaining data on aerofoils, streamline bodies, etc., by simple means without the expense of wind channel or other laboratory apparatus. It is anticipated that the information contained in this paper will be of great value to all those interested in the design of aircraft.

THE ROYAL AIR FORCE STAFF COLLEGE

"CONFERENCES rather than Cramming" is *not* the official motto of the Royal Air Force Staff College at Andover, but perhaps it expresses fairly well the spirit in which, under the guidance of its Commandant, Air-Commodore Brooke-Popham, the College is working during this, its first, year of existence. Opened on April 4, 1922, the R.A.F. Staff College marks, as Air-Marshal Sir Hugh Trenchard, Chief of the Air Staff, said in his opening address, "a signpost, and on the signpost are the words 'To Efficiency, Economy, and Foresight.'" The R.A.F. Staff College may be described as the cradle of the brains of the R.A.F., and to a very great extent the manner in which the R.A.F. of the future will develop depends upon the work done at Andover. The General Staff has recently been defined as "a system of co-ordinated functions, performed by persons working together, to a certain degree irrespective of rank, deriving their status from the fact that they are essential elements in the working of the whole." A Staff system is not peculiar to the Navy and Army; it is the method by which authority conveys its intentions to, or renders them practicable by, the Executive. "The General Staff," as Clausewitz says, "is intended to convert the ideas of the Commander into orders, not only by conveying them to the troops, but far more by working out all necessary matters of detail, thus relieving the General from a great amount of trouble."

By the courtesy of the Air Ministry and of the Commandant of the Staff College, Air-Commodore Brooke-Popham, we had the privilege, last week, of paying a visit to the Andover establishment, which is next door to the headquarters of No. 7 Group, Inland Area. Here we were permitted to gain an insight into the general principles upon which the Staff College is conducted, and were present, for some considerable time, at a conference between students, instructors, and one representative of the directing staff. The subject that was being discussed at this conference was the new Operations Manual, and it provided an excellent illustration of the very great advantage which the policy of "conferences rather than cramming" gives. In a case like this, the procedure is for the students to be divided into groups, usually three, who discuss among themselves a certain section of the Manual. Having thoroughly sifted the matter contained, and discussed every sentence, amendments or amplifications are suggested by each group, and during the conference which follows two representatives from each group meet in the library, where they place their views before instructors. Usually a member of the Directing Staff is present, but does not usually take part in the discussion. The section of the Manual under discussion is then gone through, sentence by sentence and paragraph by paragraph. Certain amendments are accepted, subject always to the later approval of the Directing Staff, and the minutes of the conference entered in a special book. After the conference this book is handed to the Directing Staff, who enter in it their own views on each amendment, either disagreement or concurrence, and finally the book is to be sent to the Air Ministry, where the ultimate decision is made by the Chief of the Air Staff.

It will be seen that the procedure is necessarily a slow one, but, on the other hand, the Air Ministry has, in this manner, the benefit of the accumulated experience of the officers, all of whom, students as well as instructors, have seen active service in various theatres of war. Thus there is real and immediate practical advantage in this system of conferences, in addition to their value in teaching the students to express themselves clearly and concisely.

The Directing Staff of the R.A.F. College is composed as follows: Air-Commodore H. R. M. Brooke-Popham, C.B., C.M.G., D.S.O., A.F.C. (Commandant); Air-Commodore R. H. Clark Hall, C.M.G., D.S.O., L. of H.; Group Captain P. B. Joubert de la Ferte, C.M.G., D.S.O.; Wing Commander W. R. Freeman, D.S.O., M.C., L. of H.; Wing Commander C. H. K. Edmonds, D.S.O., O.B.E.; Squadron-Leader B. E. Sutton, D.S.O., O.B.E., M.C., B.C. de G.; Flight-Lieut. Adjutant C. B. Dick-Cleland. Of these officers four have previously served with the Army, and two with the Navy. Each year twenty students are admitted to the Staff College, and the course lasts for twelve months.

During the present year the list of students is as follows: Wing Commanders: J. E. A. Baldwin, D.S.O., O.B.E.; R. E. C. Peirse, D.S.O., A.F.C. Squadron Leaders: B. F. Smythies, D.F.C., W. S. Douglas, M.C., D.F.C., C. W. Pulford, O.B.E., A.F.C., K. R. Park, M.C., D.F.C., W. A. McClaughry, D.S.O., M.C., D.F.C., C. F. A. Portal, D.S.O., M.C., L. L. MacLean, H. S. Powell, M.C., E. B. Beauman. Flight-

R.A.F. STAFF COLLEGE, ANDOVER: Group of Directing Staff, Instructors and Students. Top row, left to right: Flight-Lieut. N. W. Wadham; Flight-Lieut. J. B. Cole-Hamilton; Flight-Lieut. W. B. Farrington, D.S.O.; Flight-Lieut. G. M. Lawson, M.C.; Flight-Lieut. H. S. Kerby, D.S.C., A.F.C.; Squadron-Ldr. K. R. Park, M.C., D.F.C.; Flight-Lieut. W. R. D. Acland, D.F.C., A.F.C. Middle row, left to right: Squadron-Ldr. H. S. Powell, M.C.; Squadron-Ldr. C. W. H. Pulford, O.B.E., A.F.C.; Squadron-Ldr. E. B. Beauman; Squadron-Ldr. C. F. A. Portal, D.S.O., M.C.; Squadron-Ldr. L. L. MacLean; Flight-Lieut. R. M. Drummond, D.S.O., O.B.E., M.C.; Flight-Lieut. E. B. C. Betts, D.S.C., D.F.C. Bottom row, left to right: Flight-Lieut. C. B. Dick-Cleland (Adjutant); Wing-Commdr. R. E. C. Peirse, D.S.O., A.F.C.; Squadron-Ldr. B. E. Sutton. D.S.O., O.B.E., M.C. (Directing Staff); Wing-Commdr. C. H. K. Edmonds, D.S.O., O.B.E. (Directing Staff); Air-Commodore H. R. M. Brooke-Popham, C.B., C.M.G., D.S.O., A.F.C. (Commandant); Group-Capt. P. B. Joubert de la Ferte, C.M.G., D.S.O. (Directing Staff); Wing-Commdr. W. R. Freeman, D.S.O., M.C. (Directing Staff); Flight-Lieut. C. H. Hayward.

KEEPING FIT: R.A.F. Staff College hockey team playing match against 17th Lancers.

Lieuts: W. R. D. Acland, D.F.C., A.F.C., G. M. Lawson, M.C., R. M. Drummond, M.C., N. W. Wadham, C. H. Hayward, H. S. Kerby, D.S.C., A.F.C., J. B. Cole-Hamilton, E. B. C. Betts, D.S.C., D.F.C., W. B. Farrington, D.S.O.

Nine of the students have served previously with the Army, four with the Navy, and three with the Australian or New Zealand Army. Later it is hoped to introduce a system of interchanging officers between the R.A.F. Staff College and the Army and Navy Staff Colleges, while next year's course, which begins on April 1, 1923, will be attended by representatives of the Canadian and Australian Air Services. At present two R.A.F. officers are undergoing courses at the Naval Staff College at Greenwich, and two at the Army Staff College at Camberley. As soon as sufficient experience has been gained at Andover—and in this connection it should be realised that whereas the Army and Navy have had generations of gradual development, air war is less than ten years old—it is intended that every year two officers from the Army and two from the Navy should attend the R.A.F. Staff College.

The course of study at the R.A.F. Staff College is at present devised with two objects in view: firstly, to train officers in staff duties whether in peace or war; secondly, to afford a general education which will serve as a sound foundation for the building up of a school of thought in the R.A.F. It aims at developing the habit of steady reading and thinking rather than at the acquisition of a mass of detail. The many and varied experiences of air-fighting during the last war have given rise to a diversity of theory and practice. Service regulations must therefore for some time be tentative and provisional, and must be tested out continuously by exercises and discussion. A knowledge of broad principles and a wide outlook will prevent these exercises and discussions from resulting in the formation of narrow and dogmatic conclusions.

Space does not permit of going into any great detail regarding the course of instruction, but the following brief summary may give some idea of the nature of the subjects studied:—The nature of war and its fundamental principles; inter-relations of policy, strategy and tactics; the development of scientific warfare; employment of aircraft in war; naval strategy; naval tactics; land strategy; land tactics; combined operations; Air Force organisation; Naval organisation; Army organisation; supply and lines of communications; transportation; staff duties; intelligence and secret service; imperial defence; British foreign policy before 1914; the peace settlements in Europe and the East; the Washington Conference and its effect on naval armaments; the relations between war and industry; organisation, administration and distribution of the Japanese, French and American Air Forces; technical progress in aircraft and their equipment. Each of these subjects is divided into a number of subdivisions, so that it will be seen that there is a great deal to be studied and digested.

Apart from the course outlined above, conferences are, as already mentioned, held at frequent intervals, while lectures by "outside" experts are given whenever possible, and these are so chosen as to give students an opportunity of learning something about matters which would not ordinarily come within their sphere. Thus, to give an idea of the extraordinarily varied subjects which are dealt with in these lectures, we mention two that were given recently. Lord Hugh Cecil gave a lecture on the League of Nations, and Mr. Bramley one on Trade Unions. It was explained that in the course of their duties officers of the R.A.F. would naturally come into contact with aircraft manufacturers, and that unless they knew something about trade unions they could not fully appreciate the position of manufacturers. With such a policy in force there is, it will be realised, little danger of the Royal Air Force Staff getting into a narrow groove, out of which afterwards it would be difficult to break away.

In this matter of policy, of forming a school of thought, the R.A.F. Staff College is at an advantage compared with the corresponding institutions of the older services, which grew up gradually, and thus had not, it is to be feared, the same opportunity of broadening their outlook. As the Staff College has only just come into being, it is not hampered by precedent, and those responsible for its foundation have a glorious opportunity—an opportunity that will never occur again—of creating an institution worthy of the Service it represents. Let it be said at once that those in charge, no less than the officers attending as students, fully realise not only their opportunity but also their responsibilities. From the Commandant down to the youngest student, all are giving the very best of which they are capable, and all are working together in that spirit of being, largely irrespective of rank, "essential elements in the working of the whole," which is so necessary if success is to be attained.

As regards the establishment itself, little need be said. It resembles others of this type, and is noteworthy for its lack of pretentiousness. Yet the spirit which pervades the establishment is such that one comes away with a feeling that here if anywhere calm thinking and considered judgment are the keynotes. Not that the lighter side is neglected. Far from it. On the day of our visit a hockey match was being played between a College team and an Army team (17th Lancers). When we left, the match stood at 2 all.

Sports of all sorts are encouraged in order to keep students as well as instructors and Directing Staff fit, and several aeroplanes are maintained at the establishment so that officers may "keep their hands in" by occasional flying.

THE ROYAL AIR FORCE

London Gazette, November 28, 1922

General Duties Branch

The follg. are granted permanent commns, as Flying Offrs., retaining their present seny. *Gazettes* of the dates indicated, appointing these offrs. to short service commns., are cancelled:—S. M. Park Sept. 12, 1919. C. D. Adams; Sept. 16, 1919. S. McKeever; Nov. 28, 1919. The follg. are granted permanent commns as Flying Offrs. (since promoted). *Gazettes* of dates indicated in brackets, appointing these offrs. to short service commns., are cancelled:—F. P. Adams; Dec. 5, 1919 (Dec. 5, 1919). S. F. Vincent, A.F.C.; Oct. 19, 1920 (Oct. 26, 1920).

The follg. are granted short service commns. as Pilot Offrs. on probation, with effect from, and seny. of, Nov. 13:—R. E. Bain, K. K. Brown, C. H. S. Buckmaster, C. W. A. Byrne, D. L. Dawson, M. Fraser, A. H. Grace, A. E. St. G. Gratte, A. S. Hutton, E. V. H. Jarvis, L. M. T. Marescaux, H. P. Morris, G. H. Rawlinson, H. J. Storey, N. H. F. Unwin.

The follg. are granted temp. commns. in the ranks stated on seconding for four years' duty with R.A.F. (Nov. 20):—

Flying Offr. (Hon. Flt. Lt.).—K. M. Murray (Capt., Prince of Wales' Vols.).

Flying Offrs.—E. V. H. Hudson (Lieut., Middx. R.); Lieut.-Col. L. F. Blandy, D.S.O., R.E., is granted temp. commn. as Group Capt., with effect from Nov. 30, and seny. Jan. 1, 1919; Pilot Offr. H. V. Alder is confirmed in rank; June 30. The follg. Pilot Offrs. to be Flying Offrs.:—A. E. Rogenhagen; Oct. 15. W. J. Gayes, D. J. Hughes-Jones, E. A. Slater, K. R. Thomas; Oct. 28.

Flying Offr. D. P. Cameron, M.B.E., is transfd. to Res., Class A; Nov. 28. Sqdn. Leader M. G. B. Copeman is placed on ret. list on account of ill-health contracted in the Service, and is granted rank of Lieut.-Col.; Nov. 29. Flight Lieut. W. J. de Salis, D.S.C., resigns his perm. commn., and is permitted to retain rank of Capt.; Nov. 22. Flying Offr. M. R. Cooper-Driver (Lieut., Devon R.) relinquishes his temp. commn. on resigning his commn. in Army; Nov. 25.

ROYAL AIR FORCE INTELLIGENCE

No. 56 Squadron moved from Egypt.—No. 56 Squadron, Royal Air Force, ceased to exist in Egypt, with effect from midnight, September 23, 1922; headquarters and two flights were re-formed on November 1, 1922, at Hawkinge.

The third (detached) flight of No. 56 Squadron, now serving with the Constantinople Wing, will rejoin the squadron at Hawkinge on withdrawal from the Constantinople area.

No. 3 Squadron moved to Gosport.—No. 3 Squadron, Royal Air Force, moved on November 8, 1922, from Leuchars to Gosport.

Relinquishment of R.A.F. Station.—The land and buildings comprising the Airship Station at Inchinnan were handed over on October 12, 1922, to the Disposal and Liquidation Commission for disposal.

IN PARLIAMENT

Imperial Airship Service

SIR NEWTON MOORE, on November 30, asked the Prime Minister whether he can inform the House of the result of the investigation on the proposed Imperial airship service by the Committee presided over by the First Lord of the Admiralty; if the result of this investigation is satisfactory, will he indicate the intentions of the Government at an early date in view of the urgency of improving Empire communication?

The Prime Minister: The report of this investigation is now before the Government, which is, however, not yet in a position to announce its decision.

Captain Viscount Curzon: Would not an airship service give employment to a certain number of people, and could it not be considered in relation to the Government proposals for the relief of unemployment?

The Prime Minister: The question will be considered as soon as we possibly can. That is all I can say.

Mr. Wells: Will the right hon. gentleman consider the position at Bedford—affecting the employment of 1,500 men—where unemployment is rife, in connection with the airship scheme?

Mr. Speaker: Perhaps the hon. member will put that question down.

Royal Air Force Depôt, Harlescott.

MAJOR VISCOUNT SANDON asked the Secretary of State for Air what is the policy of His Majesty's Government as to the vacant buildings in possession of the Royal Air Force depôt at Harlescott, Salop; when they and the land they stand on are to be released for other uses; and for what purpose they have been retained hitherto?

Lieut.-Colonel Sir Samuel Hoare: The depôt at Harlescott is one of the Air stations which it is intended to retain as part of the permanent organisation of the Royal Air Force. The building accommodation and lands now included within this station are not surplus to requirements, and I therefore regret that they cannot be released for other purposes.

Royal Air Force Expansion

CAPT. TERRELL on December 4 asked the Secretary of State for Air how many new squadrons have been formed since the ex-Prime Minister's announcement in August; whether any additional number of airmen have been called into being; and what steps have been taken to relieve airmen recently employed in trying climates such as Iraq?

Sir S. Hoare: As regards the first and second parts of the question, I would ask my hon. friend to put down this question again in about a week's time, when I hope to be in a position to deal fully with all questions concerned with the proposed expansion of the Royal Air Force, as outlined in the announcement made to the House by the ex-Prime Minister in August last. The answer to the third part of the question is that the normal period of service of airmen in Iraq is two years. The replacement of those who have completed their period is proceeding normally, except that some delay has occurred on account of the late Near East crisis.

New Aeroplanes

MR. ALFRED T. DAVIES asked how many additional or up-to-date aeroplanes have been added to the home and foreign forces over which the Ministry has control since April 1 last; and what number are now under construction?

Sir S. Hoare: Since April 1 the Air Ministry has taken delivery of 21 new aeroplanes for service and experimental purposes; a further 132 are under construction. In addition, a large number of machines has been reconditioned.

R.A.F. Recruiting

MR. MCENTEE asked whether civilian recruiters are employed by the Royal Air Force in different centres; whether he is aware that men desirous of entering the force have to come to London and return home, have afterwards to go to Uxbridge and return home, and then, if passed, have to report once more; and whether, in view of the unnecessary expense involved in so much travelling, arrangements can be made for recruits in the various centres being examined on the spot?

Sir S. Hoare: The answer to the first part of the quèstion is that the employment of civilian recruiters, whether in London or elsewhere, ceased as from the 1st instant, for reasons of economy; to the second, that persons wishing to enlist need not make a special journey to London, there being also recruiting facilities at every Royal Air Force station in the United Kingdom and at Glasgow and Birmingham, and that the subsequent journey to Uxbridge is only necessary for recruits who have to pass a trade test; to the last, that the cost of setting up trade test establishments at local centres would be more expensive than the cost of taking the recruits to Uxbridge, which cost, I should add, is in all normal cases borne by public funds, and does not fall on the recruit.

Air Force

SIR C. YATE asked the Under-Secretary of State for India when Sir John Salmond's Report on the Air Force in India will be published?

Earl Winterton: The Report deals with defence questions, and in view of the important strategic considerations involved it would not be in the public interest to publish it.

* * *

Vickers, Ltd., Extend Their Activities

ON November 21, in the High Court of Justice, Chancery Division, Mr. Justice Lawrence heard the petition of Messrs. Vickers, Ltd., to extend the objects of the Company in accordance with a special resolution passed at extraordinary general meetings held on July 19 and August 3 last. This petition referred to extended powers in utilising the buildings and plant which the company had acquired during the War. There being no opposition, Mr. Justice Lawrence granted the petition. The additional powers conferred upon the company include the holding of interest in coal and iron mines, brickworks, quarries, etc.; the manufacture, etc., of locomotives, tractors, motor-cars, aircraft and other vehicles; dealing in explosives and the manufacture of all classes of optical and scientific apparatus; the construction of aircraft for commercial purposes, and of tramways, railways, roadways, bridges, tunnels, canals, hydraulic, electric and gas works, smelting works, refineries, kilns, cement works, quarries, garages and aerodromes; the manufacture of by-products of the company's various industries and other chemical and natural products; the granting of pensions, etc., to any employés and the establishment of institutions for their benefit; the carrying out of research work. The already extensive activities of this go-ahead firm will thus very considerably be increased.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association)

ON Sunday last members turned up in strong force on Parliament Hill. The weather conditions were very favourable both for flying and gliding, and were taken advantage of by all present, Messrs. Pilcher, Whelpton and Woolley having excellent sport flying their enclosed-fuselage models and putting up excellent performances. Mr. W. E. Evans had a new glider with double-surfaced wings, which shows great promise. Mr. F. de P. Green also had a new glider, which no doubt after a few slight alterations will put up a good attempt for the glider record. Messrs. Burchell, Davies, Howes, Johnson, Rippon and others were very busy with gliders and model aeroplanes. Messrs. Howse and Rippon put in a great deal of time experimenting with launching models on special towing lines.

On Sunday next many members will make an attempt on the glider record at Parliament Hill. Judges will be at the starting-point at 11 a.m. prompt.

On Sunday, December 17, members will congregate at Wimbledon Common, near the Windmill, for the specific purpose of trying to improve the British records of model aeroplanes The Society having now been officially recognised by the Royal Aero Club as the body governing model aeroplane competitions, no doubt greater efforts will be made by all model aeroplane enthusiasts throughout Great Britain. The Competition Secretary, Mr. C. A. Rippon, 52, Fairbridge Road, Holloway, London, N. 19, will be pleased to get into communication with prospective competitors.

It is hoped to have the 1923 Programme of Competitions ready early in the new year.

On December 15, at Headquarters, Mr. W. E. Evans will give a lecture on "Some Points on Wood." All interested in the subject are invited to attend.

Meetings are held at Headquarters, the "Red Lion Hotel," 20, Great Windmill Street Piccadilly, W. 1, every Friday at 7.30 p.m. Full particulars of the Society may be obtained from A. E. Jones, Hon. Sec., 48, Narcissus Road, West Hampstead, N.W. 6.

* * *

The Newell (Parachutist) Relief Fund

THE first list of contributions collected by Messrs. E. R. Calthrop's Aerial Patents, Ltd., for the above fund, amounting to £30, has been forwarded today to the Rev. Prebendary F. W. Joyce, Vicar of Harrow. Further contributions for the benefit of the widow and children are earnestly solicited.

Mullion R.N. Airships

THE Reunion Dinner will be held in January next. It is requested that changes of address and new members be notified to W. G. Lavender, Hon. Sec., 16, Alma Road, Wandsworth, S.W. 18.

* * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motor

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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(*Continued from p. xiv.*)

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list;

1922.	
Dec. 15	**Lecture, "Experimental Data without Wind Channel," by O. T. Gnosspelius, before I.Ae.E.**
Dec. 15–Jan. 2	**Paris Aero Exhibition**
1923.	
Jan. 3	**F.A.I. Paris Conference**
Jan. 12	**Lecture, "Seaplane for Commercial Duties," by Maj. D. C. M. Hume, before I.Ae.E.**
Jan. 26	**Lecture, "Wind Tunnel Work at the N.P.L.," by W. L. Cowley, before I.Ae.E.**
Feb. 6–7....	**Third Air Conference at the Guildhall**
Feb. 9	**Lecture, "Seaplane Design," by W. O. Manning, before I.Ae.E.**
Feb. 23	**Lecture, "Aerofoils," by Dr. A. P. Thurston, before I.Ae.E.**
Mar. 15	**Entries close for Dutch Height Indicator Competition.**
Apl. 12	**Lecture, "Some Controversial Points in Aircraft Design, by F. T. Hill, before I.Ae.E.**
May 11	**Lecture, "Experimental Flying," by Maj. M. E. A. Wright, before I.Ae.E.**
June	**International Air Congress, London**
Dec. 1	**Entries close for French Aero Engine Competition.**

EDITORIAL COMMENT.

The British Aircraft Industry

THIS issue of FLIGHT represents a radical departure from our usual practice, inasmuch as it contains, to all intents and purposes, but one subject, albeit a very large one: The British Aircraft Industry. Large, that is to say, when it comes to condensing reference to it into a single issue, although not a tithe of what it should be, and falling very dangerously short of the size it ought to be for national safety. Nevertheless, we are convinced that the British Aircraft Industry need fear no comparison with that of any other country, and if financial conditions are such that it is not possible for British constructors in large numbers to exhibit at the Paris Aero Show, this is not the fault of the Industry but is due to the scant encouragement given by our Government to British aviation firms.

Other countries, and notably France, have realised that there is an enormous future before aviation in all its branches, and huge sums are being devoted to the development of air lines, to the production of new types of machines, and to propaganda abroad. Thus, in the past, when a few British firms have had the enterprise to send representatives abroad, these have usually found that other and more far-seeing nations have got in ahead of us, and have reaped a large share of the orders that might otherwise have been placed with British firms. Partly this has been due to the rate of exchange, which has generally been against us and in favour of countries like France and Italy, but to a large extent the cause may also be ascribed to the support which these countries have given their aviation firms in the matter of sending out missions, of granting subsidies for propaganda, or else, indirectly, by placing orders at home which have enabled the firms themselves to defray the expenses involved in propaganda work of this nature.

In spite of all these drawbacks, however, British aircraft are still to be seen all over the world, giving yeoman service to the purchasers and maintaining British prestige abroad, and we think that most unbiassed observers will admit that, as regards quality, British aircraft products have nothing to fear from comparison with those of other nations.

That being so, it is unfortunate that the Paris Aero Show will not find British aircraft and engines represented nearly so well as they deserve to be. There is little doubt that, apart from the multitudes who visit the Paris Show merely as representatives of the "man in the street," and in regard to whom the exhibition is mainly of value as a piece of very effective propaganda, representatives of most civilised nations will visit the Grand Palais, there to study the latest developments in aircraft and aero-engine design.

While it is probably a fact that the latest designs, at any rate those of a military nature, rarely are allowed to be exhibited at the Salon, and thus, from the point of view of Government representatives, an aero show offers less of interest than might be supposed, there still remains the civil aviation side, and developments in detail construction, which can be, and usually are, shown at the Grand Palais.

In order that the British Aircraft Industry should not be entirely forgotten in the general interest of the Paris Show, we have compiled in the present issue brief references to all the main firms still actively engaged upon the design and construction of aircraft, aero engines, and equipment and accessories. As there would in any case have been comparatively few novelties to record, either among complete aircraft, engines, or accessories, we have thought that an issue such as the present might be made more generally interesting by giving a brief historical sketch of the past and present activities of the various firms, instead of long technical descriptions which would, in most cases, already have been published from time to time in our ordinary issues.

Thus, this week's FLIGHT contains what is hoped to be a very complete work of reference to the British Aircraft Industry as it exists today, outlining the past history—necessarily very briefly—of each firm, indicating the kind of work which has been done in the past, and mentioning, in so far as Air Ministry regulations allow, the types now being produced or about to be produced by the various designing and construction firms.

In order to facilitate reference, the articles have been subdivided under three main heads or sections, the first of which deals with British aircraft designing and construction firms, the second with British aero engine firms, and the third with firms manufacturing or selling equipment and accessories.

In each section the firms have been arranged in alphabetical order, so that it should be an easy matter to refer to any firm under any section. In cases where one firm manufactures both aircraft and aero engines, we have dealt with the aircraft under one section and with the engines under the other, as in this manner all machines are kept together and all engines together.

It has been suggested that we should publish this issue of FLIGHT in two or three languages. After considering the matter most carefully we have decided not to do so for several reasons. To begin with, it is a matter of the very greatest difficulty to get technical articles translated really well, and the representatives of foreign governments to whom FLIGHT goes every week all, or practically all, read English as easily as they do their own language. Consequently they will have no difficulty in extracting from this issue any information required. Another point is that, were we to publish the reading matter in, for example, three languages, this would mean that we should only be able to devote one-third as much space to each firm, and we think it will be agreed, after reading the present number, that any such reduction could not be made without seriously detracting from the value of the issue.

Yet another reason for not publishing FLIGHT in several languages is that, as illustrations always have much greater appeal than columns of solid matter, we have included a very large proportion of photographs of machines and engines, publication of which will, in most instances, be sufficient reminder, to those who follow aviation matters at all closely, of the different types, full particulars of which have, in nearly all cases, already been published in previous issues of FLIGHT.

Our aim in compiling the following *résumé* of the British Aircraft Industry of today, has been to produce, as completely as possible within the space at our disposal, an index to which reference can constantly and easily be made, during the coming year, by anyone wishing to familiarise himself with the history and work of any one of our aviation firms, and we hope to have succeeded in producing a reference work the utility of which will not be confined to the week of its publication, but apply equally during the months to come. So far as we are aware, this is the first occasion upon which a weekly aviation journal has attempted to encompass within one issue a *résumé* of the entire aviation industry of the country, and the advantage of having all this information in one volume instead of spread over two or three should be very considerable.

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AIRCRAFT INDUSTRY AT A GLANCE

In the following notes we give a very brief outline of the past history and present activity of the chief British firms at presen actively engaged upon the design and construction of aircraft, aero engines, equipment, etc. In order to facilitate reference, we have subdivided the article into three distinct groups, the first of which deals with aircraft firms, the second with aero engine firms, and the third with firms manufacturing equipment, components, and accessories. The firms have been arranged alphabetically in each group, so that any firm may be found with a minimum of trouble. In the case of firms who design and manufacture engines, as well as complete aircraft, we have arranged their products under the respective headings, as in this manner it will be found easier to refer to any section for information upon any particular subject.—ED.

Aerial View of the A.D.C. Depot at Waddon (Croydon).

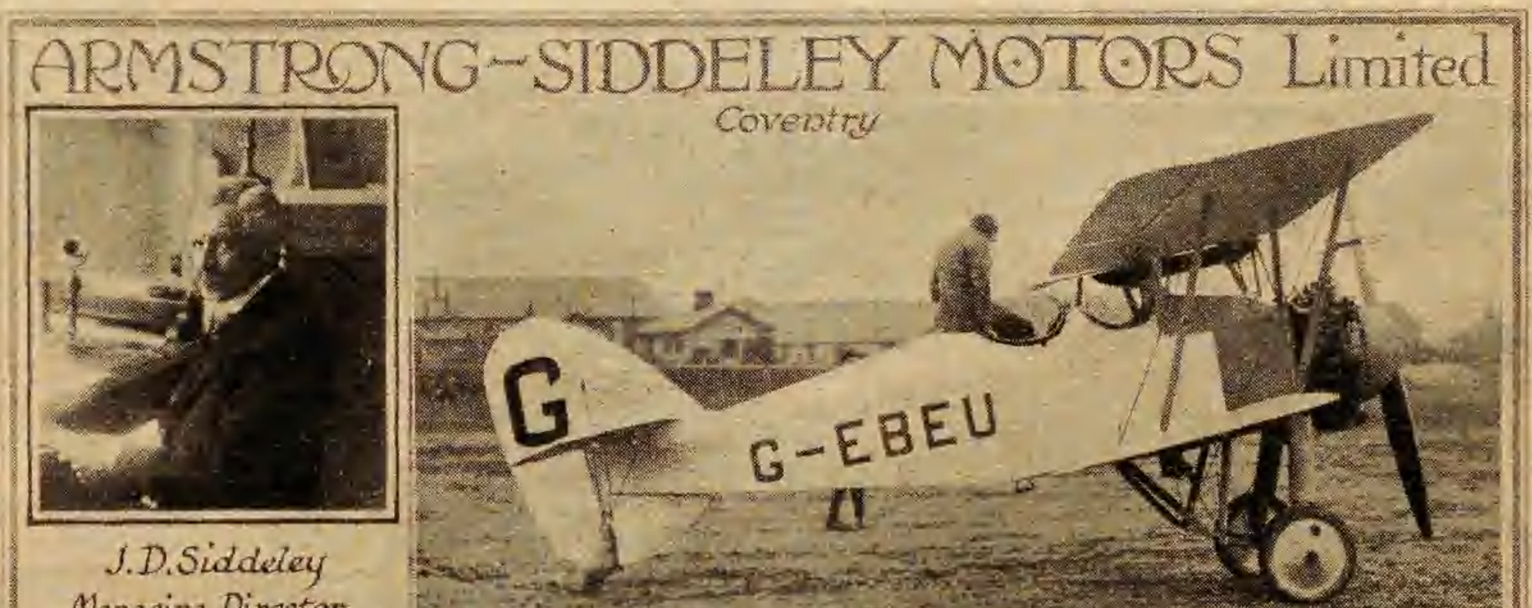
FOUNDED a few months after the Armistice, the Aircraft Disposal Co., Ltd., commenced its activities by taking over from the Government the enormous stocks of aircraft, aero engines, and equipment which were in existence at the termination of hostilities. A system of storage at the Waddon depôt was adopted which would ensure not only that all material was kept in sound condition, but also that any *fuselage*, pair of wings, engine, etc., could be got out at any time should it be desired to re-condition a machine at short notice. Expert workmen were engaged who set to work to overhaul machines and engines, and any part found to be defective or which failed to come up to A.I.D. standards was scrapped and a new part substituted. In this manner a number of different types of machines and engines were re-conditioned, and between the taking over by the firm of the Government surplus stock and the present day close upon 1,000 machines and a corresponding number of engines have been supplied by the A.D.C. to foreign governments. Incidentally it may be mentioned that there are very few civilised nations which have not purchased British machines from this firm, and thus the British aircraft industry has been represented practically all over the world, and its reputation for "the Goods" kept to the fore.

Colonel M. O. Darby, who is managing director of the A.D.C., has thus worked up excellent connections in a great number of foreign countries, and it has now been decided that in the future the Aircraft Disposal Co. is to do original designing and construction.

At first it is the intention to design machines—of military type—which are slightly better as regards performance, etc, than those which the firm has hitherto supplied, so that countries which require slightly more up-to-date types will be able to obtain them from the original suppliers. We understand that it is not intended to compete in the home market, but merely to study the requirements of foreign Governments.

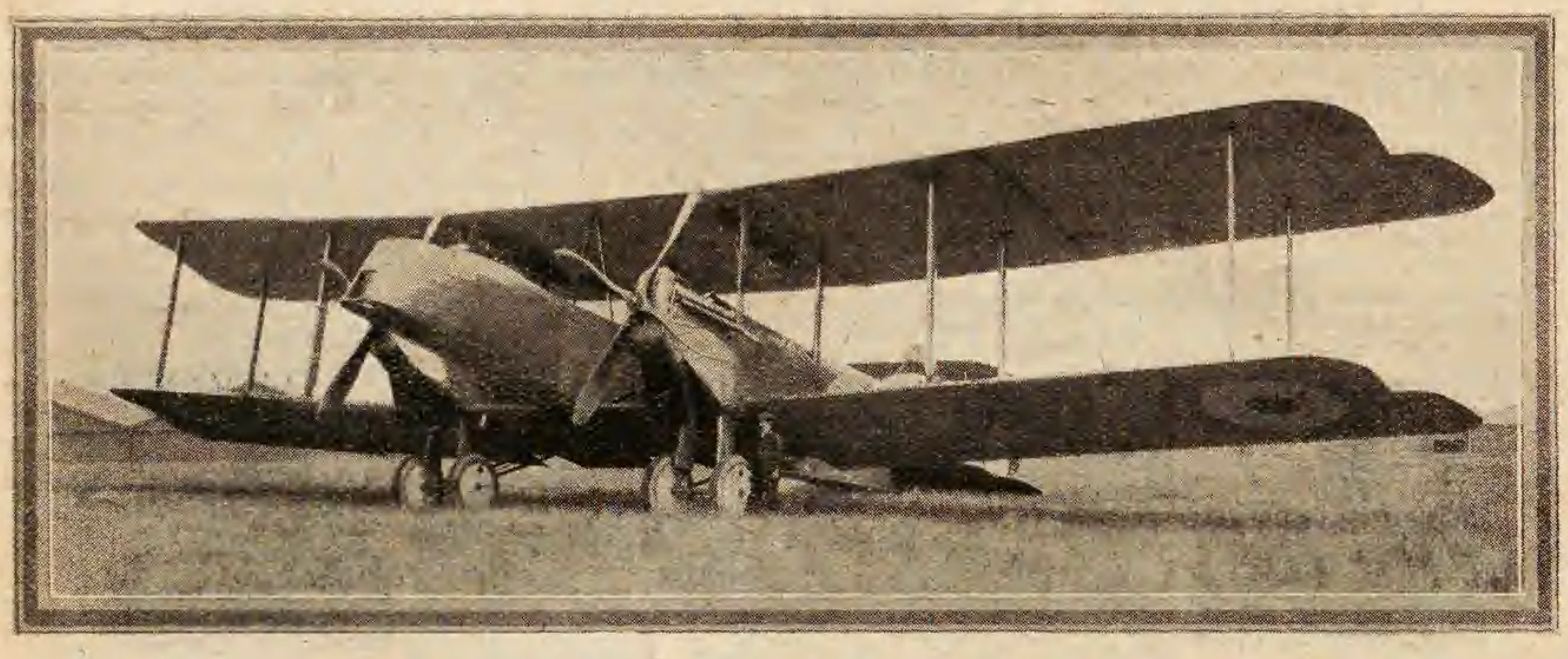
In addition to the establishment of a designing staff and construction works, the A.D.C. will act as general aeronautical agents, and already this firm has been appointed selling agents for firms such as Armstrong-Whitworth, De Havilland Aircraft Co., the Blackburn Aeroplane and Motor Co., Handley Page, Ltd., Bywater Petrol Systems, Munro Cameras, Titanine Dope, Triplex Glass, etc.

The A.D.C. will also continue as hitherto to supply aircraft, engines and equipment from stock, so that purchasers will always be certain of being able to obtain at the shortest possible notice spares, replacements, etc., for any type of aircraft or engine.



The Siddeley "Siskin," with Siddeley "Jaguar" engine.

Well known in the automobile industry long before the war, it was not until towards the end of the war that Armstrong-Siddeley Motors, Ltd., of Coventry (or Siddeley-Deasy, as the firm was then styled) established an aircraft department. The firm had, however, quite early in the war entered the aircraft industry by turning out the now famous Siddeley "Puma" aero engine. Of this side of the firm's activities, more will be said in the aero engine section.



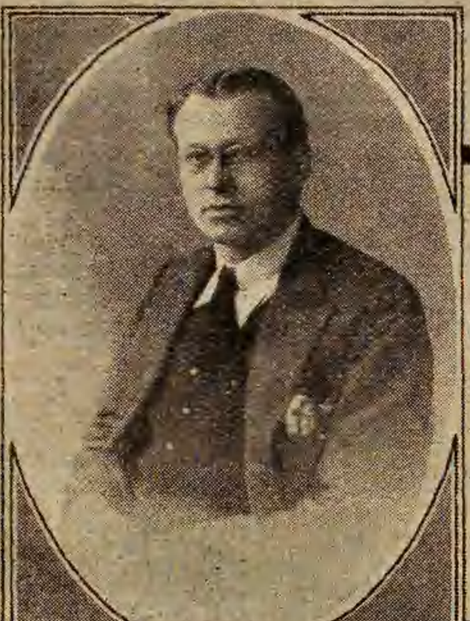
The Siddeley "Sinaia," with two Siddeley "Tiger" engines.

Probably the first Siddeley aeroplane to be heard of by the outside world was the "Siskin," an early edition of which was fitted with an A.B.C. "Dragonfly" engine. This machine was designed as a single-seater fighter, and one of its characteristic features was the Oleo undercarriage. Since that time Major F. M. Green, who is in charge of the aircraft department, has re-designed the machine, and the modern "Siskin," which is fitted with one of the new Siddeley "Jaguar" radial air-cooled engines, differs considerably from the original model.

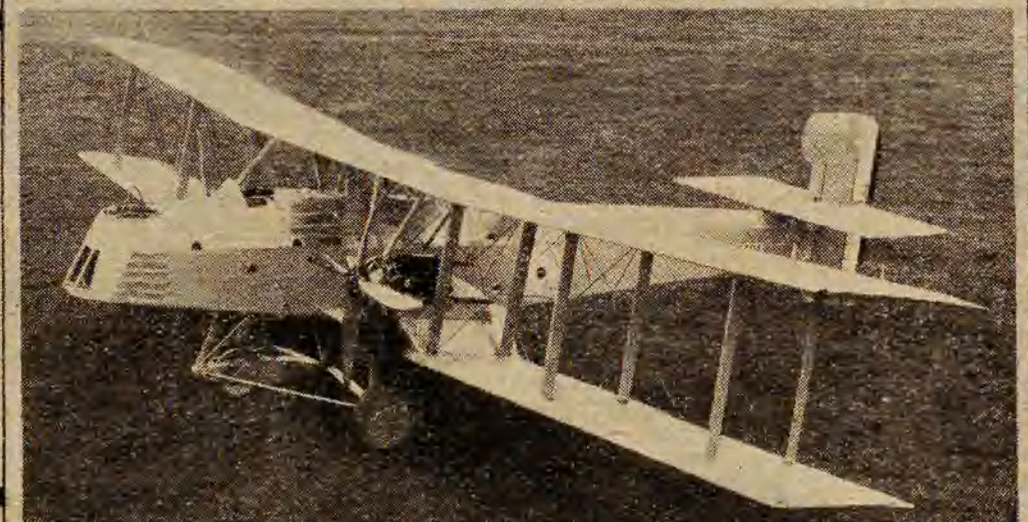
Another machine produced by this firm was the "Sinaia", a twin-engined military machine fitted with two Siddeley "Tiger" engines. The accompanying photograph shows the "Sinaia," but as the machine is the property of the Air Ministry, no details may be given.

The same remark applies to a great extent to a very great deal of the experimental work now being carried out by Armstrong-Siddeley Motors. Regarding this little may be said, beyond stating that work on metal construction is being carried out in the experimental shops, and that some very interesting researches into this form of construction give good promise. Major F. M. Green is a firm believer in metal for aircraft, and this side of the firm's activities will be watched with interest.

BOULTON & PAUL Ltd.
Norwich



J.D.North
Chief Engineer & Designer

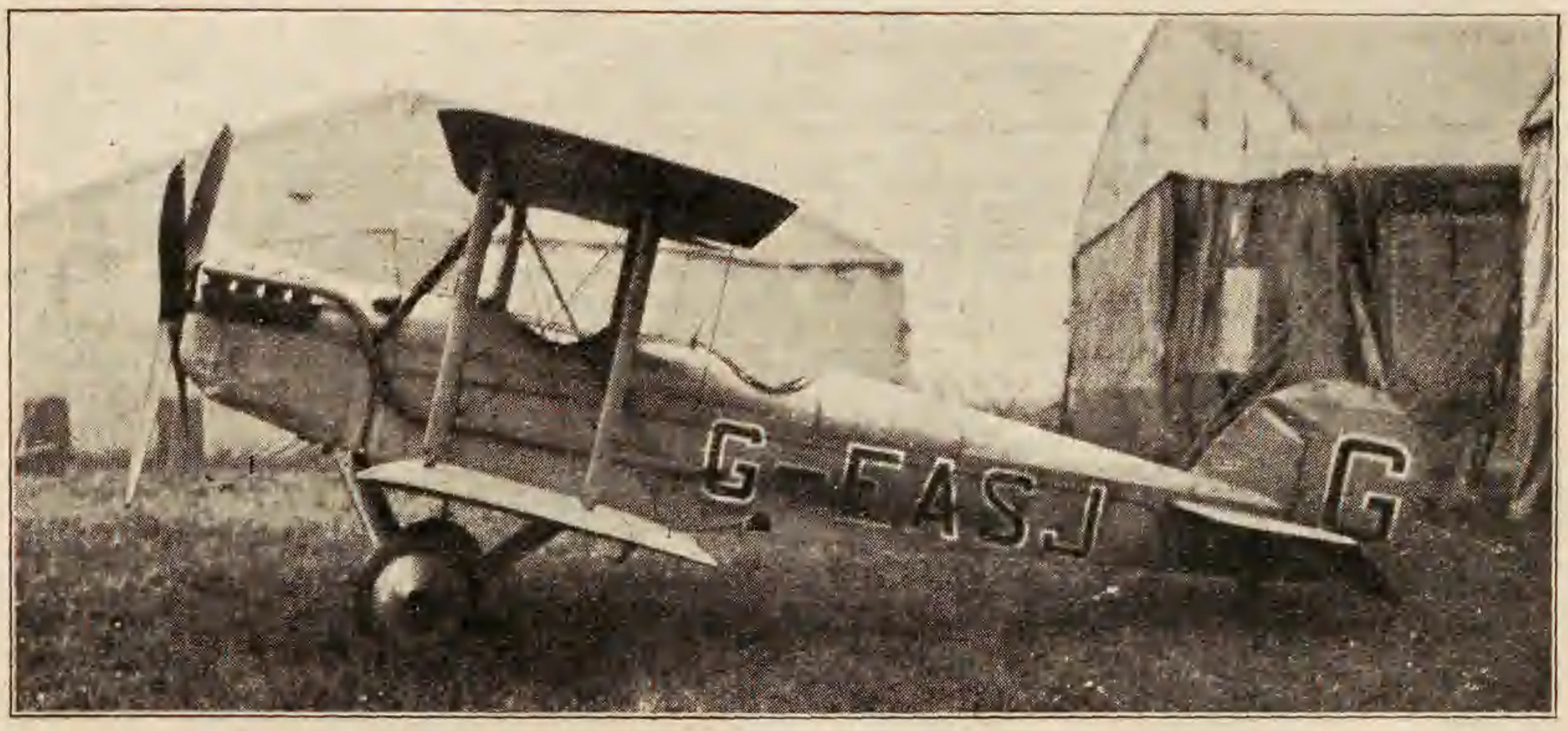


The Boulton and Paul "Bolton" all-metal aeroplane, two Napier "Lion" engines.

Boulton and Paul, Ltd., of Norwich, is a very old firm of general engineers, and when, during the war, they first commenced to build aircraft, they started with one F.E.2B. Others followed, and before many months the aircraft department of Boulton and Paul had assumed large proportions. Other types of machines were built, notably a very great number of Sopwiths, and ultimately almost the whole of the extensive works in Norwich, as well as the new works built at Mousehold, were busy turning out aircraft.

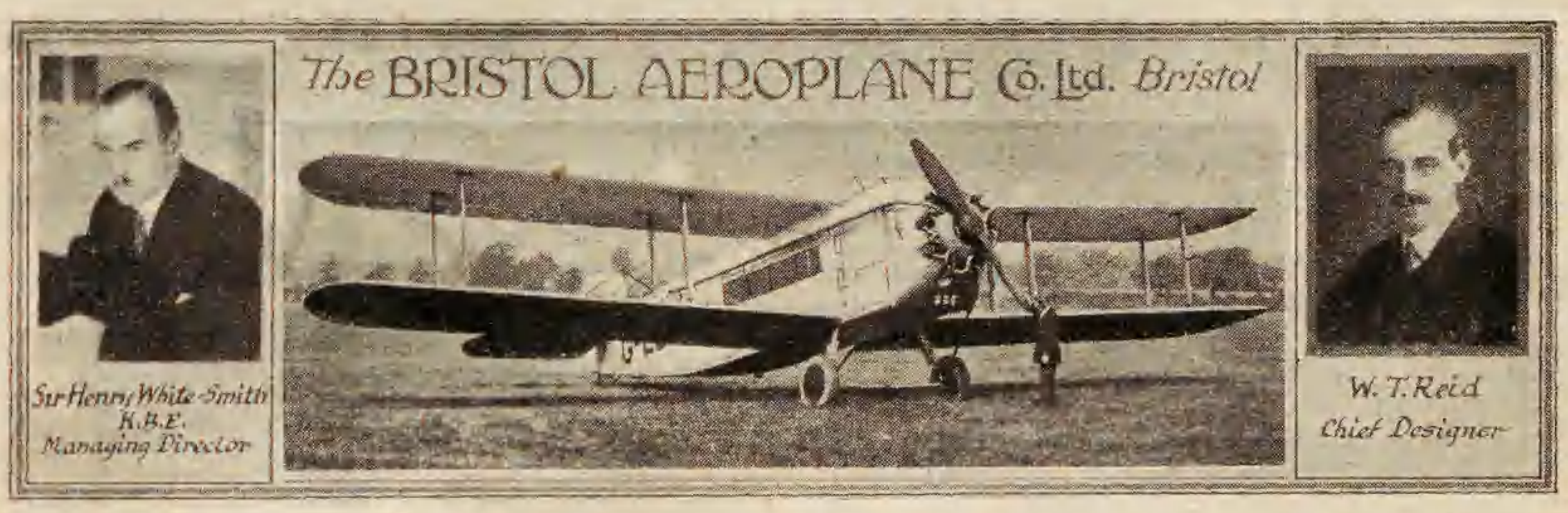
The directors of Boulton and Paul's, of whom there are several Ffiskes and Pauls, as they familiarised themselves with aircraft and aircraft construction, became convinced that there was a great future before aviation in its various branches, and they decided that the time had come for getting out original machines instead of building to other people's designs. Consequently Mr. J. D. North, who was at that time chief engineer to the Grahame-White Co., was engaged as chief designer, and he at once set to work on producing military machines. Of those which he designed, perhaps the best known is the "Bourges," which, in its first form, was designed for A.B.C. engines, but which has appeared since the war in slightly altered form, both with rotary engines and with Napier "Lions."

Mr. North is now, and has been for several years, chief engineer of the aviation department, and for some years has devoted his attention specially to metal construction. Examples of Boulton and Paul all-metal machines have been exhibited at the Paris Aero Shows, and experimental work is being undertaken on a large scale at Norwich. The latest machine to be completed for the Air Ministry is the "Bolton,"



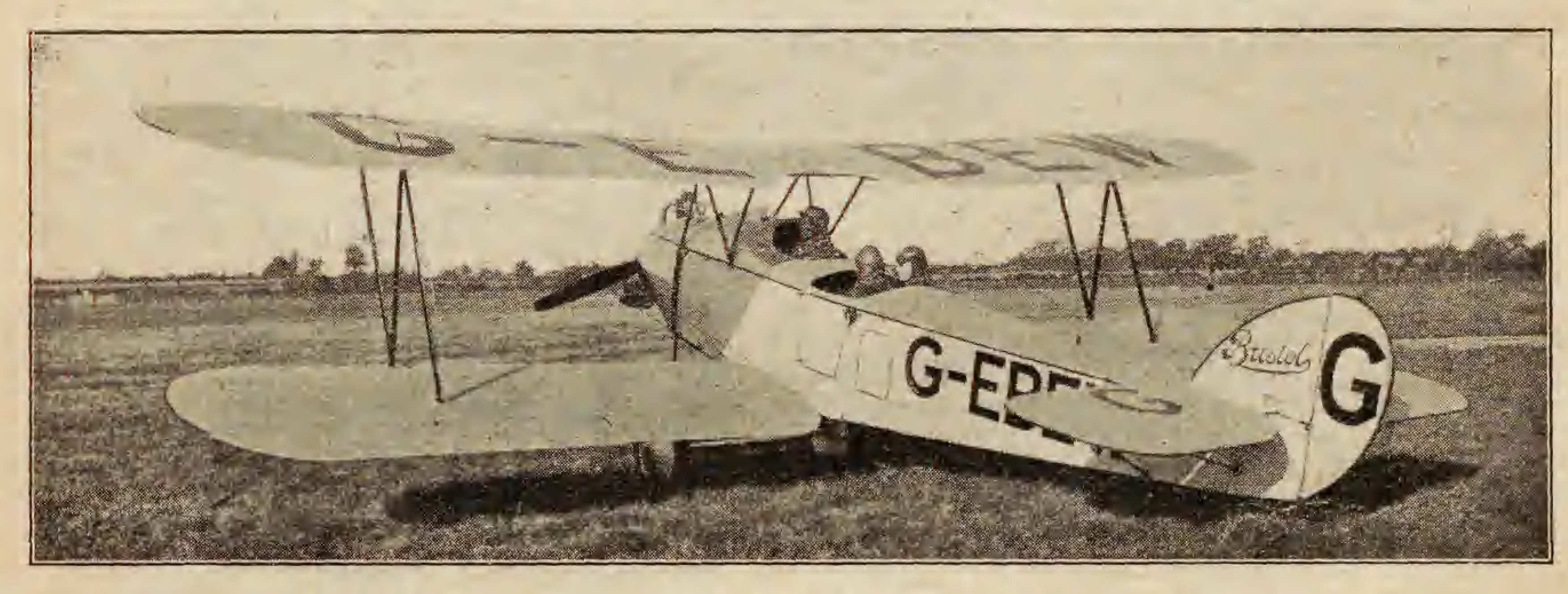
The Boulton and Paul P. 9 two-seater, with 90 h.p. R.A.F. engine.

a photograph of which is published herewith. Owing to the many novel features of this machine, no detailed reference to it is permitted, but it is not too much to say that in the sphere of all-metal aircraft construction, Boulton and Paul hold a premier position. Their machines are built almost exclusively of steel, and in the main the highly-stressed members of the structure are built up of rolled sections of very light gauge, a tremendous amount of research work having been done in the B. and P. laboratory in order to discover the best form of sections and the most satisfactory way of producing them. It is to be regretted that samples of Boulton and Paul steel construction will not be shown in Paris.


The BRISTOL AEROPLANE Co. Ltd. Bristol
Sir Henry White-Smith K.B.E. Managing Director
W. T. Reid Chief Designer

The "Bristol" 10-seater, with Bristol "Jupiter" engine.

Founded in 1909 by the late Sir George White, the Bristol Aeroplane Co. is one of the oldest aircraft firms in Great Britain. Originally, the firm was known as the British and Colonial Aeroplane Co., but the title was changed fairly recently to the present one. The managing director is now Sir Henry White Smith. In the early days of its existence this firm built "Box Kites" of the H. Farman type, and these soon gained a reputation for excellence of workmanship, a reputation, incidentally, which this firm has worthily maintained right up to the present time. Sundry types of



The "Bristol" three-seater, with 100 h.p. "Bristol" Lucifer" engine.

machines were designed at Bristol before the war, of which it suffices to mention a few, such as the Prier monoplane, the Coanda monoplanes and biplanes, and the Gordon England biplanes, all named after their designers.

A couple of years or so before the war the services of Mr. (now Squadron Leader) F. S. Barnwell were secured, and as chief designer to the firm, Barnwell was responsible for a number of successful "Bristol" machines, of which it will suffice to mention the Bristol "Bullet" (first known as the Bristol "Scout"), the Bristol fighter, the Bristol monoplane, and the Bristol "Badger." A little more than a year ago Squadron Leader Barnwell severed his connection with the firm, and accepted an appointment in the Australian Air Force. The last machine of Barnwell design is very unorthodox, and highly interesting, but as it is being built for the Air Ministry no reference to it is permissible.

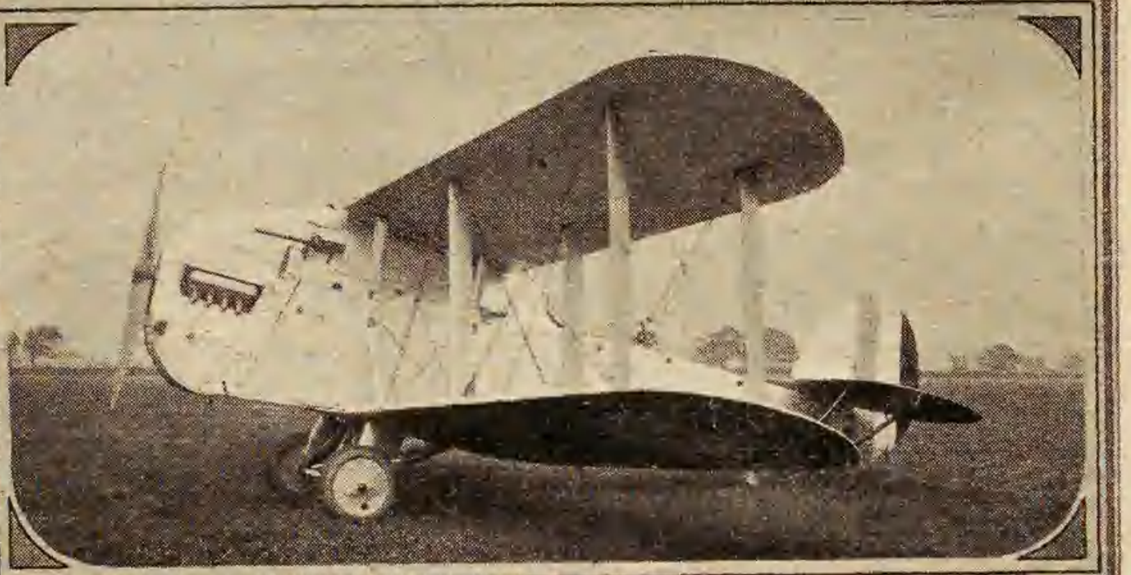
Mr. W. T. Reid, who was Squadron Leader Barnwell's chief assistant, is now chief designer, and has already produced several machines, of which mention may be made of the huge "Braemar" triplane with four engines, the "Bristol" ten-seater, and, quite recently, the little three-seater, which was fully described in our issue of December 7, 1922.

In addition to these machines, Mr. Reid has designed a racing monoplane, which was intended as a challenger for the Coupe Deutsch, but which could not be got ready in time for that race. This machine is of very unusual design, its chief features being a very deep *fuselage*, very small monoplane wings, and a retractable undercarriage.

The Bristol Aeroplane Co. also manufacture the famous "Bristol" radial air-cooled engines the "Jupiter" and "Lucifer," reference to which will be made under the Aero Engine section.

BLACKBURN AEROPLANE AND MOTOR Co. Ltd. Leeds

Robert Blackburn

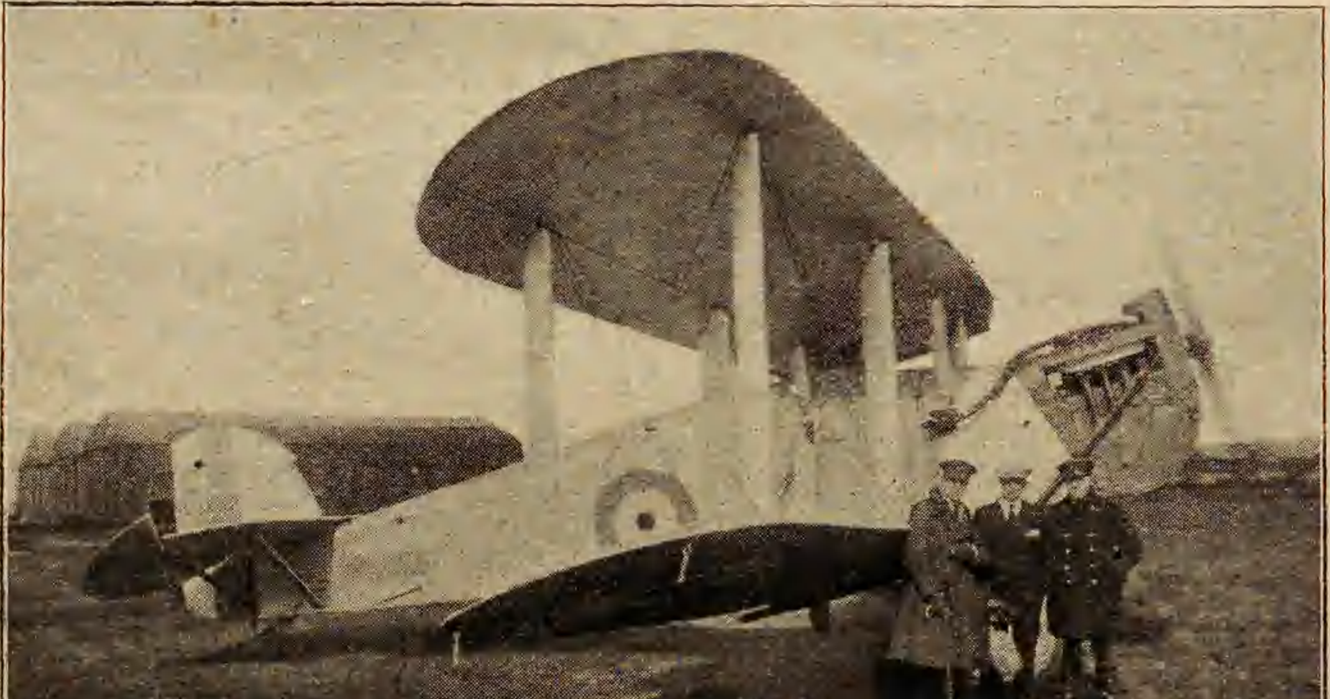


The Blackburn "Dart" Fleet Spotter.

The earliest Blackburn aeroplane was designed and built by Robert Blackburn at the beginning of 1909, and from that date until the present time the history of Blackburn aircraft has been one of steady progress, and Mr. Robert Blackburn, the founder of the firm, has remained with it ever since as managing director.

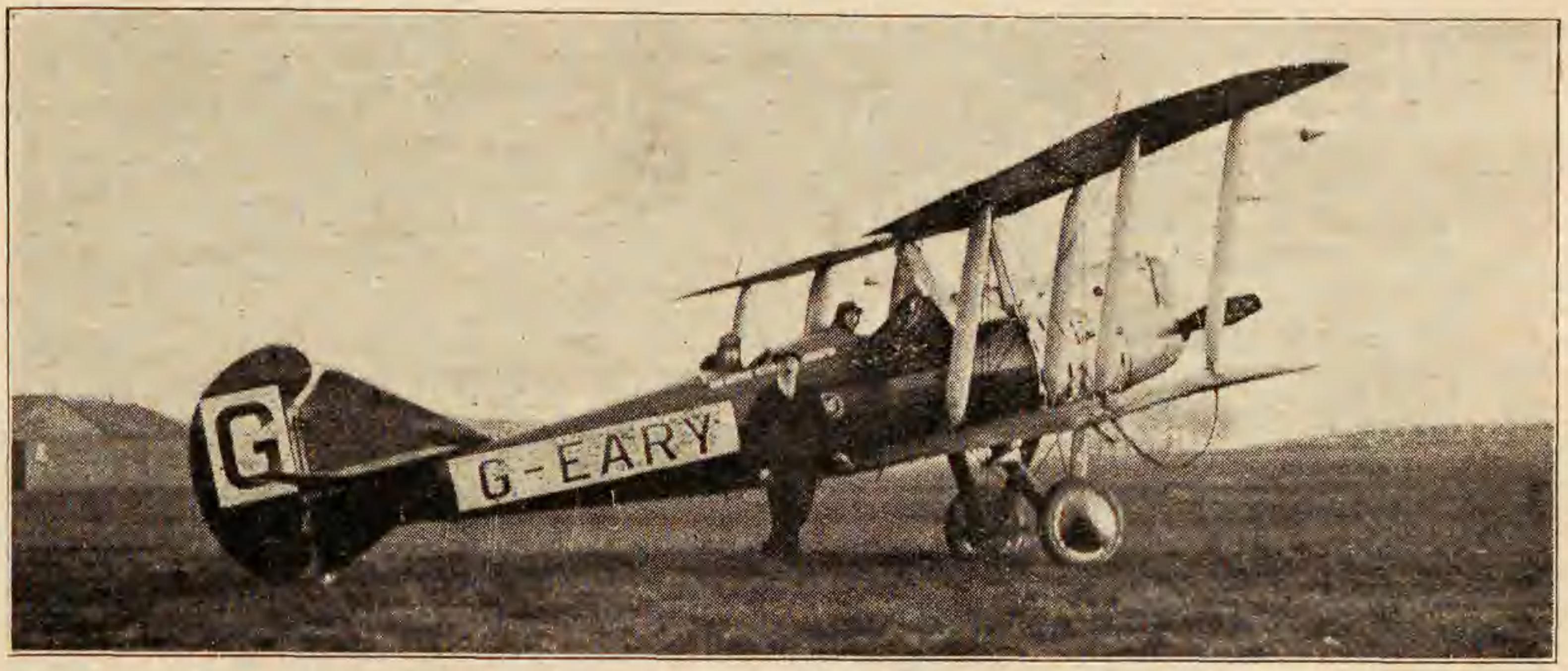
During the war the Blackburn Aeroplane and Motor Co., Ltd., of Leeds, built, at first, various types of machines under licence. It was not long, however, before they turned their attention to original design, and a number of different types were produced, seaplanes as well as land machines. Among the latter, probably the type which became best known was the "Kangaroo," a twin-engined bomber with two Rolls-Royce engines.

A type of machine upon which the Blackburn Aeroplane and Motor Co. have specialised for a number of years is the torpedo plane, and Blackburn machines of this type are now being introduced into both British and foreign air services. One of the best-known modern Blackburn torpedo planes is the "Swift," which has a Napier "Lion" engine. Another modern Blackburn is the "Dart" Fleet Spotter, about which, however, nothing regarding its constructional details may be published at present. We give, however, a photograph of this machine.



The Blackburn "Swift" Torpedo 'Plane, Napier "Lion" engine.

WILLIAM BEARDMORE AND CO., LTD.



The Beardmore W.B.2 Commercial Biplane, with 160 h.p. Beardmore engine.

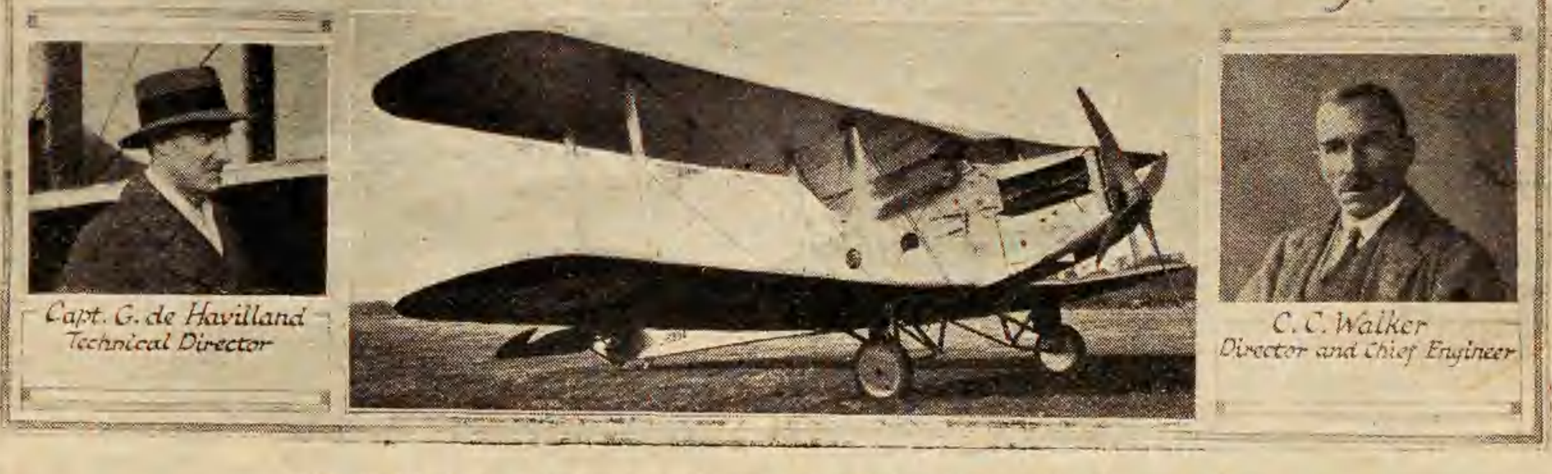
The business of Wm. Beardmore and Co., Ltd., of Glasgow, is chiefly that of steel manufacturers, shipbuilders, and general engineers on a very large scale. They have nine works in and around Glasgow, and, further, hold a controlling interest in many other British industrial enterprises.

During the war this firm produced nearly 700 aeroplanes and seaplanes of various types, ranging from the Sopwith "Baby" to the four-engined Handley-Page bomber. After the war, Beardmores turned their attention to commercial aircraft, and several types of all-metal machines were produced, among which we mention the WB2, with 160 h.p. Beardmore engine. For the Air Ministry competition at Martlesham in 1920, Beardmores undertook the design of a large all-metal multi-engined flying boat (amphibian), but the machine was not finished in time for the competition and has never, we believe, been completely finished.

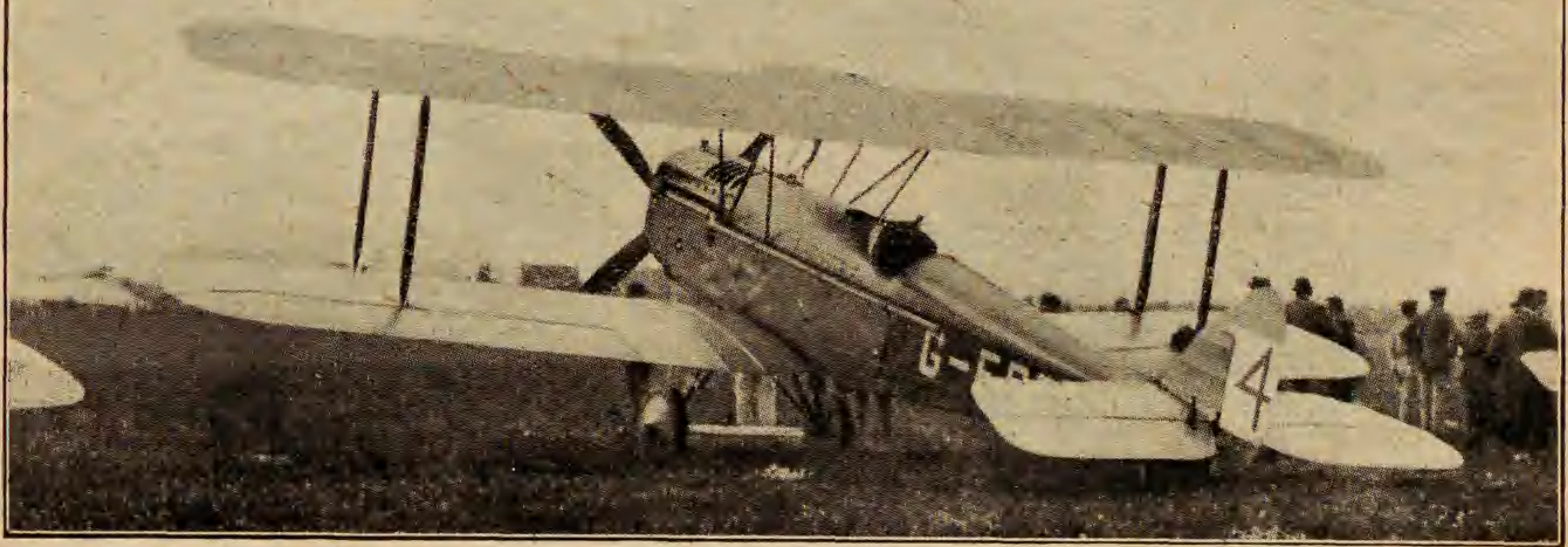
It is, of course, well known that Wm. Beardmore and Co. are also airship constructors, and at the large ariship shed at Inchinnan were constructed the large rigid airships R.24, R.27, R.34 (which made the double crossing of the Atlantic), and R.36, the last-mentioned being of 3,000,000 cubic feet capacity. The aeroplane and seaplane construction works are situated at Dalmuir, and cover an area of 100 acres, with a frontage of 1½ miles on the river Clyde.

To the Beardmore aero engines reference will be made under that heading.

The DE HAVILLAND AIRCRAFT Co. Ltd. Edgware



The D.H. 27 "Derby," fitted with Rolls-Royce Condor engine.



The D.H. 37, with 275 h.p. Rolls-Royce "Falcon" engine.

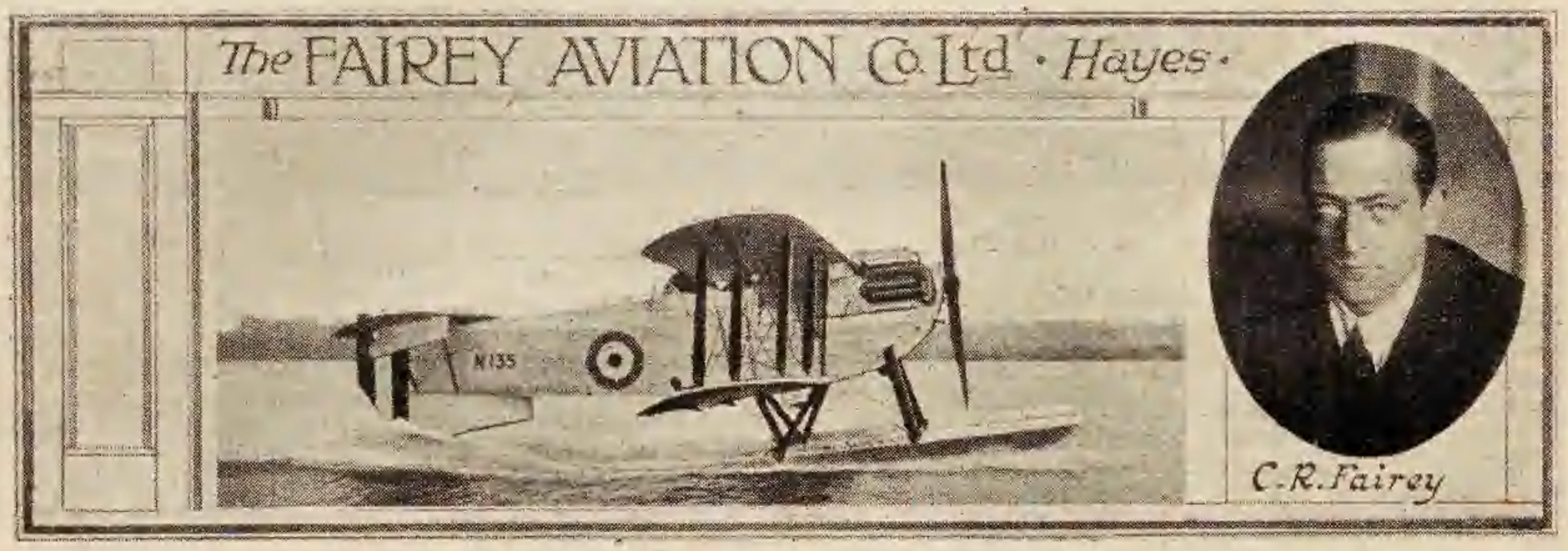
Captain Geoffrey de Havilland is one of our oldest aircraft designers (in experience at any rate, although not in years), his first machine being built in 1909. For a number of years Capt. de Havilland was a designer at the Royal Aircraft Factory (as it then was, now the Royal Aircraft Establishment) at Farnborough, and among the best-known of his machines from that time is the original B.E. Shortly after the war Captain de Havilland joined the Aircraft Manufacturing Co. as Technical Director, and the world knows the number of successful machines which he turned out during the war, from the D.H.1 "pusher" to the D.H.10 twin-engined bomber.

When the "Airco." (as the Aircraft Manufacturing Co. had become known) closed down after the war, Captain de Havilland established his own company at Stag Lane, Edgware, Middlesex, and he brought with him several of those who had been associated with him at the Airco., notably Mr. C. C. Walker, who is now his chief engineer, and Mr. Hagg, chief of the de Havilland drawing office staff.

The de Havilland Aircraft Co. have produced a number of commercial machines, of which the best known are perhaps, the D.H.18, the D.H.34 (which is now very extensively used), the D.H.37, a fast touring machine, and the D.H.29, a thick-wing cantilever monoplane with Napier "Lion" engine. Recently a bomber, known as the "Derby," has been finished and other interesting machines are in the offing.

Run as a separate concern is the de Havilland Hire Service, which provides, at a moment's notice, taxiplanes which take passengers to any point in Europe. This section of the firm has also met with great success, and some very notable flights have been carried out, notably by Mr. Alan Cobham.

Recently a flying school has been started at the Stag Lane aerodrome, and this promises to become as successful as the other de Havilland undertakings.



The Fairey Amphibian "Pintail," Mark III, 450 h.p. Napier "Lion" Engine.

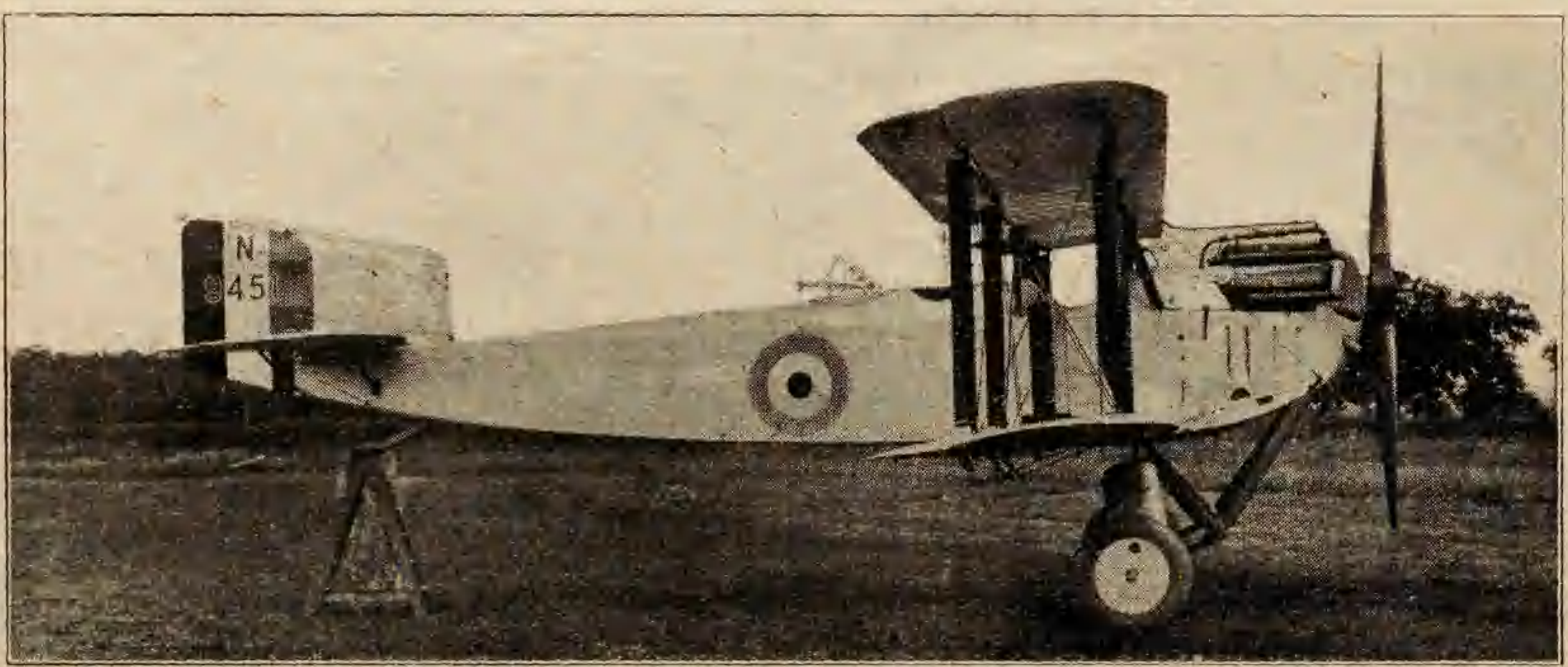
THE Fairey Aviation Co., Ltd., of Hayes, Middlesex, was founded in 1915 by Mr. C. R. Fairey, who had previously been on the technical staff of Short Brothers, of Rochester and Eastchurch. Mr. Fairey is chairman of the firm, and is also designer and chief engineer, his chief assistant being Mr. F. Duncanson, with Mr. A. C. Barlow as chief draughtsman.

At the Hayes Works, of which Mr. W. Broadbent is manager, the Fairey Aviation Co. have produced a number of interesting machines, starting during the war with a twin-engined fighter (land machine), and with the following seaplanes and amphibians in close succession: the "Campania," the "Hamble Baby," the N.9, the N.10, with its successors, the IIIA, IIIB, IIIC and IIID types. With the exception of the N.9, all these went into production for war use. In 1918 Mr. Fairey designed the N.4.

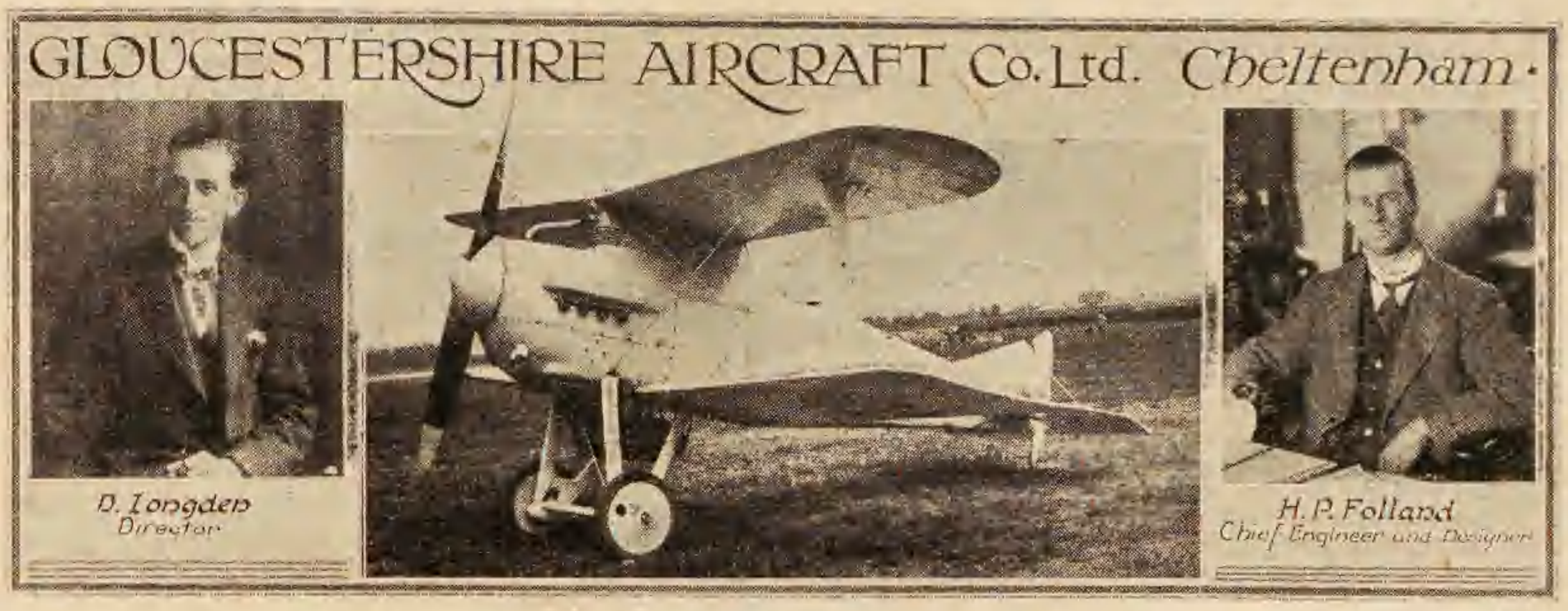
Since the Armistice, the Fairey Aviation Co. have produced a number of types, but owing to the fact that all have been designed for the Air Ministry, no detailed reference is possible. A few of the types may, however, be mentioned, such as the "Pintail" Marks II and III, the improved IIID, the "Fawn" and the "Flycatcher" types. Several experimental amphibians have also been built, and it may be recalled that the machine on which the Portuguese aviators Cabral and Coutinho flew from Lisbon to South America was a Fairey seaplane.

This firm has done a considerable amount of experimental work on oleo undercarriages, and have made great improvements in float construction.

It might also be mentioned that the Fairey variable camber flap gear has recently been tested at Martlesham Heath experimental station with markedly successful results. Less known is probably the fact that the Fairey Aviation Co. have done a considerable amount of work on metal construction, all with high-grade steels. The policy has been to substitute gradually metal parts for wood units, and now Fairey machines are composed of nearly 50 per cent. metal. Several all-metal designs are in hand. The company's works at Hayes and Hamble (near Southampton) now cover some 140,000 square feet of area and employ at the present moment about 450 hands, with a technical staff of 30, which is being further increased.



The Fairey Series III Military Aeroplane, 450 h.p. Napier "Lion," has variable camber wings and long-travel oleo undercarriage.


GLOUCESTERSHIRE AIRCRAFT Co. Ltd. Cheltenham.
D. Longden
Director
H. P. Folland
Chief Engineer and Designer

The Gloucestershire Aircraft Co.'s "Mars I," Napier "Lion."

Founded as an aircraft firm in 1915 (although having been in existence in a different line of business long before that time) the Gloucestershire Aircraft Co., Ltd., of Cheltenham, Gloucestershire, at first centred their attention upon the production of machines to Government design. An idea of the capacity of the Sunningend works may be formed when it is mentioned that the average output during the war was 20 machines per week. After the war Mr. A. W. Martyn, chairman and managing director of the firm, and Mr. D. Longden, one of the directors, decided that the firm, having taken up aircraft construction so successfully during the war, should become permanently an active member of the aircraft industry. A slight rearrangement of the firm was consequently carried out, and Mr. H. P. Folland, who had until the closing down of that firm been chief designer to the British Nieuport Co., was engaged as chief engineer and designer.

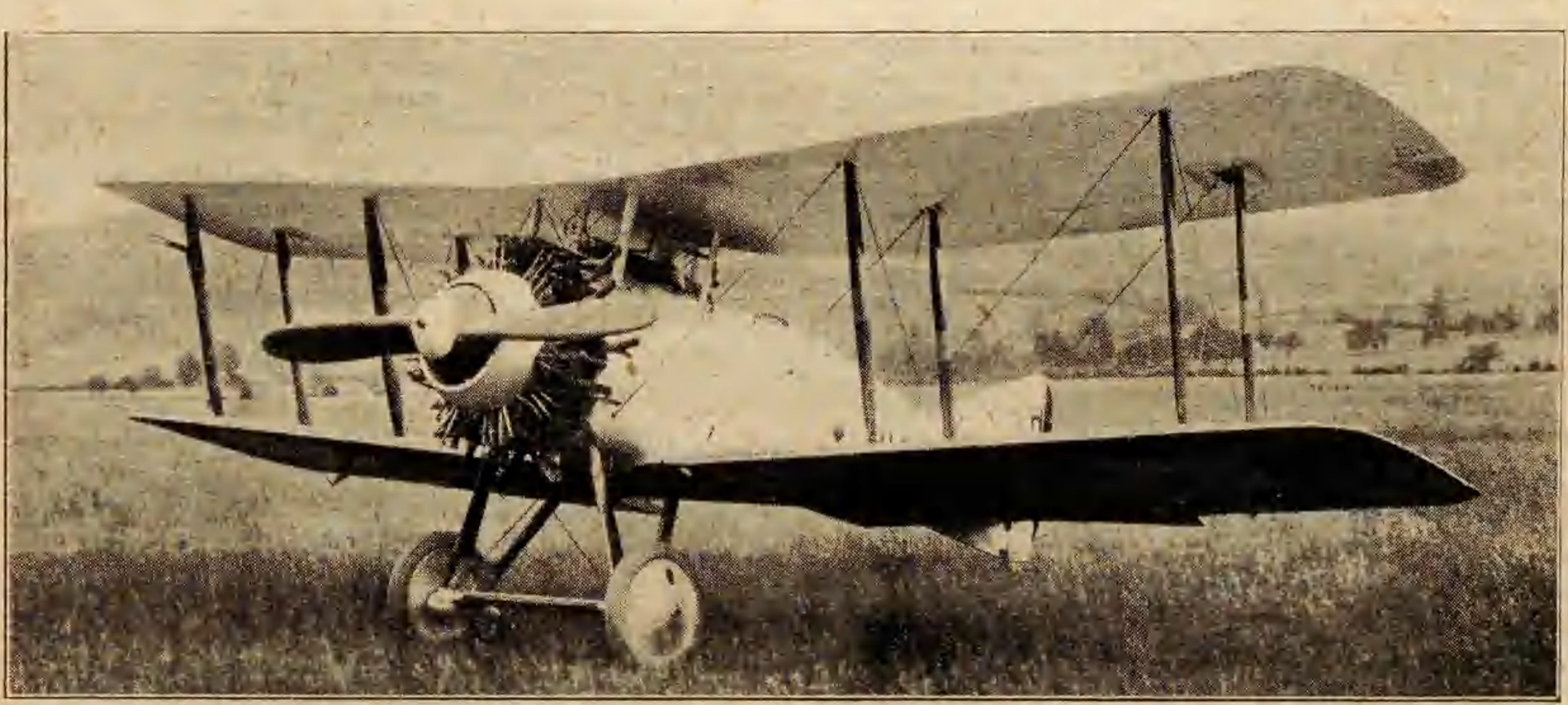
Mr. Folland brought with him from the Nieuport company several of the members of the Nieuport designing staff, many of whom had been with Mr. Folland when he was at the Royal Aircraft Establishment at Farnborough, where he did much of his early work, having had a considerable share in the design of such machines as the F.E.2, the F.E.4 and the S.E.5A, the last mentioned being a machine which was built in very large number and extensively used in many parts of the world.

While with the Nieuport and General Aircraft Co., Mr. Folland designed the Nieuport "Nighthawk," with A.B.C. "Dragonfly" engine. This machine was accepted by the Air Ministry for the 1919 programme, but the cessation of hostilities resulted in the many orders placed for the "Nighthawk" being cancelled. A twin-engined bomber, and the single-seater "Goshawk" were also designed and built. It was practically inevitable, however, that machines of this standard of performance would lead to even greater things, and this promise has been more than fulfilled.

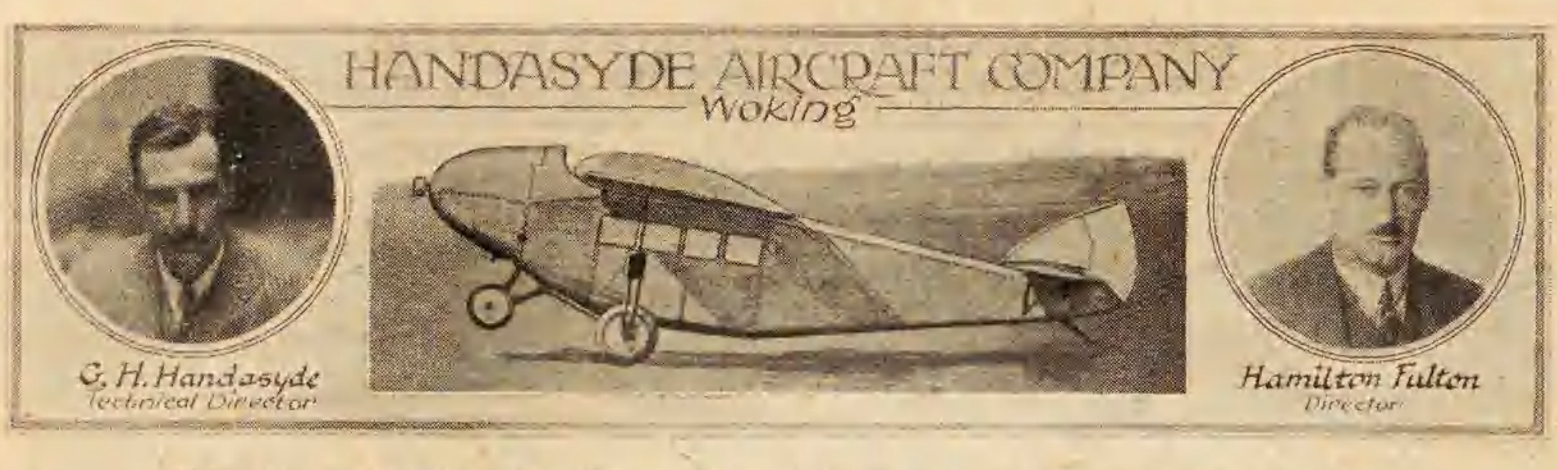
Since the year 1921, Mr. Folland has designed for the Gloucestershire Aircraft Co. the famous "Mars I," with 450 h.p. Napier "Lion" engine, which holds the British speed record, and which but for the unfortunate affair with the pilot's maps might well have won the Coupe Deutsch this year. It may also be recalled that it has won the Aerial Derby for two years in succession, and is still going strong.

Another type produced by Mr. Folland since joining the Gloucestershire firm is the "Sparrowhawk," which is generally similar to the "Nighthawk" except that it has a B.R.2 rotary engine. This company has produced a large number of machines for the Greek and Japanese Governments, those built for the latter having now been in service for about a year, and the purchasers having been entirely satisfied with them.

Recently the "Nighthawk" has been brought up to date by being fitted with a Siddeley "Jaguar" engine. The modified type is known as the "Mars VI," and it is worthy of note that it combines with a speed of 150 m.p.h. a climb of 20,000 ft. in 18 minutes with full military load, a very meritorious performance.



The Gloucestershire Aircraft Co.'s "Mars VI," fitted with Siddeley "Jaguar" engine, a machine which has fine climbing and speed performances.

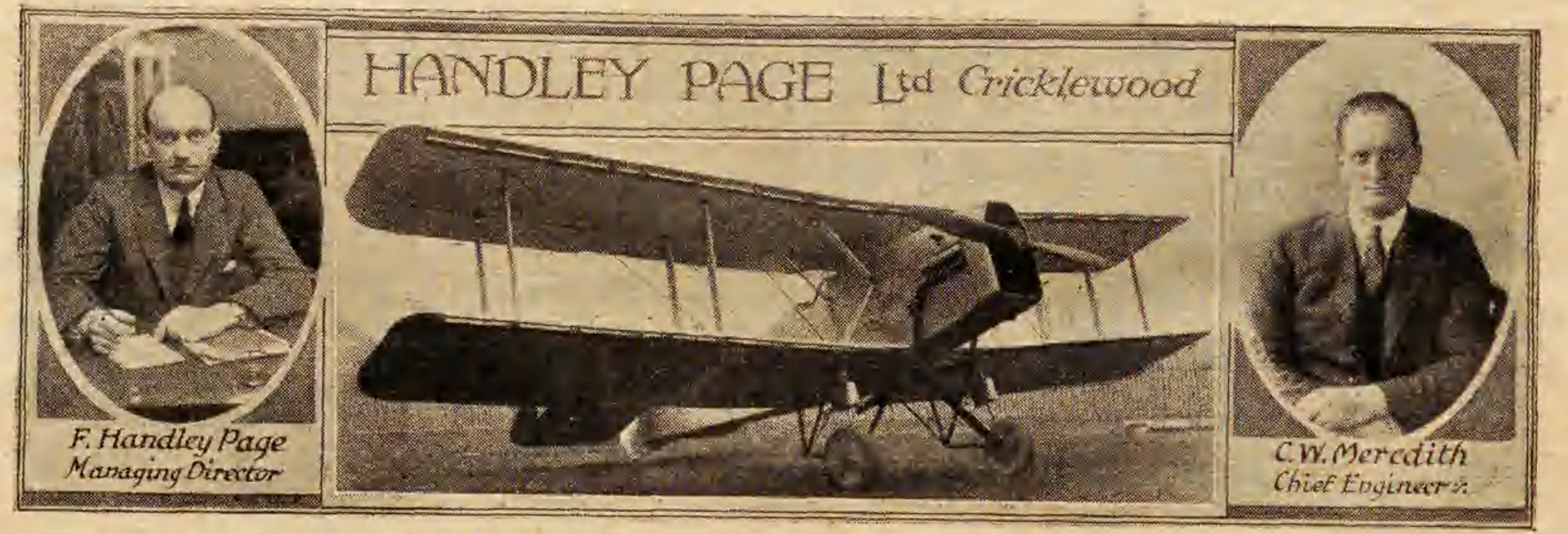


Side view of the Handasyde Cantilever Monoplane with "Eagle IX" engines.

After severing his connection with Martinsyde, Ltd., of Woking, of which firm he had been a partner since 1909, Mr. G. H. Handasyde formed, with Mr. Hamilton Fulton, the Handasyde Aircraft Co., Ltd. This was in 1921, and the firm has been handicapped to a certain extent by not having their own construction works. Now, however, we are glad to be in a position to announce that this difficulty has been overcome, arrangements having been completed for obtaining control and supervision of the aircraft section of the Air Navigation Co., Ltd., of Addlestone (formerly Bleriot Aeronautics). The board of directors will be added to shortly by Mr. F. P. Raynham and Maj. A. Graves joining. The H.A.C. will in the future be in a position to undertake design and construction work of any kind.

Since the formation of the company Mr. Handasyde has designed several machines, notably a cantilever monoplane, fitted with one of the new Rolls-Royce "Eagle IX" engines. This machine was designed for one of the air mail services in Australia, and we understand that more machines of similar type are to follow. The machine was fully described in FLIGHT of July 20, 1922.

It may also be recollected that the glider on which Raynham flew for 1 hr. 53 mins. at Itford was built at Addlestone for the H.A.C. firm. The same applies to the commercial monoplane, and under the new arrangement all future H.A.C. machines will be built there. We regret that no photographs of the H.A.C. monoplane are available at the moment, but we hope to publish some shortly.

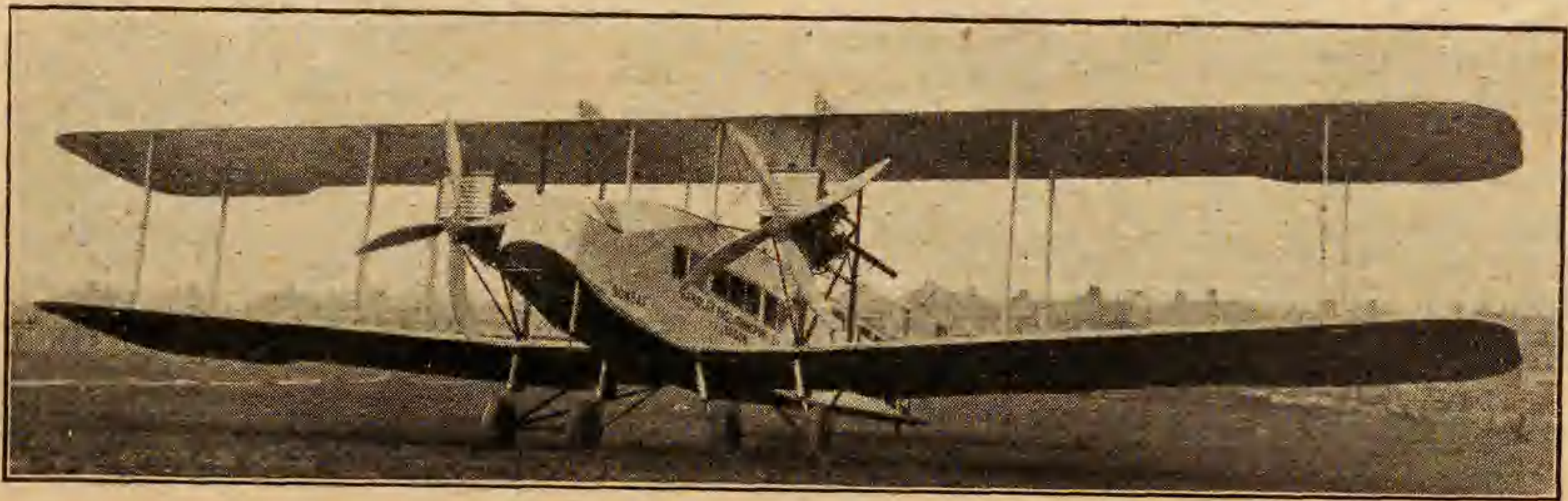


The Handley Page "Hanley" Torpedo 'Plane, Napier "Lion" engine.

Mr. F. Handley Page, as is, of course, well known, is one of the pioneer British aircraft constructors, havng built his first machine, a monoplane with crescent-shaped wings, in 1909. Since that distant date Mr. Handley Page has been, without interruption, actively connected with aviation, although the firm of Handley Page, Ltd., in its present form, was established many years later. In the earliest days Mr. Handley Page specialised on monoplanes, of which type he produced several. In 1914 he designed a biplane, which still retained the crescent-shaped wings. Then came the war, and the machine which laid the foundation for the fame of the name Handley Page was the large twin-engined bomber 0-400, which was fitted with two Rolls-Royce engines. The history and activities of machines of this type during the war are well known, and the effect of the type can still be clearly traced in the majority of modern twin-engined machines.

In order to increase the range and bomb capacity of an aeroplane, Mr. Handley Page and Mr. C. W. Meredith, his chief engineer, who has been with Mr. Handley Page since the earliest days, designed the huge four-engined bomber known as the V-1500, which was intended for the bombing of Berlin. In this machine the engines were placed in pairs, one behind the other, on the wings.

Several other types were designed during the war, but these did not reach the production stage.



The Handley Page W. 8 B, with two Rolls-Royce "Eagle" engines.

Since the war Handley Page, Ltd., have produced a number of commercial types, all being clearly developments of the original 0-400. First of all the firm produced the W.8, with two Napier "Lion" engines, which won the Air Ministry competition (large class) at Martlesham Heath. This machine was for some time put on the London-Paris route, where it made some trips in record time. A later development was the W.8.B, which was fitted with Rolls-Royce "Eagle" engines and carried 12 passengers. For next year's services a further development, the W.8.C will be put on, this machine to have seating accommodation for 16 passengers.

Lately Handley Page, Ltd., have turned their attention to the design and construction of torpedo planes, of which mention may be made of the "Hanley," in which, for the first time, use has been made of the slotted wing invented by Mr. Handley Page. A D.H.9 was first fitted with slotted wings in order to test the idea, and the results were so promising that a cantilever monoplane wing with slots was fitted to a D.H.9 fuselage in order to test the effect of slots on a high-lift wing (the section being airscrew 4). It was found that again the full-size results bore out the model experiments, and consequently the "Hanley" torpedo plane was built to incorporate the slots in a machine designed for a specific military purpose. The first of the "Hanley" machines had rather ugly wing tips and a complicated undercarriage. In spite of these drawbacks the machine had a good performance, and in the latest type of "Hanley" a simpler undercarriage and finer wing tips have resulted in an increase in speed of 10 m.p.h.

Concerning the activities of the operational side of the firm, known as Handley Page Transport, Ltd., something will be found elsewhere in this issue.

THE HAWKER ENGINEERING CO., LTD.

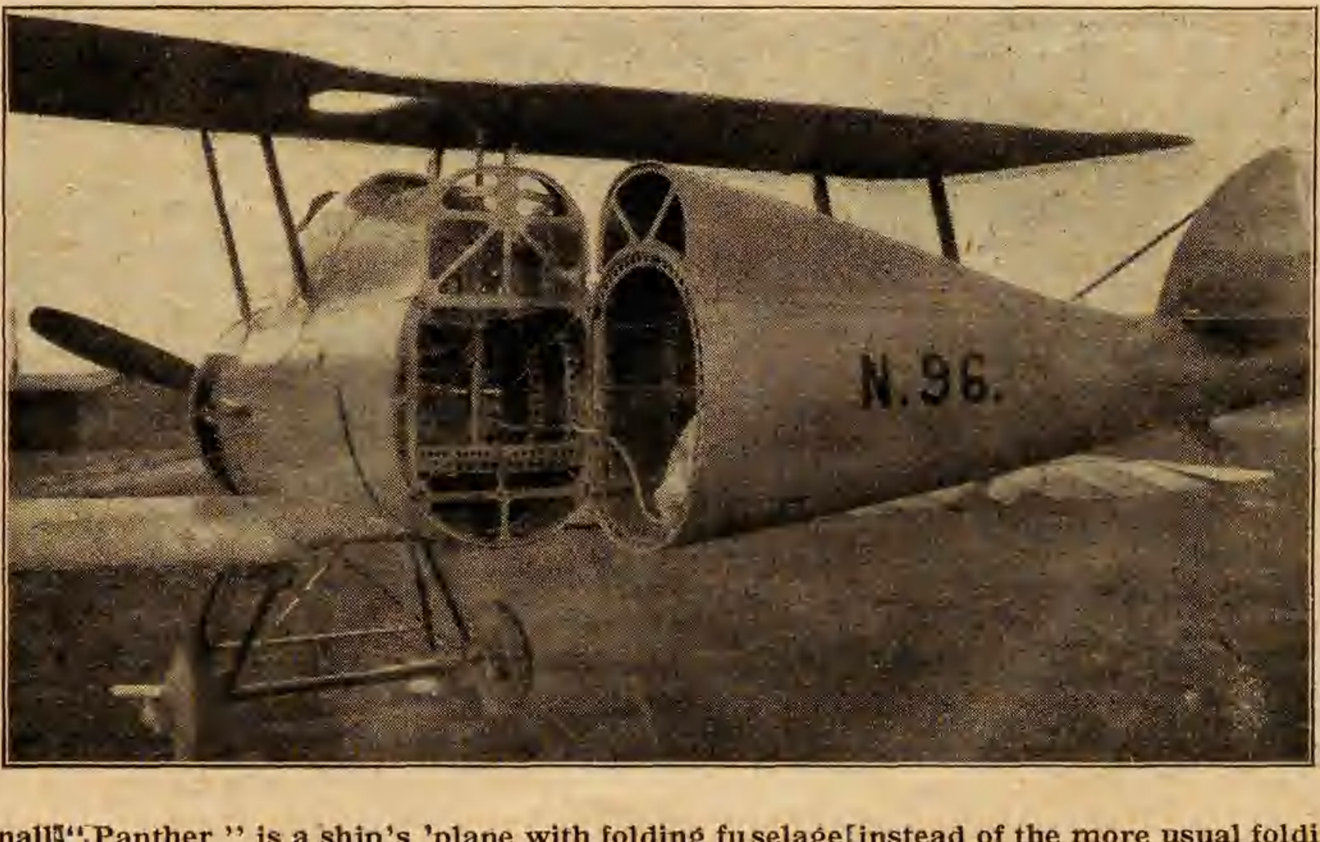
T. O. M. Sopwith, Director.

Upon the Sopwith Aviation Co. going into liquidation in 1920, the H. G. Hawker Engineering Co., Ltd., was formed by the late Mr. H. G. Hawker, Mr. F. Sigrist and Mr. T. O. M. Sopwith. The late Mr. Hawker was, as is well known, test pilot to the Sopwith Aviation Co., and Mr. Sigrist was, from the founding of that firm up to 1919, works manager, while Mr. Sopwith will need no introduction, his name being famous all over the world as one of the first British pilots and founder of the Sopwith Aviation Co., whose products during the war were among the first in the world.

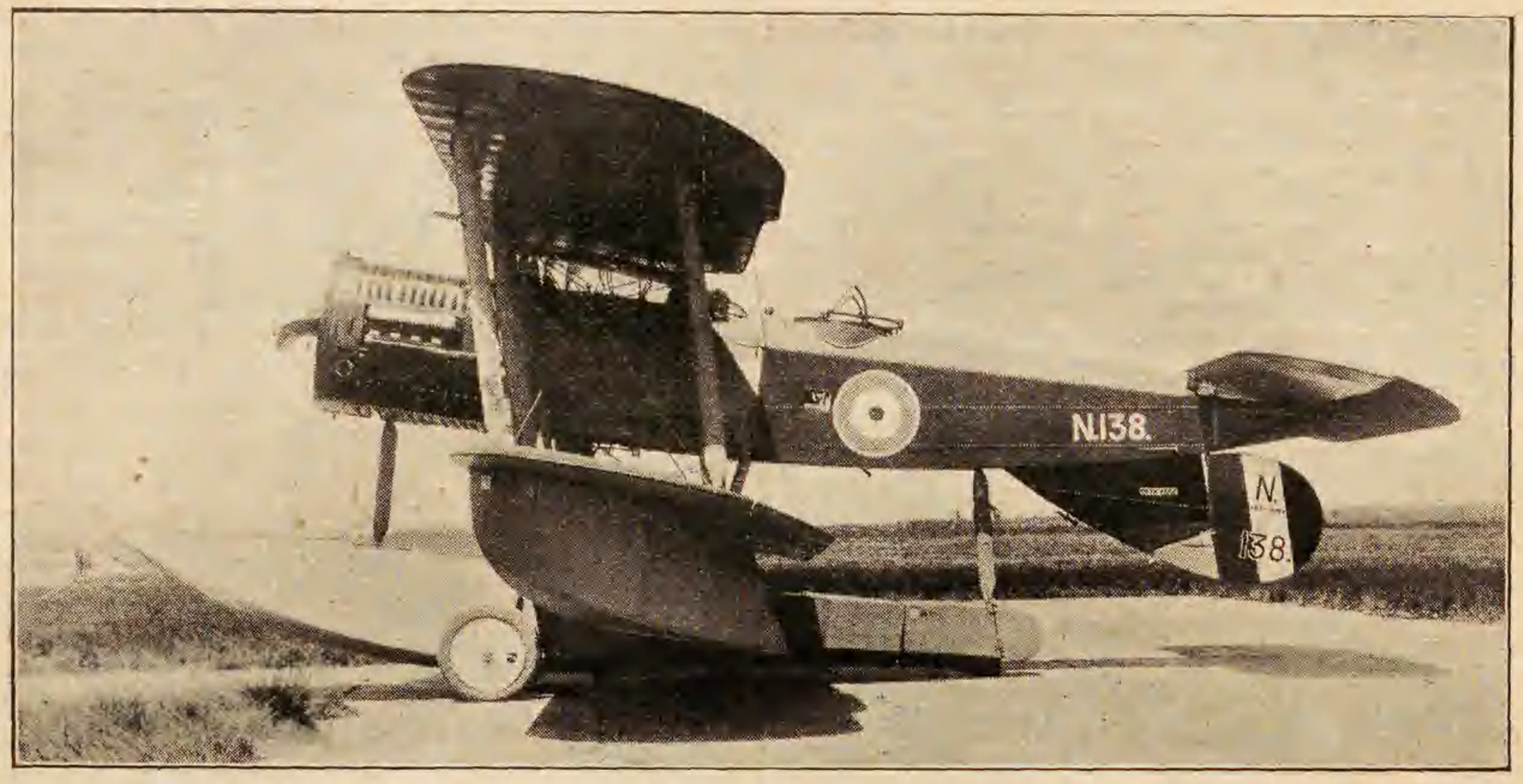
In the Hawker Engineering Co. Mr. F. Sigrist is managing director, other directors being Mr. T. O. M. Sopwith, Maj. V. W. Eyre, Mr. F. L. Bennett, who is acting as works manager, and Capt. L. F. Peaty, brother-in-law of the late Mr. Hawker. The chief designer of the firm is Capt. B. Thomson.

The H. G. Hawker Engineering Co. started at the old works of the Sopwith Aviation Co. at Kingston-on-Thames, and have now taken over the whole of the main premises. At present they are engaged upon re-conditioning a large number of D.H.9A's and Sopwith "Snipes." Two new designs by Capt. Thomson have been submitted to and accepted by the Air Ministry, and are at present under construction. Little may be said about them, except that one is a reconnaissance two-seater cantilever monoplane, and the other a single-seater fighting scout.

GEORGE PARNALL AND CO., BRISTOL



The Parnall "Panther" is a ship's 'plane with folding fuselage instead of the more usual folding wings.

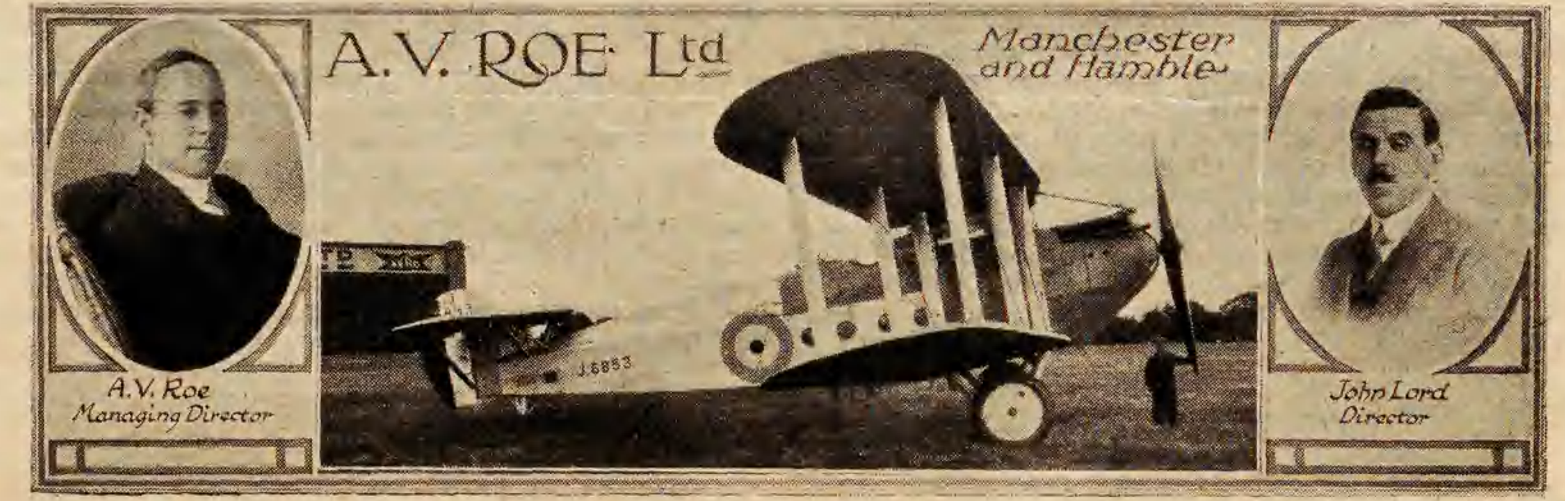


The Parnall "Puffin" deck-landing amphibian, with Napier "Lion" engine.

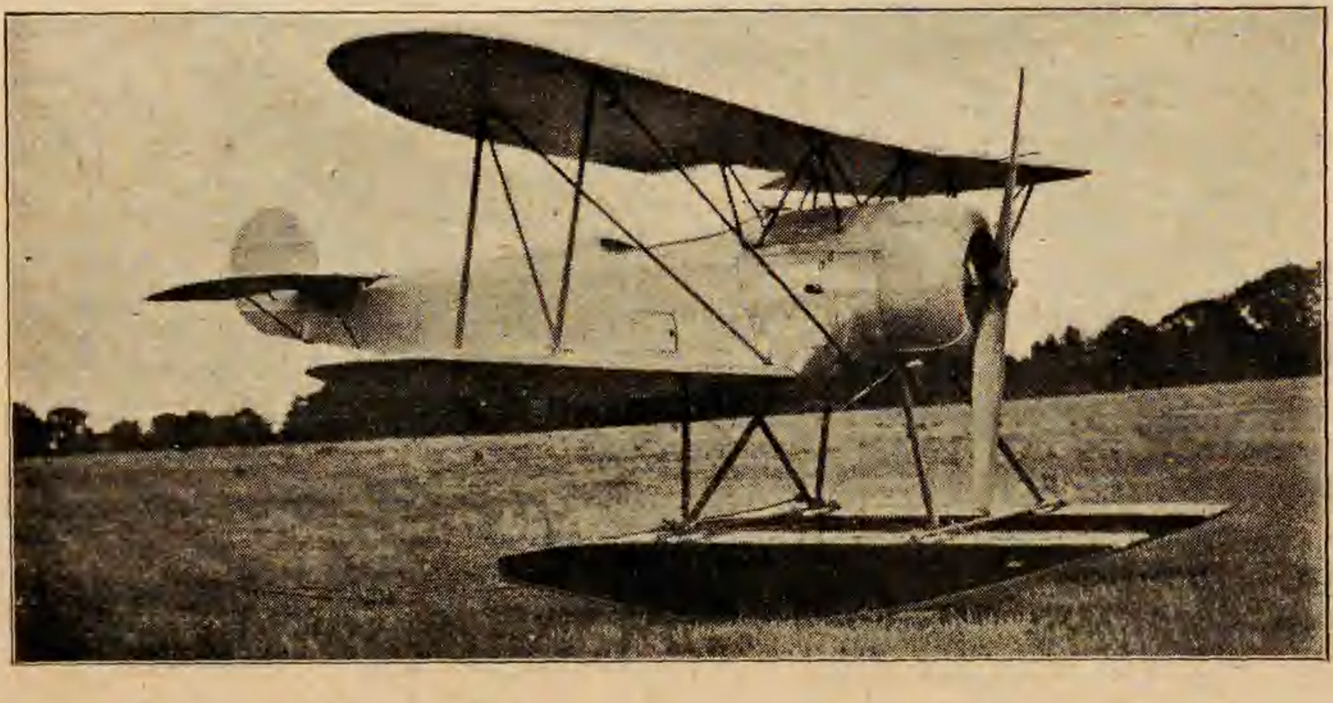
Founded during the war by the present proprietor, Mr. George C. Parnall, this firm has built a great number of machines of different type, having specialised for several years on seaplanes, amphibians and ship's planes, although recently other types are being developed. Of the best-known types produced by Mr. Bolas, chief designer to the firm, mention may be made of the Parnall "Panther," a ship's plane of unorthodox design in which, instead of folding the wings, as is the usual practice, space is saved by so designing the *fuselage* that its rear portion hinges and can be swung aside until it lies parallel with the wings.

The Parnall "Puffin" is an amphibian seaplane with Napier "Lion" engine, and its tail is designed with the fin and rudder entirely below the level of the tail plane, so as to give the rear gunner a free field of fire.

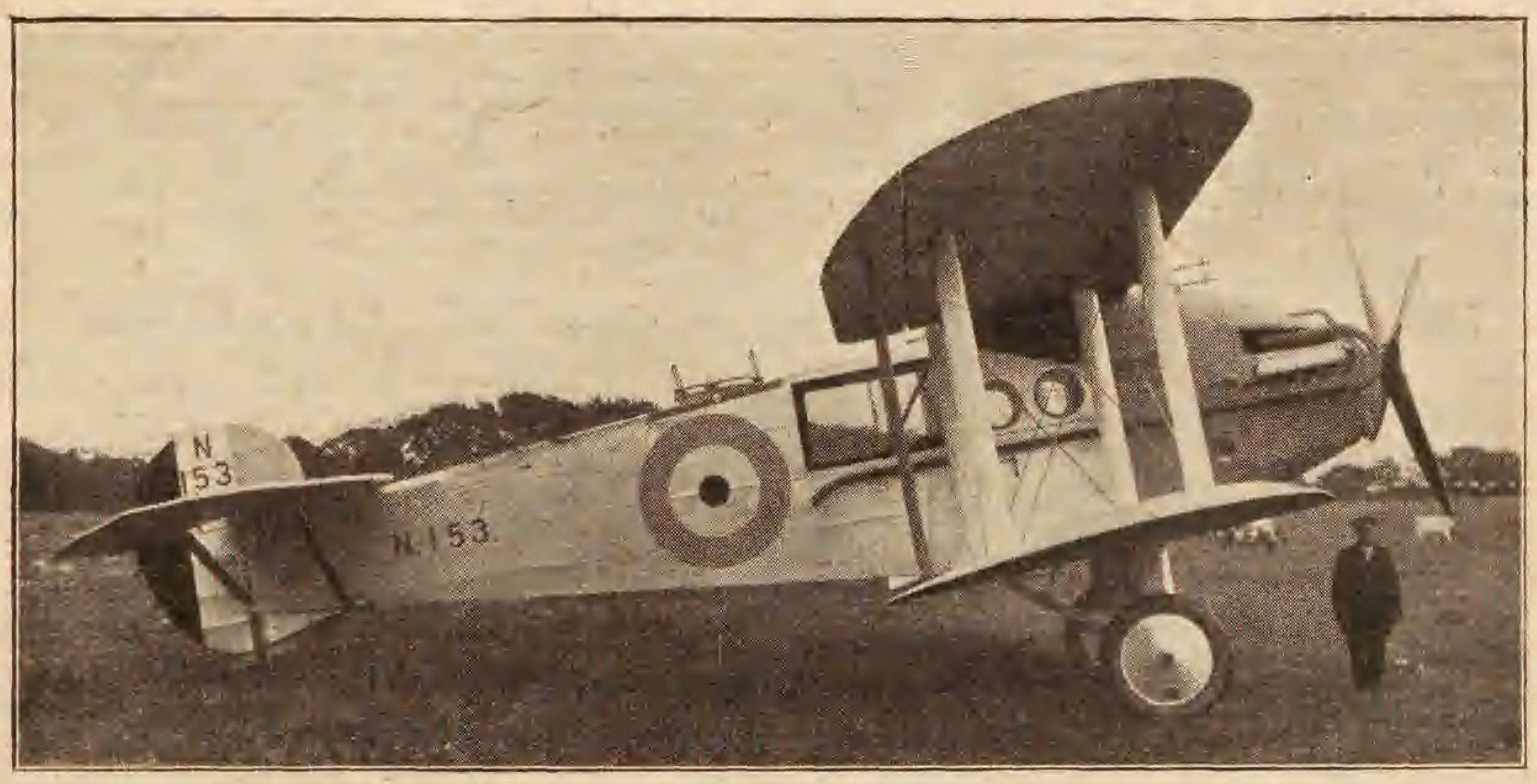
At present the firm is completing two new types, one of which, the Parnall "Possum," is a triplane incorporating several novel features.



The Avro "Aldershot," fitted with Rolls-Royce "Condor."



The Avro 80 h.p. Le Rhone Seaplane Two-seater.



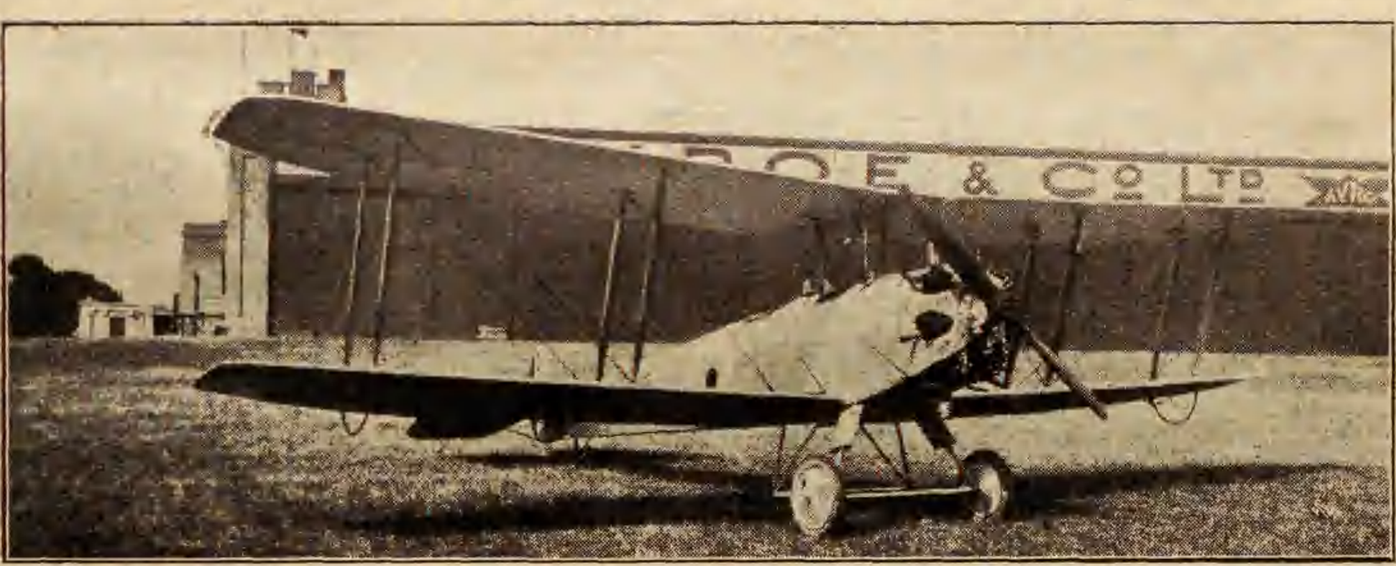
The Avro "Bison" is a Fleet Gunnery Spotting Aeroplane fitted with Napier "Lion" engine.

The name Roe, and particularly Avro, into which the name A. V. Roe was early contracted, is well known all over the world, Mr. Roe being one of the pioneers, not only of British aviation but of aviation generally. To Mr. A. V. Roe belongs the credit of having introduced the tractor machine which now holds the field almost to the exclusion of all other types.

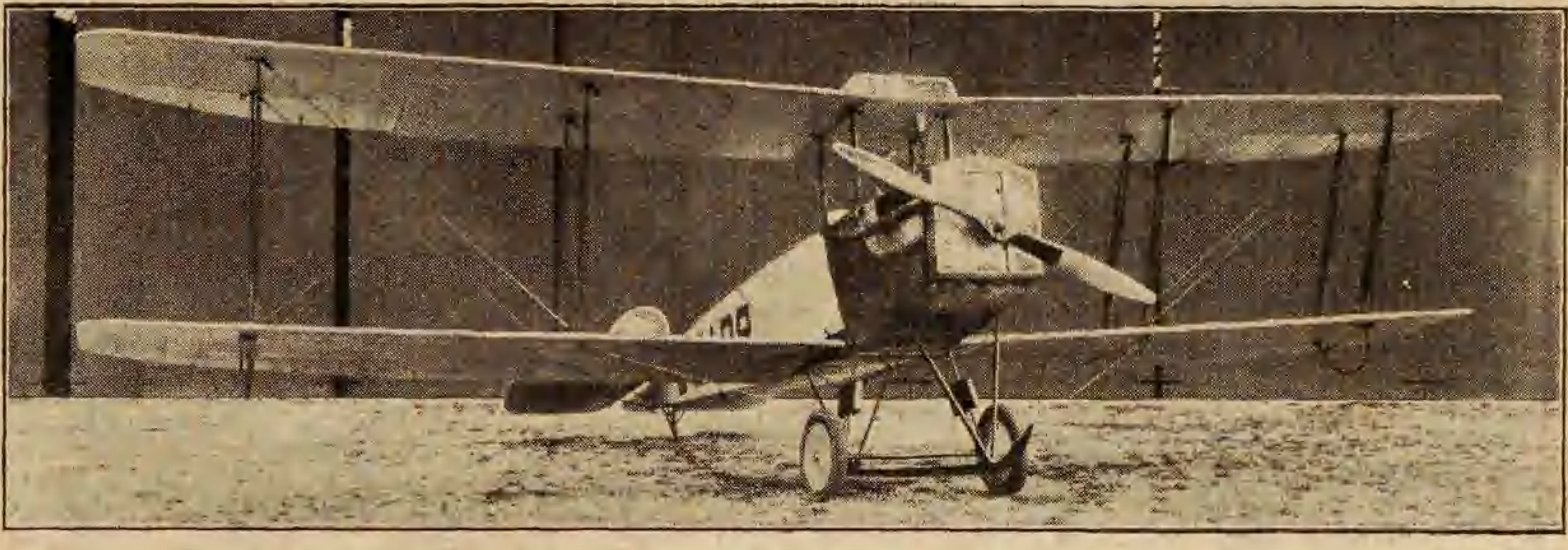
It should also be recalled that "A.V.," as he is affectionately known among his friends, designed the first two totally enclosed aeroplanes in Great Britain.

During the war A. V. Roe and Co. designed and produced several different types of machines, but probably it is the pre-war type 504 which has done most towards carrying the name Avro to the far corners of the earth. In a number of variations the 504 has made its appearance, with different engines, and it should be remembered that this continues to be the standard training machine of the R.A.F.

Since the war Mr. Roy Chadwick, who has been with Mr. Roe ever since the early days, and who is now chief designer for the firm, has designed several types, of which we can only mention a few. The Avro Baby with 35 h.p. "Green" engine has been made famous by Bert Hinkler's flight from London to Turin without landing.



The Avro 504K is fitted with a 175 h.p. Siddeley "Lynx" Engine.

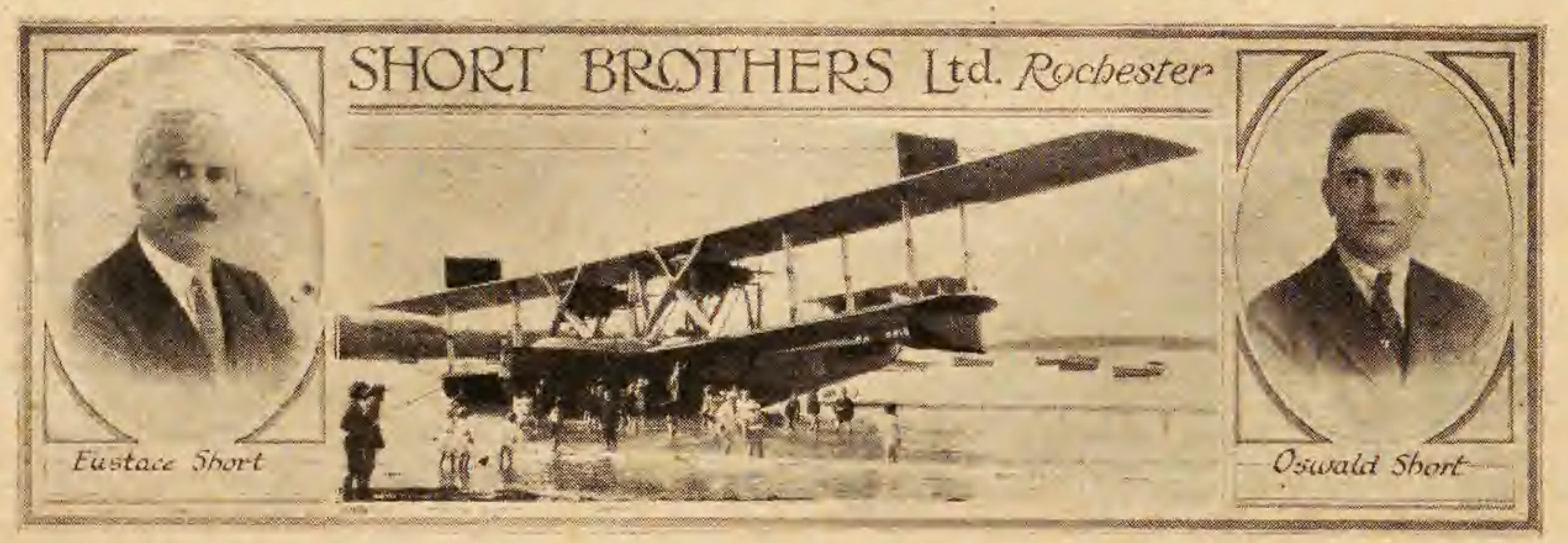


The Avro-Viper, Wolseley-Viper engine.

A somewhat similar machine, but with 80 h.p. le Rhone, was built for the Shackleton expedition, but was not, unfortunately, actually carried, the ship having to abandon its call at Cape Town, whither the Baby had been sent.

A recent modification of the 504 is the 504 K, Mark II, which is fitted with a 175 h.p. Siddeley "Lynx" engine. This machine is fitted with oleo undercarriage and improved type *ailerons* which harmonise all the control surfaces. The Avro "Viper" is also a modification of the original 504, but is fitted with a Wolseley "Viper" engine. This machine is produced both as a land machine and as a seaplane, and a considerable number have been sold to foreign governments.

Among the latest machines to be produced at the Hamble works of A. V. Roe and Co. mention may be made of the "Aldershot" with 1,000 h.p. Napier "Cub" engine, the "Aldershot" bomber, with 680 h.p. Rolls-Royce "Condor" engine, and the "Bison," with Napier "Lion" engine. The last mentioned is a fleet spotter.

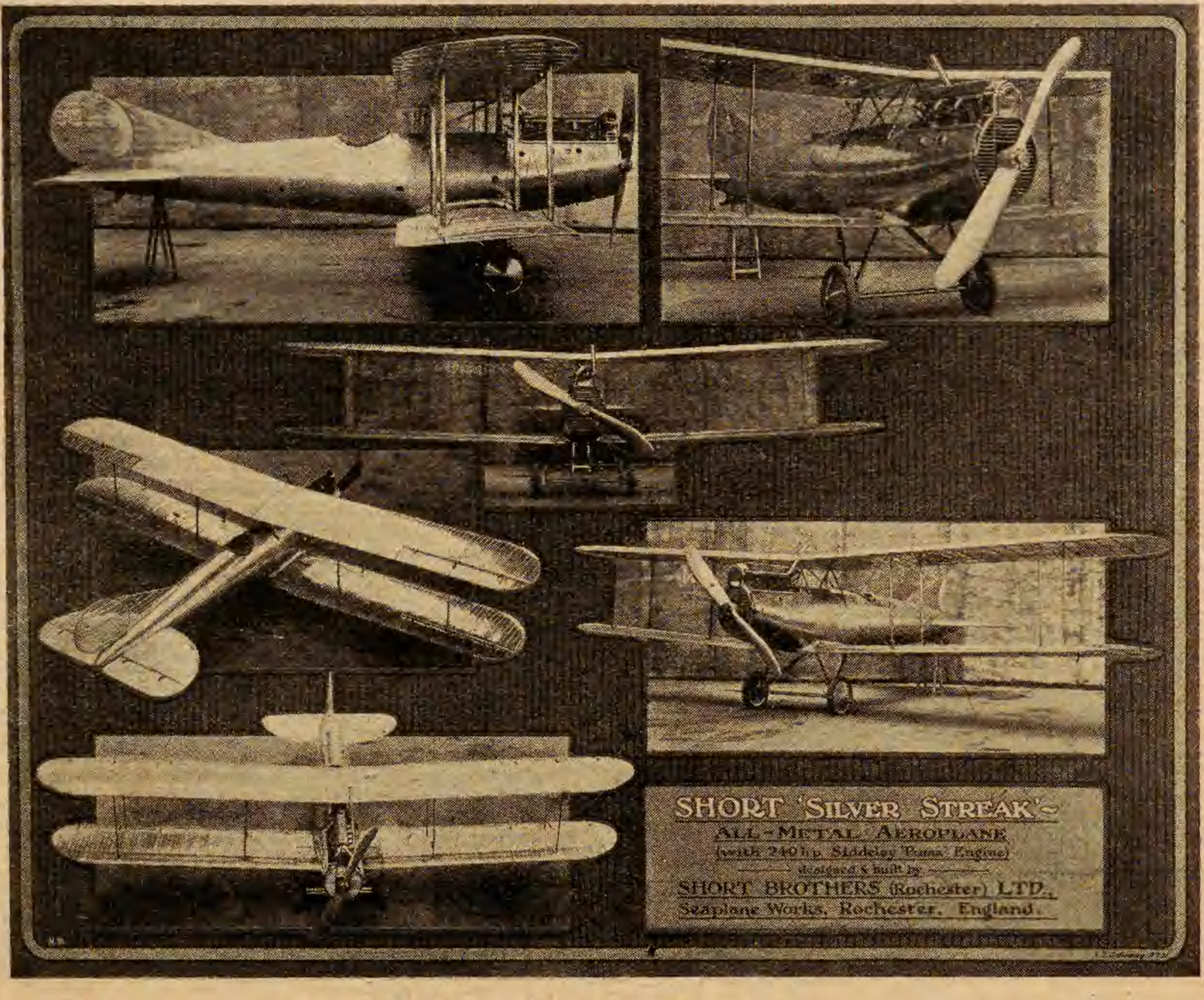


The Short "Cromarty" is fitted with two Rolls-Royce "Condor" engines.

One of the first British aircraft firms to be established was that of Short Brothers, who commenced their activities as aeroplane and seaplane constructors (although having previously been manufacturers of balloons) in 1909 at Eastchurch, Isle of Sheppey. The first machines built were of the Wright type, but later machines more resembled the Farman "box kites," although they had a *nacelle* with a very small front elevator mounted in the nose.

Short Brothers also were among the very first to fit more than one engine in a machine, and several years before the war they produced machines with two and three Gnome engines.

Of the machines produced during the war, before the death of one of the brothers, Mr. Horace Short, perhaps the most famous was the Short "225," as it became known from the power of its Sunbeam engine. A twin float seaplane, this


SHORT 'SILVER STREAK'
ALL-METAL AEROPLANE
(with 240 h.p. Siddeley 'Puma' Engine)
designed & built by
SHORT BROTHERS (Rochester) LTD.,
Seaplane Works, Rochester, England.

The Short "Silver Streak" all-metal biplane.

type was used extensively by the Royal Naval Air Service, who frequently used it for extended flights inland, although the machine was not fitted with a wheel undercarriage. It should also be pointed out that Short Brothers were the originators of folding wings, having patented an arrangement for doing this long before the outbreak of war.

In metal construction Short Brothers have also been among the leading firms, having first built rigid airships at their Bedford works, and later produced all-metal machines at Rochester, Kent. One of these, the "Silver Streak," was exhibited at an Olympia Aero Show, and was built entirely of metal, even to the wing covering, which was duralumin. A development of this machine is now being produced, but as it is for the Air Ministry nothing may be said about it at present.

Although Short Brothers have been mostly associated with twin-float seaplanes, they have also produced flying boats, and one of these, the "Cromarty," has recently taken part in development flight off the South West coast of England, putting up a very good performance, although the machine was laid down five years ago. The following particulars of the Short "Cromarty" may be of interest: Span, 112 ft. Length 60 ft. Height 23 ft. Weight of machine empty 10,692 lbs. Petrol for 7 hrs. (540 gallons) 3,888 lbs. Oil 540 lbs. Reserve water 80 lbs. Machine guns, ammunition and mountings 750 lbs. Two 500 lb. bombs and gear 1,150 lbs. Sea anchor 150 lbs. Starting gear 100 lbs. Crew of five 900 lbs. Total military load 7,808 lbs. Total loaded weight 18,500 lbs. Engines: Two Rolls-Royce "Condors" of 600 h.p. each. Full speed at sea level 96 m.p.h. Climb to 6,000 ft. in 20 mins.

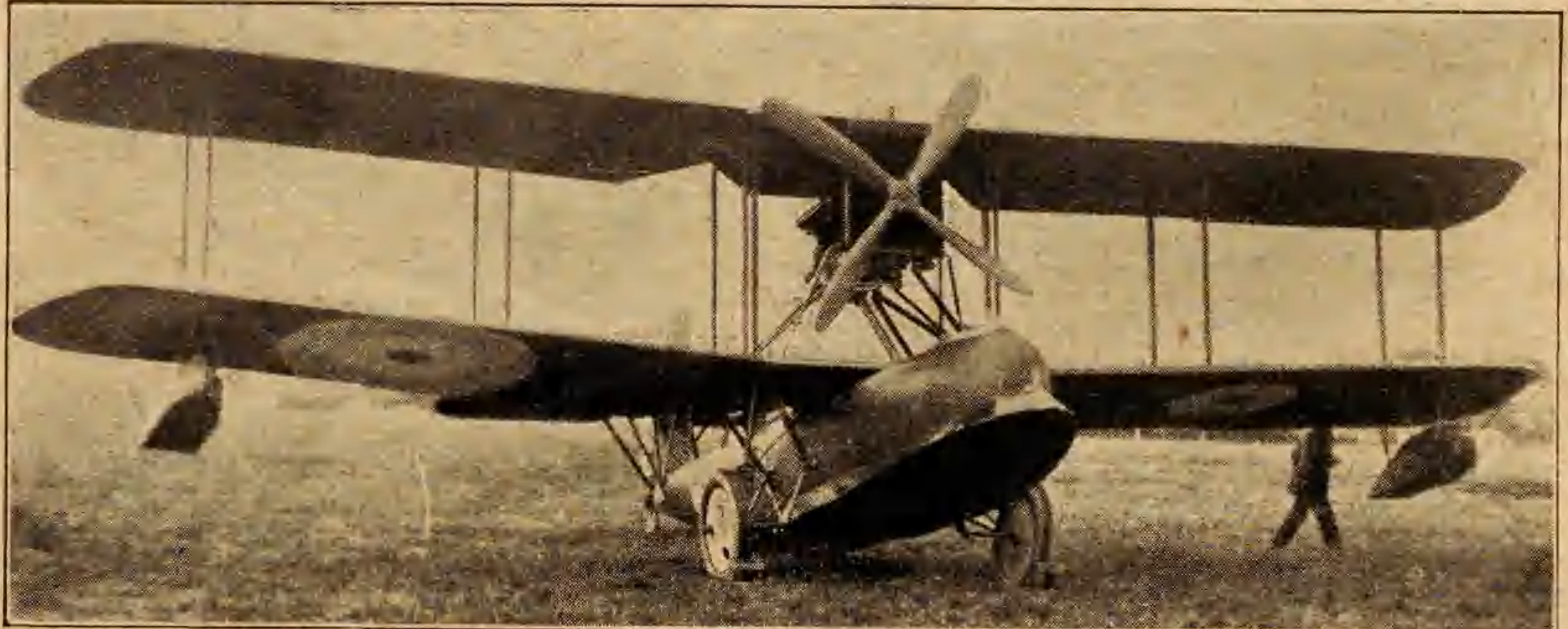
For long-distance reconnaissance the "Cromarty" can be flown with engines throttled down to a cruising speed of 90 m.p.h., when the range is approximately 800 miles. The numerous machine guns carried render this machine practically safe from attack, while the weight of bombs make it a formidable weapon of offence. Owing to its size, the "Cromarty" is able to folllow the Fleet to sea, and can be moored out for considerable periods without undue deterioration.

Supermarine "Sea Lion" II.

Founded by Mr. N. Pemberton Billing in 1912, the Supermarine Aviation Works of Southampton, with which Mr. Billing is no longer connected, the firm having been taken over by Mr. Hubert Scott Paine and Commander James Bird, have ever since they started work kept as their motto "Not an aeroplane that will float, but a seaworthy boat hull which will fly." This motto was laid down as an ideal to be attained, and through years of extraordinary difficulty the ideal was always kept in view, with the result that the firm, having started with a seaworthy boat hull, the time has now come when that hull has been made to fly. Not that the first hulls did not fly; the expression fly is used in the sense of performance. At first the machines were somewhat heavy and slow, but seaworthy they were, and as a result of painstaking application the performance has now been attained without sacrificing seaworthiness.

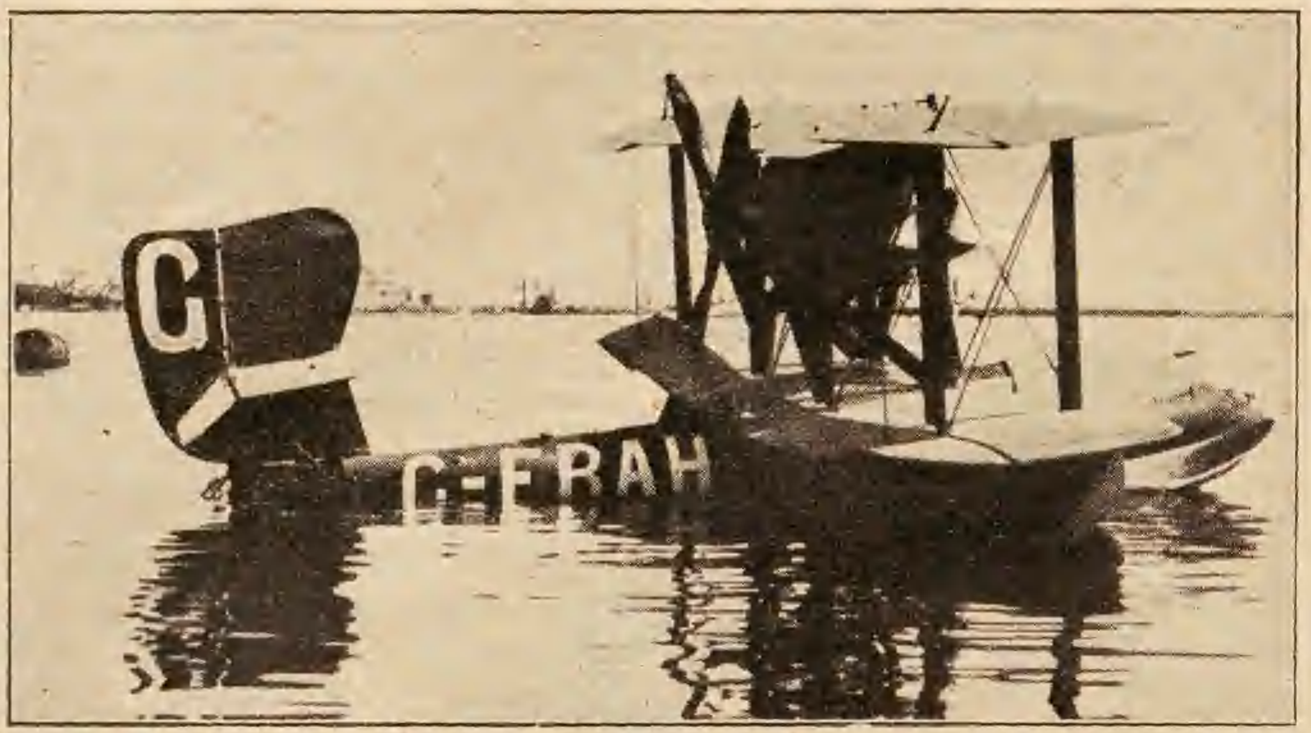
The first flying boat built by the Supermarine works in 1912 incorporated a feature which has been retained ever since, *i.e.*, the circular section hull, with the steps built on as separate units.

In 1916 this firm built what was probably the first flying boat to attain a speed of 100 m.p.h. In 1917 they designed and built the first single-seater flying boat scout, which attained the, at the time, astonishing speed of 118 m.p.h. In 1919 the Supermarine Works completed a single-seater flying boat scout which did 149 m.p.h. This machine took part in the Schneider Cup race at Bournemouth. During the same year the firm had the distinction of becoming the first British firm to obtain an Air Ministry certificate of airworthiness for marine flying machines, and it also opened up the first flying boat service in the British Empire, running a regular service by flying boat between the base at South-



The Supermarine "Seal" Amphibian flying boat, 450 h.p. Napier "Lion" engine.

ampton and places along the South coast. Towards the latter part of 1919 they inaugurated the first international marine air service by running their flying boats between Southampton and le Havre.



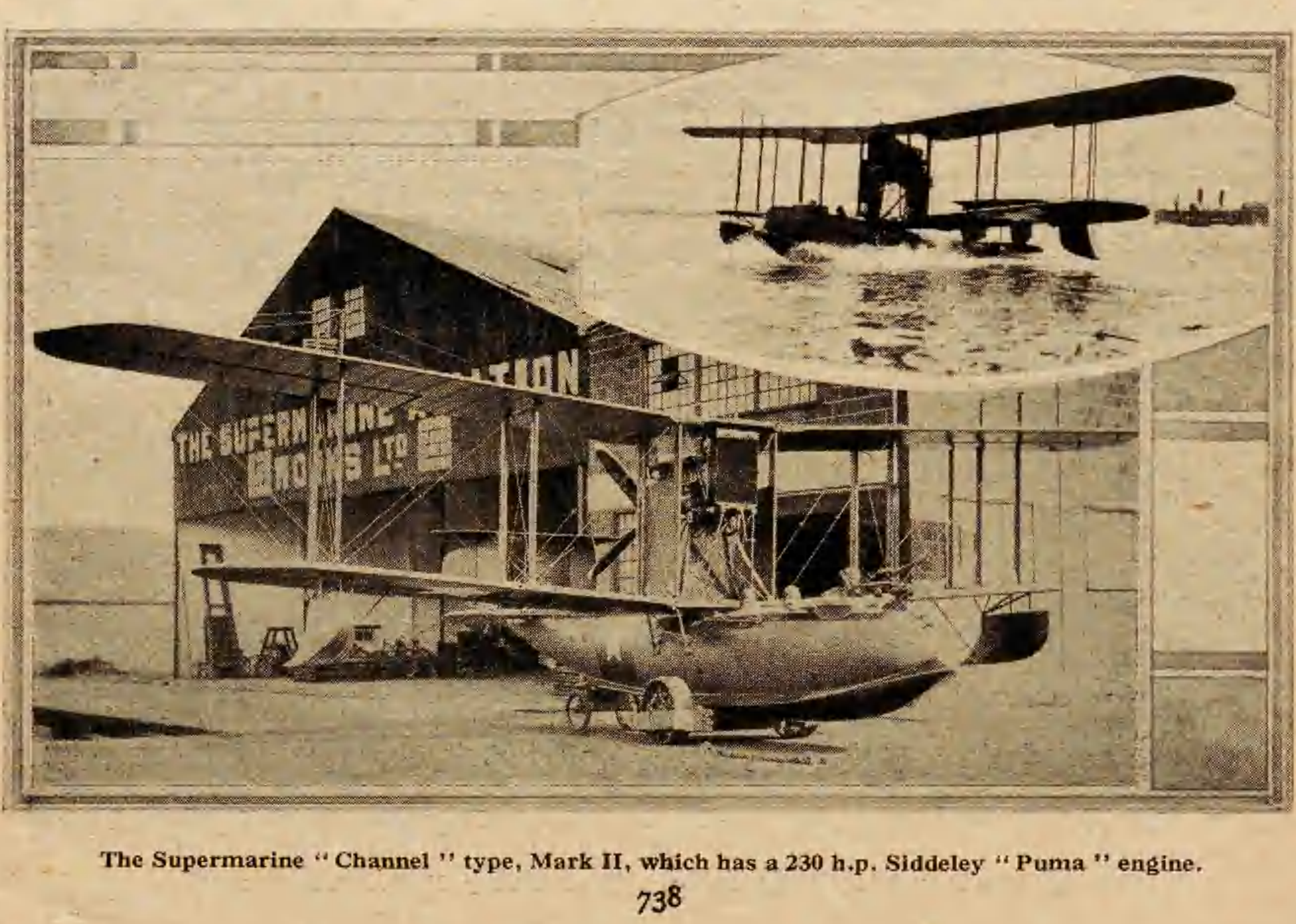
The Supermarine "Sea Lion," which won the Schneider seaplane race at Naples. This machine is fitted with a Napier "Lion" engine.

In the Air Ministry competition for amphibian machines in 1920 a Supermarine amphibian flying boat was awarded a prize of £4,000, together with a further amount of £4,000 which was granted specially by the British Government in recognition of the unusual merit of the machine, which passed the arduous tests over land and sea without any breakage, and even without any adjustment being necessary.

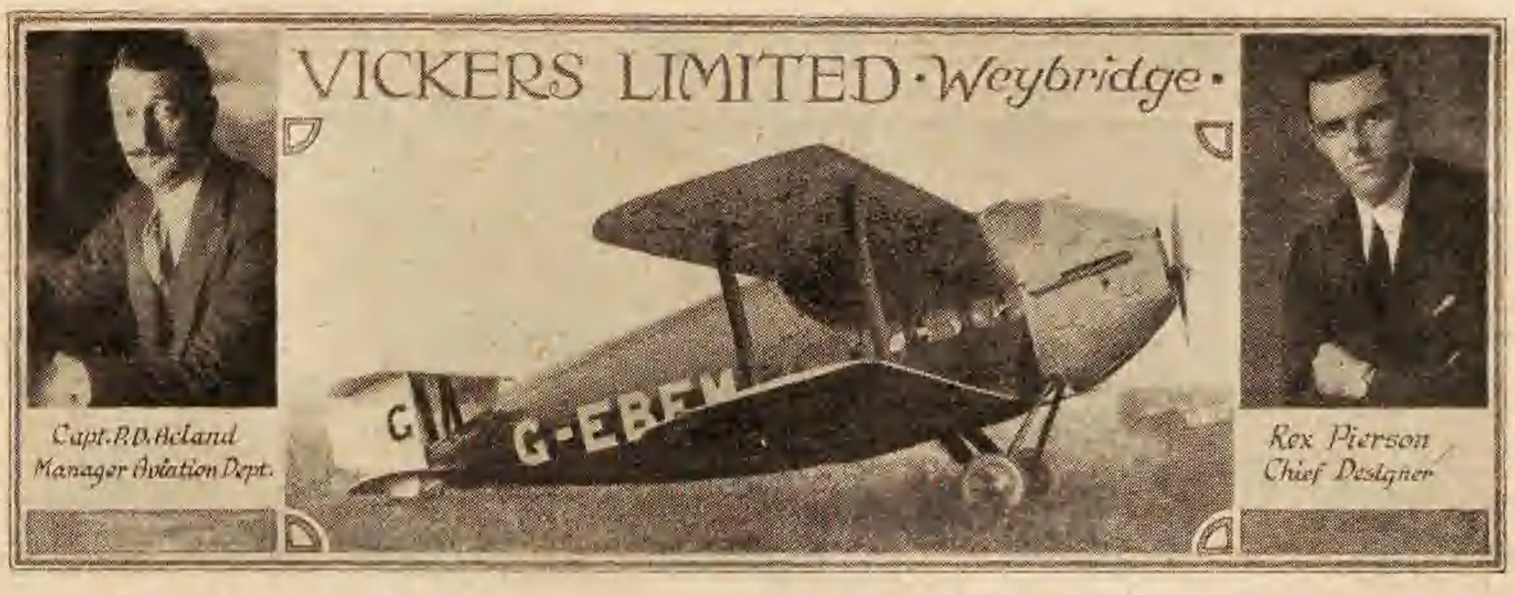
In 1921 this firm produced the first amphibian flying boat to be specially designed for operations by the R.A.F. in connection with the British Navy. In 1922 the Supermarine Aviation Works received an order from the Air Ministry for the largest flying boat to be built since the war, and another for a very large twin-engined amphibian which will be the largest amphibian flying boat in the world. The construction of both these machines is now nearing completion.

Finally it should be recalled that in the summer of this year the Supermarine Works designed and built the fast flying boat, with Napier "Lion" engine, which brought to Great Britain the Coupe Schneider, with the result that next year's race for this Cup will be flown in this country. Not only did the Supermarine "Sea Lion" win the Schneider race, but it established a world's speed record for flying boats.

The Supermarine flying boats are to be found in all parts of the world. They have been supplied to a great number of foreign powers, and in many places such as Fiji, British Guiana, Trinidad, Bermuda, Venezuela, etc., their machines have been the first marine aircraft ever to be seen.

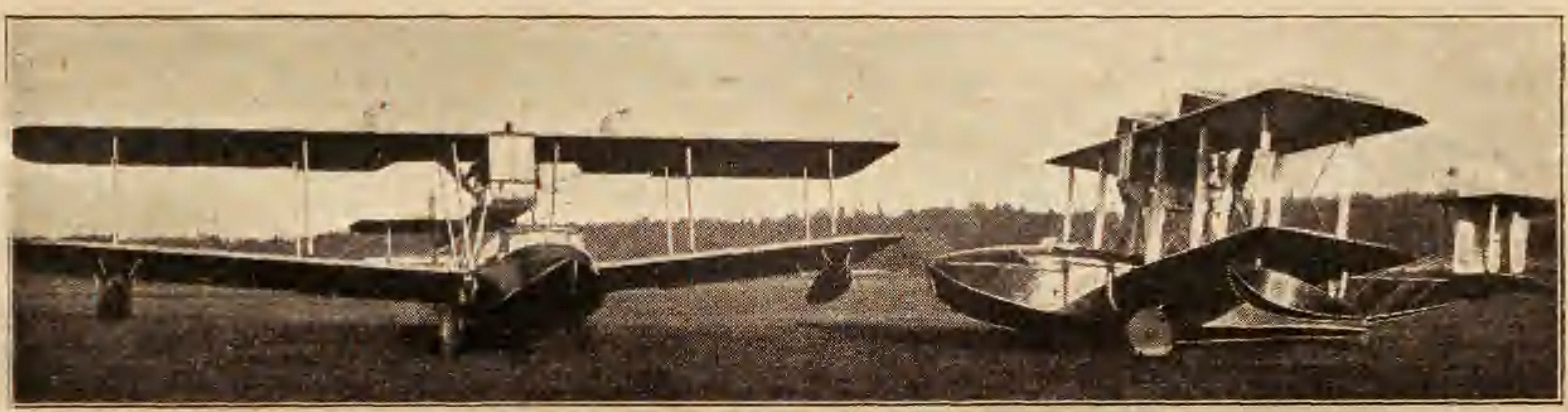


The Supermarine "Channel" type, Mark II, which has a 230 h.p. Siddeley "Puma" engine.



The Vickers "Vulcan" eight-seater, with 360 h.p. Rolls-Royce "Eagle" engine.

Already several years before the war the famous firm of Vickers, Ltd., had an aviation department, and were actively engaged upon the construction of aircraft. For a number of years the aviation department was managed by Major Wood, while the late Mr. Harold Barnwell was chief test pilot and instructor at the flying school which Vickers, Ltd., had established at Brooklands. Among the machines of those early days may be recalled sundry monoplanes of the R.E.P. type, and a number of "box kites" of the Farman type.



Two Vickers "Viking" Amphibians, with Rolls-Royce "Eagle" engines.

A year or so before the outbreak of war the firm produced a two-seater "pusher" with Gnome engine. This machine was the forerunner of the later famous Vickers "Gun 'Bus."

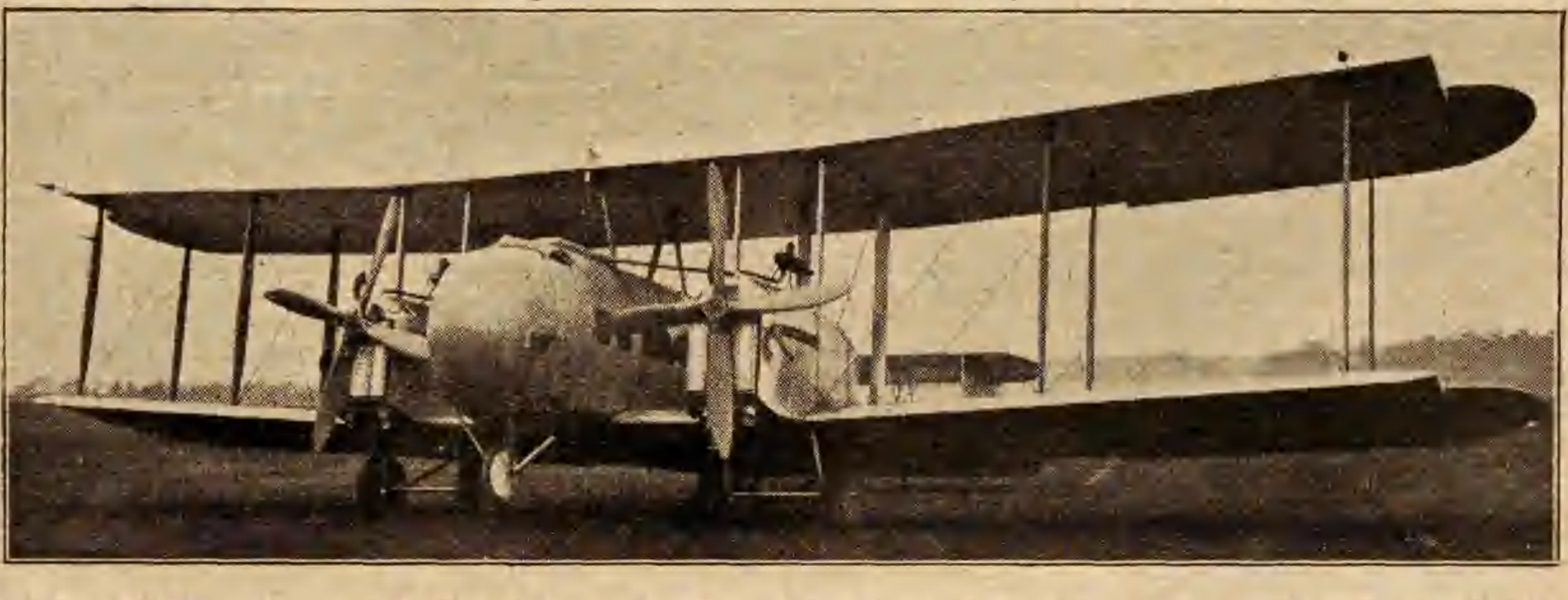
During the war a great number of types were produced, most famous of which is, perhaps, the Vickers "Vimy," with Rolls-Royce "Eagle" engines. It was on a similar machine that the late Sir John Alcock and Sir Arthur Whitten Brown crossed the Atlantic in 16 hours.

Since the war Mr. Rex Pierson, chief designer of the Vickers Aviation Department, has designed a number of different types, some for commercial use and others for military purposes. Under the energetic management of the aviation department by Capt. P. D. Acland, who took over this post on the death of Major Wood, Vickers aircraft have been introduced in most of the civilised countries of the world.

The first commercial type to be produced after the war was the Vickers "Vimy-Commercial," with two Rolls-Royce "Eagle" engines. This machine has been extensively used on the London-Continental services.

A later type is the Vickers "Vulcan," a single-engined tractor biplane with Rolls-Royce "Eagle" engine. This machine carries eight passengers, and is consequently very economical to run. It is also characterised by a very low landing speed, which should make for safety.

Of the military machines produced by Vickers since the war mention may be made of the famous "Viking" amphibian, supplied with either Napier "Lion" engine or Rolls-Royce "Eagle," according to the performance required. In 1920 the "Viking" Mark III won first prize in the Air



The Vickers "Vimy-Commercial," with two Napier "Lion" engines. The "Vernon" troop carrier is very similar in general appearance.

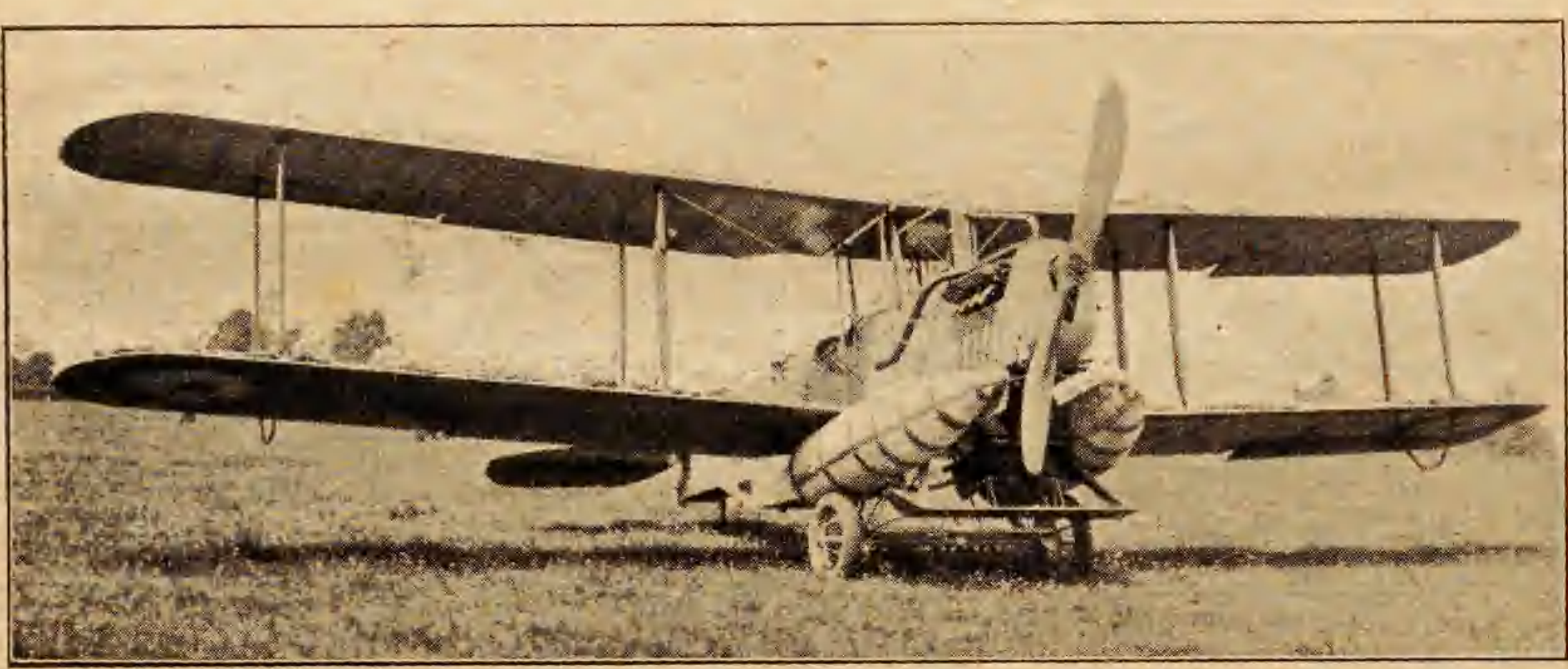
Ministry competition for amphibian machines, and since then the same machine has been used with great success for demonstrating the feasibility of landing on and taking off from rivers in the centres of large towns, such as Paris and London. Thus by using amphibian machines it is possible to save the tedious journey from cities to and from their aerodromes.

The Vickers "Vernon" is a troop carrier generally similar to the "Vimy-Commercial," but as it is built for the Air Ministry it may not be referred to in detail.

For use where the necessary amount of traffic is available Vickers have produced a large twin-engined machine, the "Vanguard," which, with two Napier "Lions," will carry twenty-three passengers at a maximum speed of 109 m.p.h.

The Westland "Weasel," Siddeley "Jaguar" engine.

Founded in 1915 as a separate branch of Petters, Ltd., of Yeovil, by Mr. R. A. Bruce, who is joint managing director of Petters, the Westland Aircraft Works, built a number of machines of different type during the war. Apart from machines built under licence, Mr. Bruce and his chief assistant designer, Mr. A. Davenport, designed several original machines, such as the Westland "Wagtail" and the Westland "Weasel."



The Westland "Walrus" is a Fleet Spotter, with Napier "Lion" engine.

Since the war the Westland Aircraft Works have produced both commercial and military machines. Among the former, mention may be made of a small four-passenger commercial machine with Rolls-Royce "Falcon" engine, followed later by a similar machine with Hispano engine, and, finally, the larger six-seater with Napier "Lion" engine, which won the Air Ministry competition at Martlesham (small class) in 1920.

All these machines have well-appointed cabins, and a feature of their design is that the pilot is actually seated in a corner of the cabin, partitioned off from it, and with his head projecting through the roof. Thus it is possible for passengers to converse with him to some extent, such as to ask for information relating to places flown over route followed, etc.

Concerning military machines produced since the Armistice, nothing may be said, but we publish herewith a photograph of the Westland "Walrus" fleet spotter, which is fitted with a Napier "Lion" engine.

The superintendent of the Westland Aircraft Works is Captain A. S. Keep, who is also the firm's chief test pilot. Captain Keep piloted the Westland machine to victory in the Air Ministry trials in 1920.

* * * *

NEXT YEAR'S AIR CONFERENCE

As on previous occasions, the third Air Conference will be held at the Guildhall on February 6 and 7, 1923, when the proceedings will be opened by the Right Hon. The Lord Mayor of London. The programme will be as follows :—

Tuesday, February 6.—Morning Session. Chairman : The Secretary of State for Air (Lieut.-Colonel the Right Hon. Sir S. J. G. Hoare, Bt., C.M.G., M.P.). *Civil Aviation Papers* : "The Position of Air Transport Today," by Maj.-General Sir W. S. Brancker, K.C.B., A.F.C., Director of Civil Aviation ; "A Self-supporting Airship Service," by Commander C. D. Burney, C.M.G., M.P.

Afternoon Session. Chairman : Sir Henry P. Maybury, K.C.M.G., C.B. *Technical Papers* : "The Progress of Research and Experiment," by Air Vice-Marshal Sir W. G. H. Salmond, K.C.M.G., C.B., D.S.O., Air Member for Supply and Research ; "Gliders and their Value to Aeronautical Progress," by Colonel A. Ogilvie, C.B.E. ; "Seaplanes," by Mr. C. R. Fairey, M.B.E.

Wednesday, February 7.—Morning Session. Chairman : The Under-Secretary of State for Air (His Grace the Duke of Sutherland). *Civil Aviation.* General discussion on the papers read on the first morning.

Afternoon Session. Chairman : The Right Hon. Lord Weir of Eastwood. *Technical.* General discussion on the papers read on the first afternoon.

Synopses of the papers will be issued a few days before the opening of the Conference.

In connection with the Conference, it is hoped to afford opportunity for a visit to the London Terminal Aerodrome at Croydon.

BRITISH AERO ENGINES

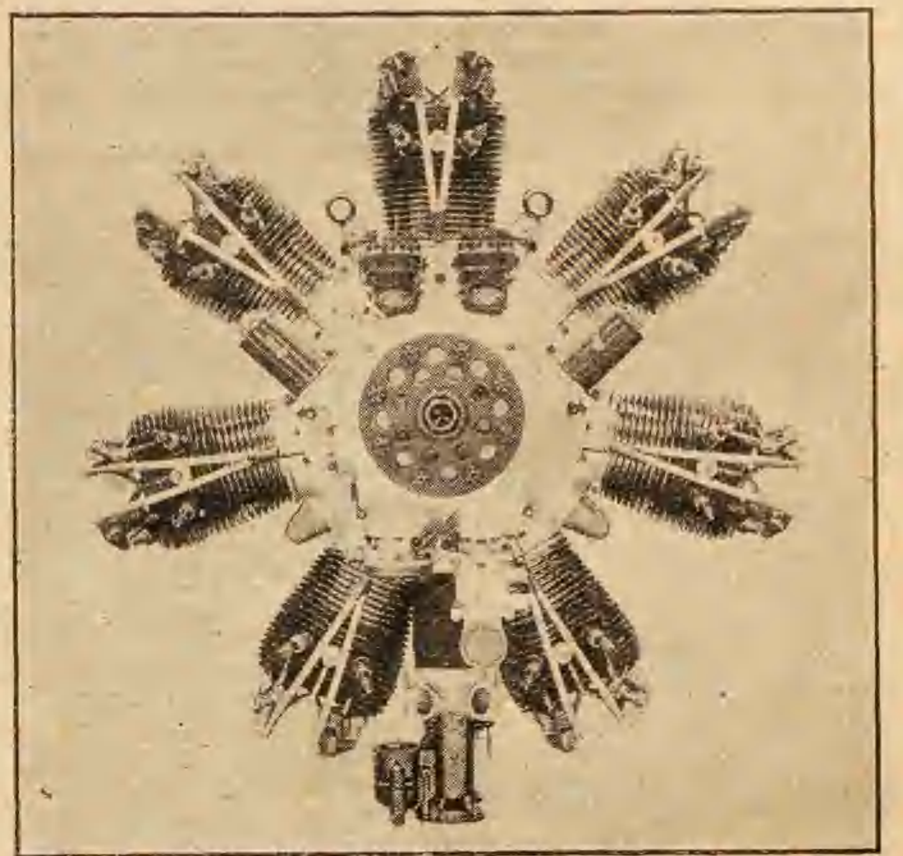
ARMSTRONG-SIDDELEY ENGINE

The history of Armstrong-Siddeley Motors, Ltd., of Coventry, has already been briefly sketched under the aircraft section of this issue of Flight. Running mainly parallel with this is the history of the engine section, which, like the aircraft department, is allied with the firm of Sir W. G. Armstrong, Whitworth and Co., Ltd. There is this difference, however, that the aero engine section came into being earlier than did the aircraft department, becoming first famous during the War by the production in huge quantities of the Siddeley "Puma" engine. This engine, a six-cylinder vertical, develops 230 to 250 h.p., according to compression, and has established an excellent reputation for reliability. Used during the War in great numbers in the D.H.9 type of aeroplanes, the "Puma" did a tremendous amount of useful work, and since the war the engine has been used in a number of D.H.9's for various purposes. Among the famous flights made by "Puma"-engined machines mention may be made of Mr. Alan Cobham's flights through Europe and northern Africa in de Havilland machines fitted with the "Puma" engine.

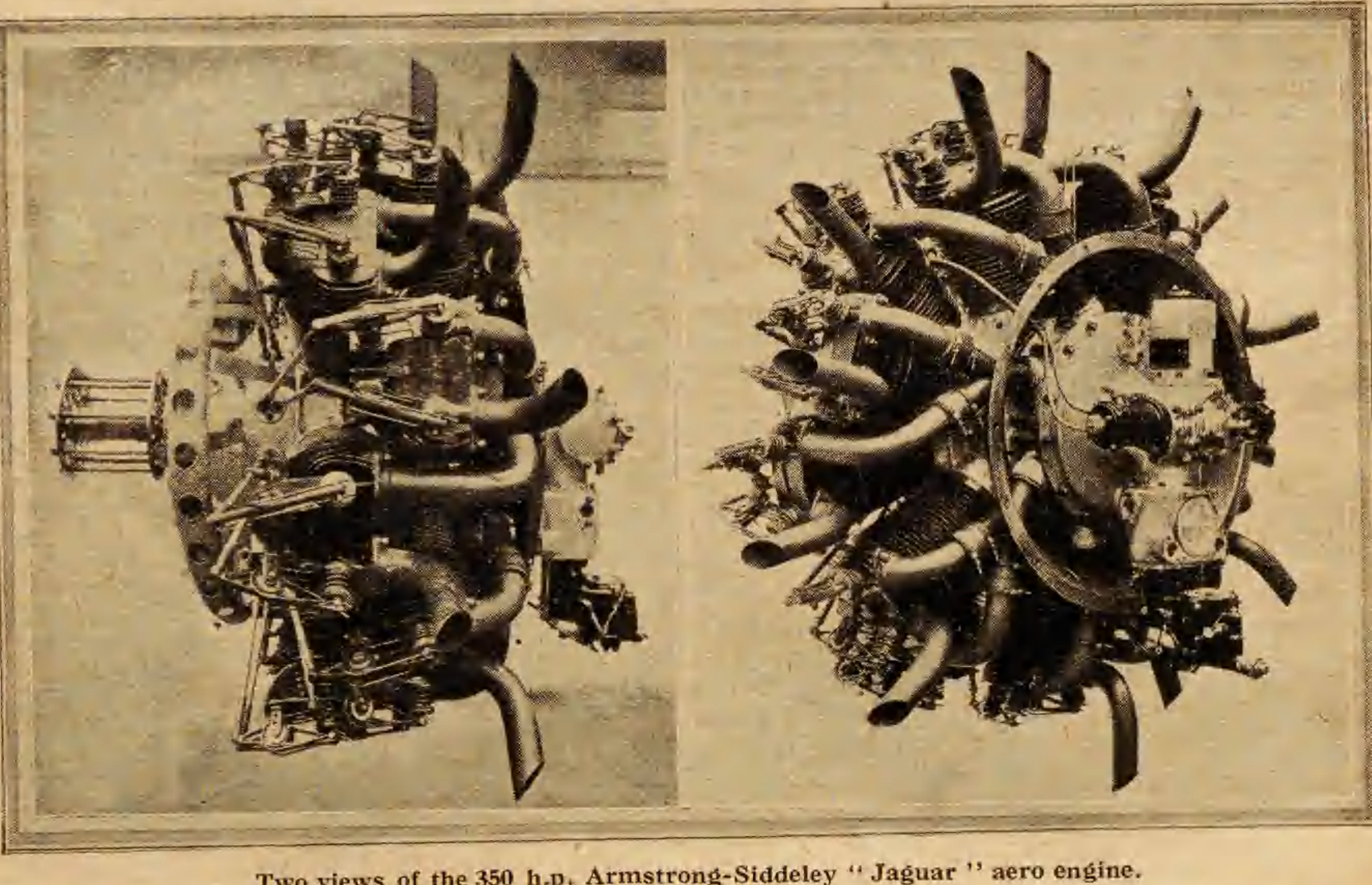
Useful as the Siddeley "Puma" has proved itself, it is now gradually being superseded by later Siddeley designs, such as the 350 h.p. Siddeley "Jaguar" 14-cylinder radial air-cooled engine and the 175 h.p. "Lynx," which has cylinders and general parts similar to those of the "Jaguar," but only seven cylinders instead of fourteen.

The Siddeley "Jaguar," which has passed the Air Ministry type-tests with flying colours, is now rapidly being introduced into military aeroplanes, although up to the present it has not been installed in any commercial aircraft. With its fourteen cylinders, it has an extremely even torque, and pilots who have flown behind it state that its smooth running is most remarkable. It has been fitted already into a number of machines, among which are the Siddeley "Siskin," the Gloucestershire Aircraft Co.'s Mars VI (which climbs to 20,000 ft. in 18 mins.), and the Westland "Weasel." Other types are now coming along into which the Siddeley "Jaguar" will be fitted, and in aviation circles this engine is regarded by many who are competent to judge as the most promising type of its power.

The "Lynx" is generally similar to the "Jaguar," except that, as already stated, it has but seven cylinders. The power developed is 175 h.p., and for low-powered military machines where a light engine is required the "Lynx" supplies the want of an engine between 150 h.p. and 200 h.p. Its general design is clearly shown in tthe photograph which we reproduce above.



The Armstrong-Siddeley "Lynx" radial air-cooled engine, which develops 175 h.p. at 1,700 r.p.m. It follows the same general design as the Jaguar, but has only seven cylinders.



Two views of the 350 h.p. Armstrong-Siddeley "Jaguar" aero engine.

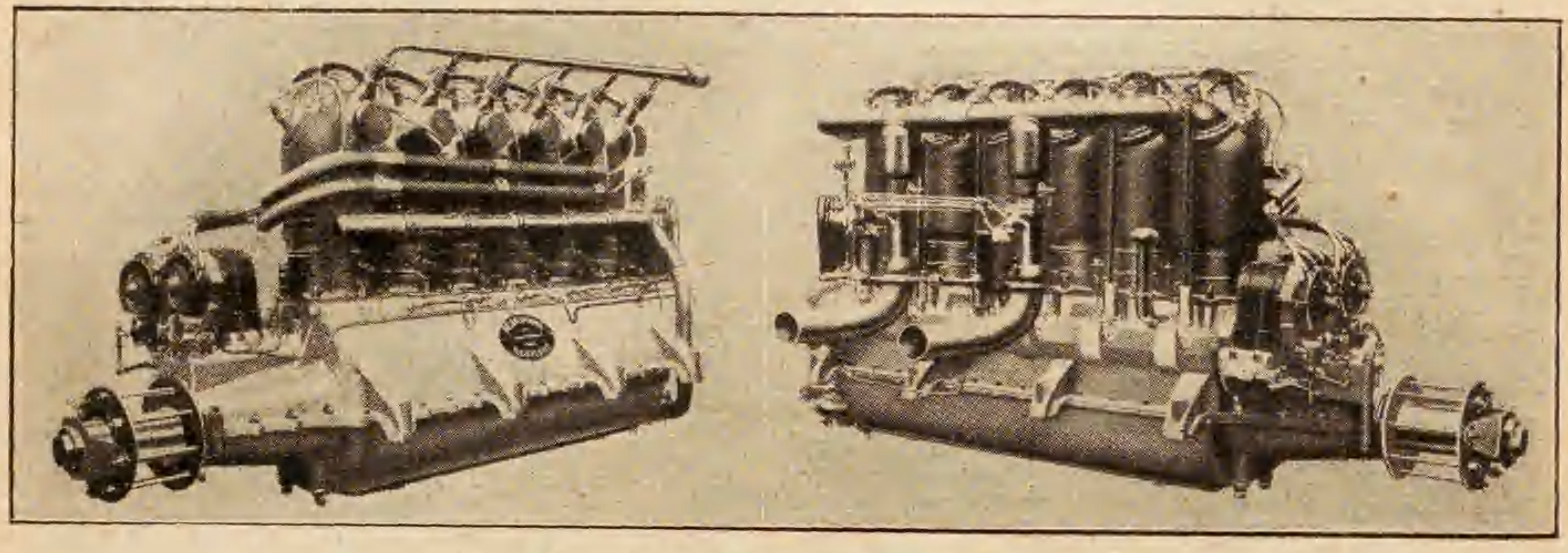
THE BEARDMORE AERO ENGINES

During the war some 3,000 Beardmore aero engines were produced and supplied to the British Government. After the war all the engines with corresponding numbers of spares, left over as Government surplus were bought back by the manufactureres, with the result that Wm. Beardmore and Co. are now in a position to supply from stock complete engines and spares at the shortest possible notice. The Beardmore engines, notably the 160 h.p. size, have a reputation for reliability, although they are not as light per horse-power as some modern engines. On the other hand, they are sturdily built, and are economical in fuel and oil consumption. The engine is already well known and requires no description here.

Mr. Alan Chorlton, chief designer of Beardmore Aero Engines, has during the last year or so been busily engaged upon the production of an engine of entirely novel type, as far as aero engines are concerned. The subject of the latest experiments is a semi-Diesel type, designed to burn heavy oil in place of petrol. It has been thought by many that it was not yet possible to reduce the weight of an engine of this type sufficiently to make it suitable for aircraft work, but Messrs. Wm. Beardmore, Ltd., think otherwise, and from what can be gathered they appear to have advanced a long step towards the production of a heavy oil engine the weight of which is not prohibitive for aviation purposes.

Naturally enough, considerable secrecy surrounds this latest Beardmore product, but it will easily be realised that if such an engine prove a practical proposition, it will go a long way towards making flying safe and economical. The fuel consumption of heavy-oil engines is low (per horse-power developed), and the cost of the heavier oil is lower than that of petrol. A further very great advantage is that the risk of fire is considerably lessened, while the high-compression engine retains its power better at great altitudes than does the petrol engine of normal compression.

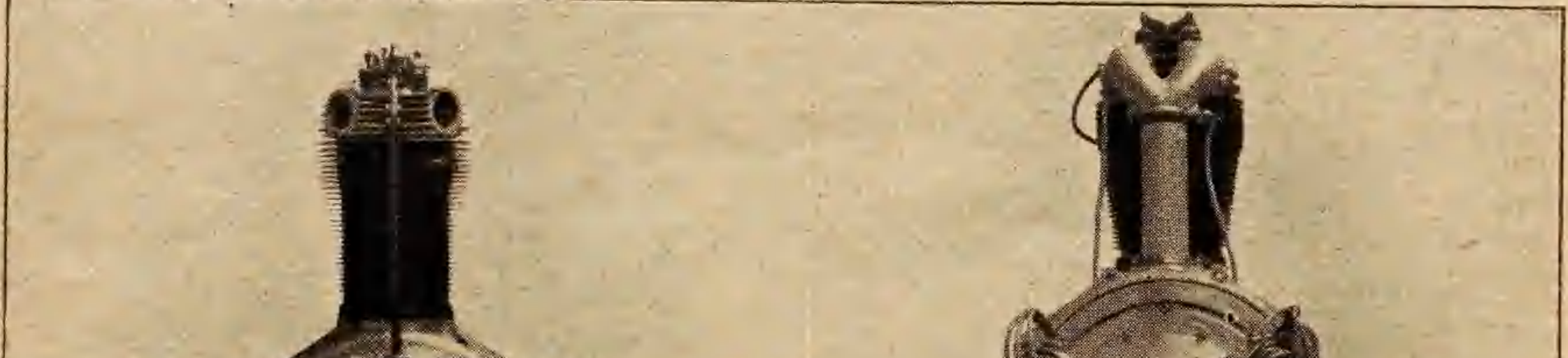
The development of the Beardmore semi-Diesel aero engine will therefore be watched with more than ordinary interest, and if the difficulties can be overcome its production will mean a great step forward in aircraft development.



Two Views of the 160 h.p. Beardmore aero engine.

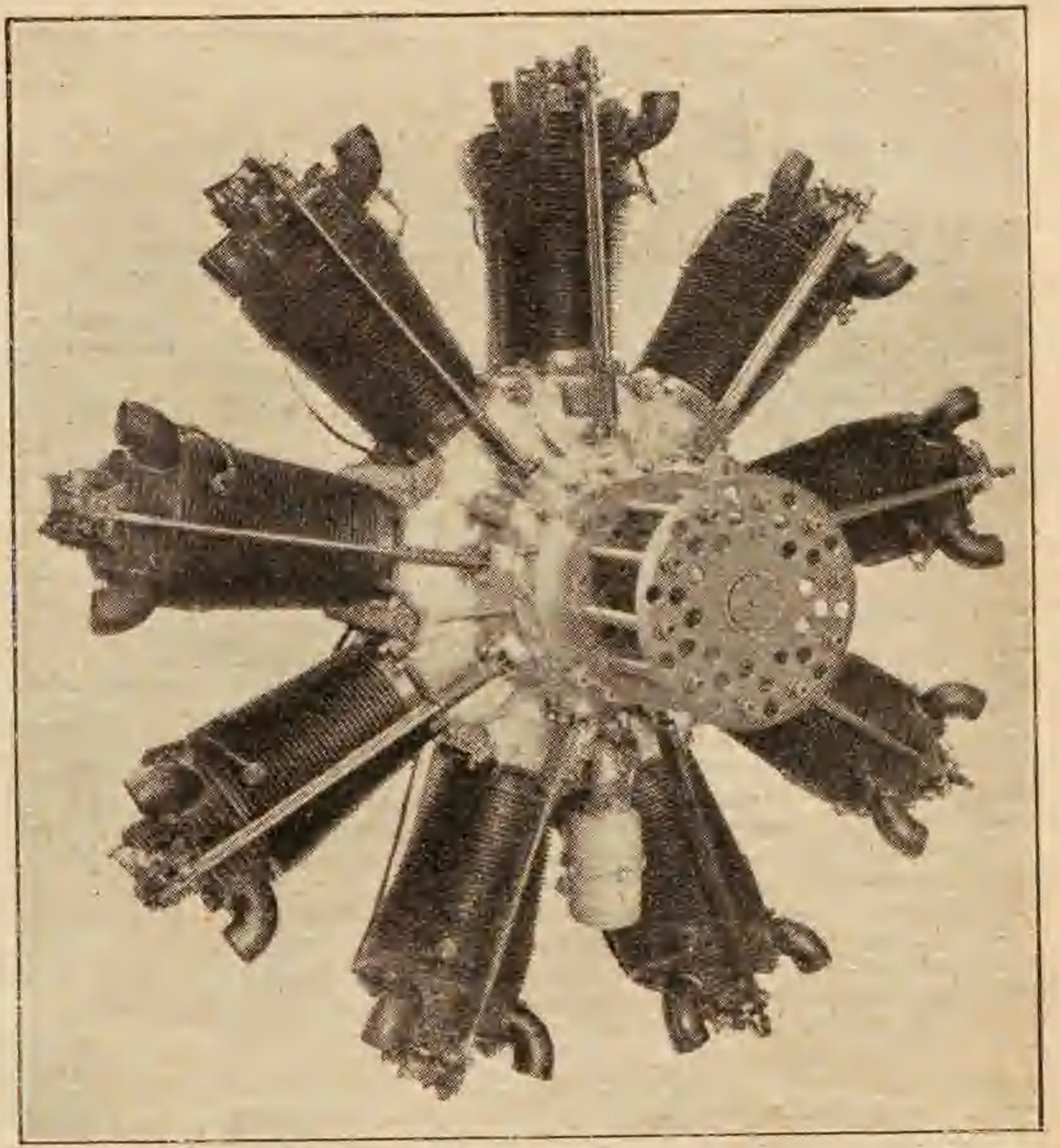
THE "BRISTOL" AERO ENGINES

Although the Bristol engines are a somewhat late development of the Bristol Aeroplane Co., Ltd., whose other activities have been dealt with elsewhere in this issue, they have already made quite a fine reputation for themselves. It may be



Two views of the Bristol "Lucifer" 100 h.p. engine.

Roy Fedden, Chief Designer.



Three-quarter front view of the Bristol "Jupiter" aero engine.

recalled that the "Jupiter" and "Lucifer" aero engines were produced by the Cosmos Engineering Co. of Bristol, chief designer of which was Mr. Roy Fedden. When the Cosmos company closed down, the patent rights for these engines were acquired by the Bristol Aeroplane Co., of Filton, Bristol, and Mr. Fedden transferred his services to the latter firm, whose chief engine designer he now is.

Since being taken over by the Bristol Aeroplane Co. the "Jupiter" and "Lucifer" engines have been further developed and improved, and have now proved themselves thoroughly. The "Jupiter" of 400 h.p. has passed both the British Air Ministry type-tests and the French tests imposed by the *Section Technique*, and recently arrangements have been completed for manufacturing the Bristol engines in France (by Gnome and le Rhone Co.), which is somewhat reversing the old order of things.

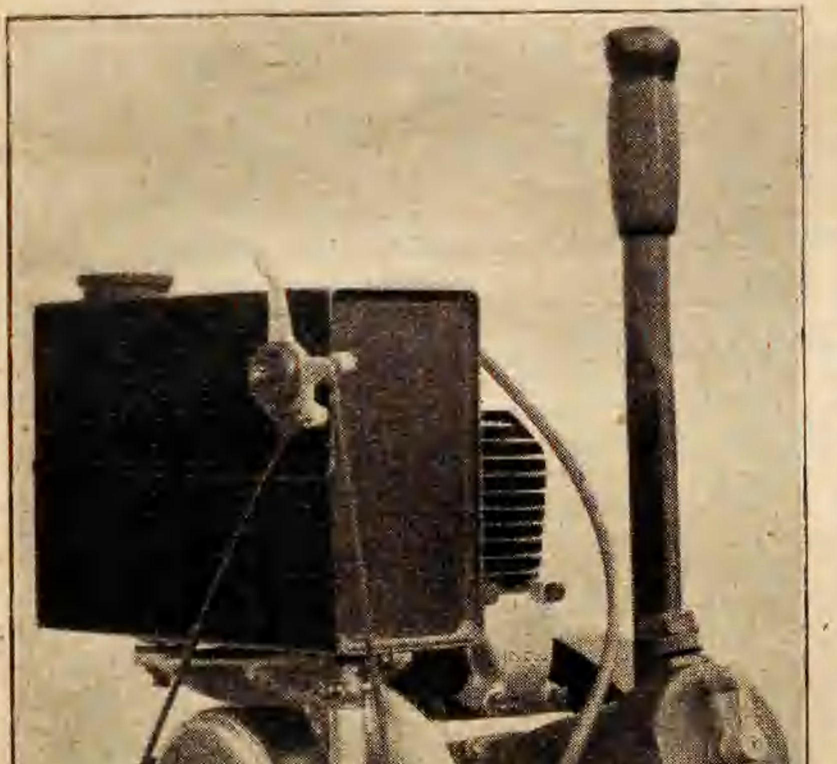
The 400 h.p. "Jupiter" has been fitted in a number of British machines, among which are the "Bristol" 10-seater commercial biplane, the "Bristol" racing monoplane, the "Bristol" "Bullfinch," the Handley Page W.8, the new Short all-metal machine and others. Light weight and low petrol consumption are features of both the "Jupiter" and "Lucifer" engines, while the relatively small number of cylinders results in having few moving parts, few valves and sparking plugs to renew, and generally easy and cheap upkeep—each of them qualifications which make a very strong appeal to those who are considering the utilization of aircraft for commercial purposes. The characteristic features of both this engine and the smaller "Lucifer" type are clearly shown in our photographs on this and the previous pages.

The "Bristol" "Lucifer," of 100 h.p., has been fitted in the Bristol monoplane, the Avro 504, and, recently, in the new "Bristol" three-seater, which but for lack of a suitable stand would have been exhibited at the present Paris Aero Show.

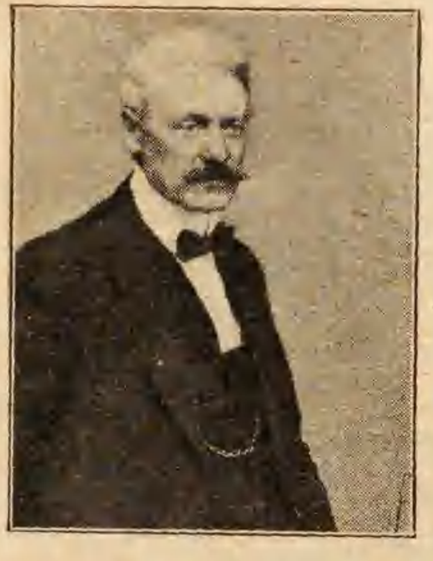
A feature of both "Bristol" engines is the swivelling engine-plate mounting by means of which the back of the engine is easily accessible for inspection, cleaning or repairs. The whole engine plate is mounted on hinges on one side, and, after undoing two pins, the engine can be swung forward and outward, when the whole back of the engine is within reach of a mechanic standing on the ground.

The Bristol Aeroplane Co. have also produced a very neat little gas starter for aero engines, consisting of a small air-cooled petrol engine with a pumping cylinder supplying combustible mixture, through a series of pipes, to all the cylinders of the main engine. The starter is designed as a complete unit, and weighs but 40 lbs. It will start from cold any aero engine up to about 400 h.p. in a few seconds.

A great advantage of this type of starter is that it can be placed anywhere in the aircraft, within convenient reach of the pilot, and can be used to start both engines of a twin-engined machine. For commercial aircraft it is often of great advantage for the pilot to be able to re-start his engine after a forced landing *en route* without calling upon the local inhabitants, if any, for assistance.



The "Bristol" engine-starter is made as a complete unit.



THE GREEN ENGINE CO., LTD.

G. Green, Designer.

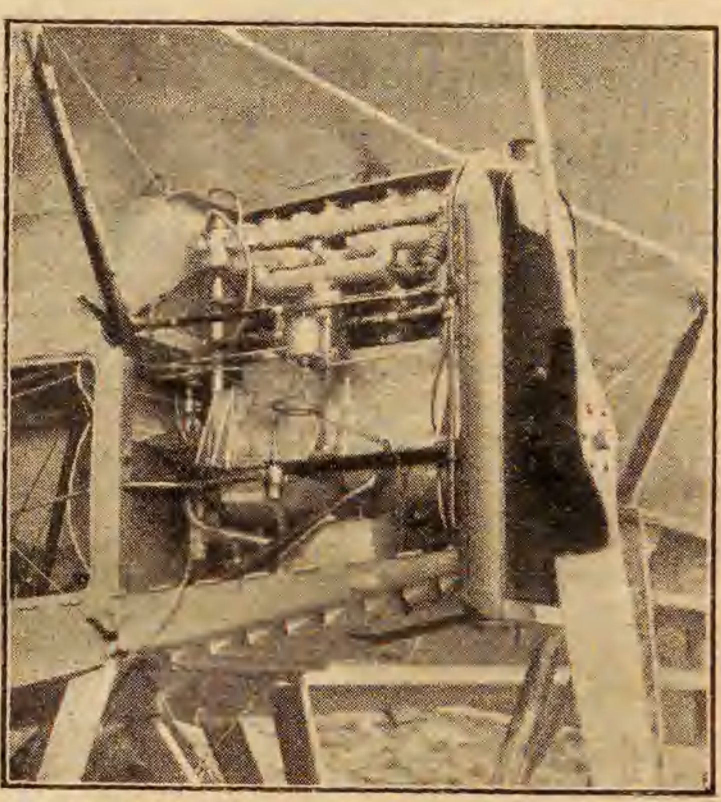
Fred May, Managing Director.

As the pioneer British aero engine firm, the Green Engine Co., of 166, Piccadilly, London, W. 1, occupies a unique position. The first Green aero engine was heard of as early as 1909, while several years before the War a Green engine won the Patrick Alexander Prize. Early Green engines were fitted in such pioneer aeroplanes as the Avro biplanes at Brooklands in 1911 and in the Cody biplanes from about 1910 to the untimely death of that aviation pioneer.

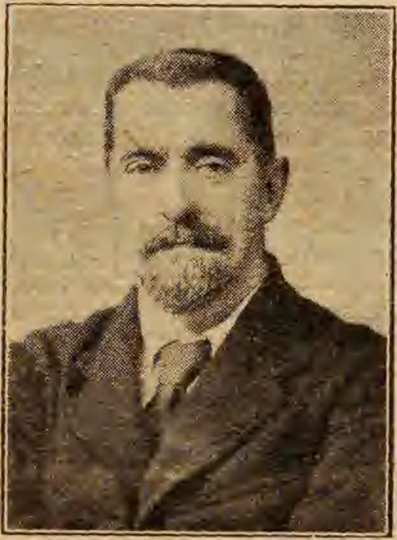
During the War the Green Engine Co. made large numbers of engines for aircraft, both heavier and lighter than air, and Green engines are also extensively used in motor vessels of various sorts, and they did very fine work in coastal motor-boat during the war.

Of recent years the model which has come most prominently before the public is the small 35 h.p. engine with which Bert Hinkler, on the Avro ' Baby," made his famous non-stop flights from London to Turin, and from Sydney to Bundaberg in Australia and also put up most striking performances in the post-war Aerial Derby races and other chief events of a competitive character.

This wonderful little engine is practically identical in general design with the early engine on which Brooklands pilots used to rely in 1911 and thereabout, with the exception that aluminium pistons have been fitted. Although not a " featherweight " engine, the 35-40 h.p. Green weighs 185 lbs. ; it makes up for its weight by reliability and freedom from breakdown and by its low fuel and oil consumption, the former being 0·58 pint per h.p.-hour and the latter 0·10 pint per h.p.-hour.



The 35 h.p. Green Engine Mounted in an " Avro Baby."



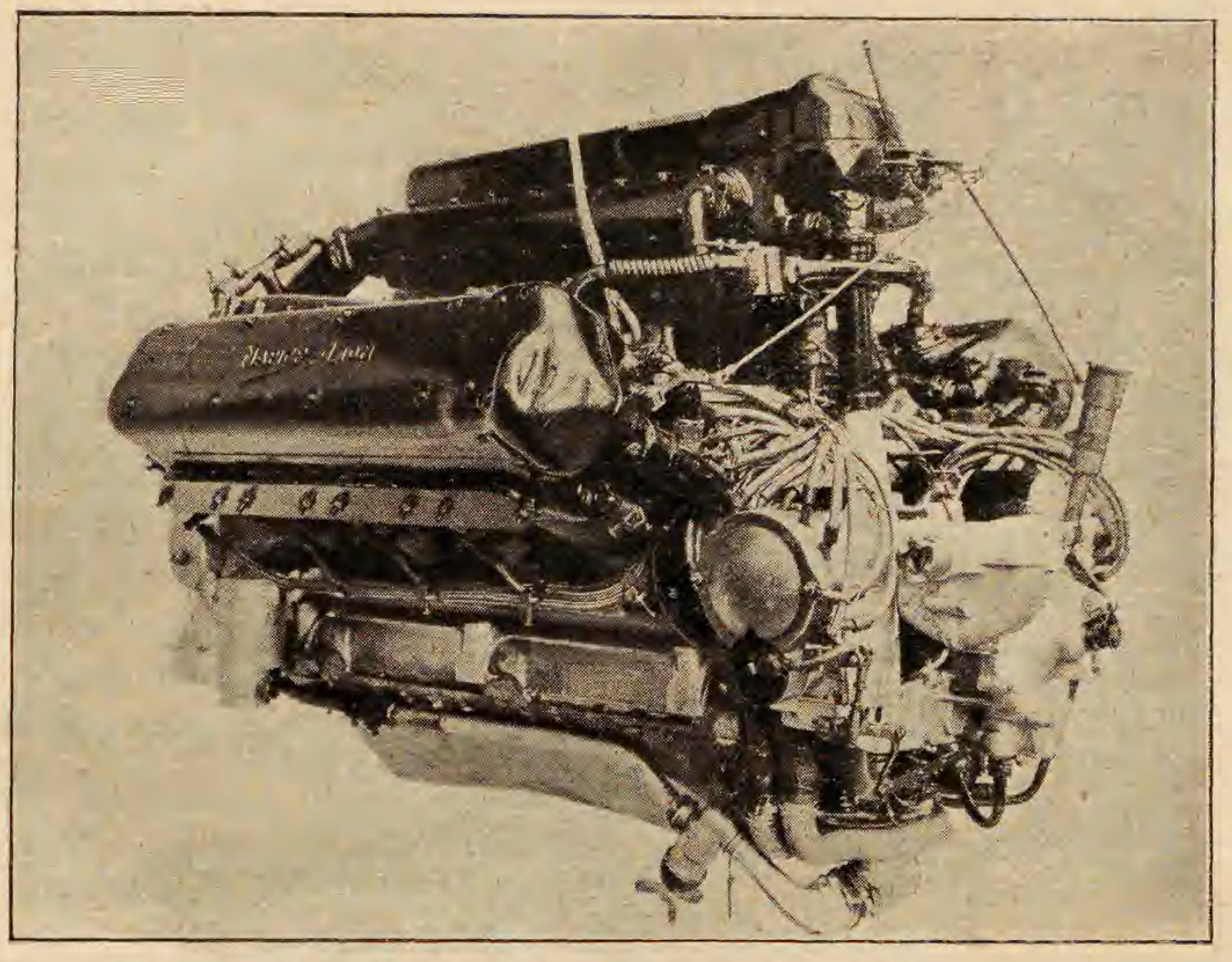
D. NAPIER, AND SON, LTD.

M. S. Napier, Director, and responsible for design.

H. T. Vane, Managing Director.

The first Napier internal combustion engine was produced in 1899, and in the automobile branch of D. Napier and Son, Ltd., the development has been one of steady progress. The Napier company first turned their attention to aircraft and aero engines in the early days of the War. Already in 1914 designs were being prepared, but owing to the attitude of the Government of that time it was not until 1918 that the firm was allowed to proceed with the construction of an engine, and the first Napier " Lion " made its appearance in January of 1919. Almost on its very first flight this engine achieved fame, when Capt. Lang, flying a D.H. " Airco " with the " Lion," reached an altitude of 30,500 ft.

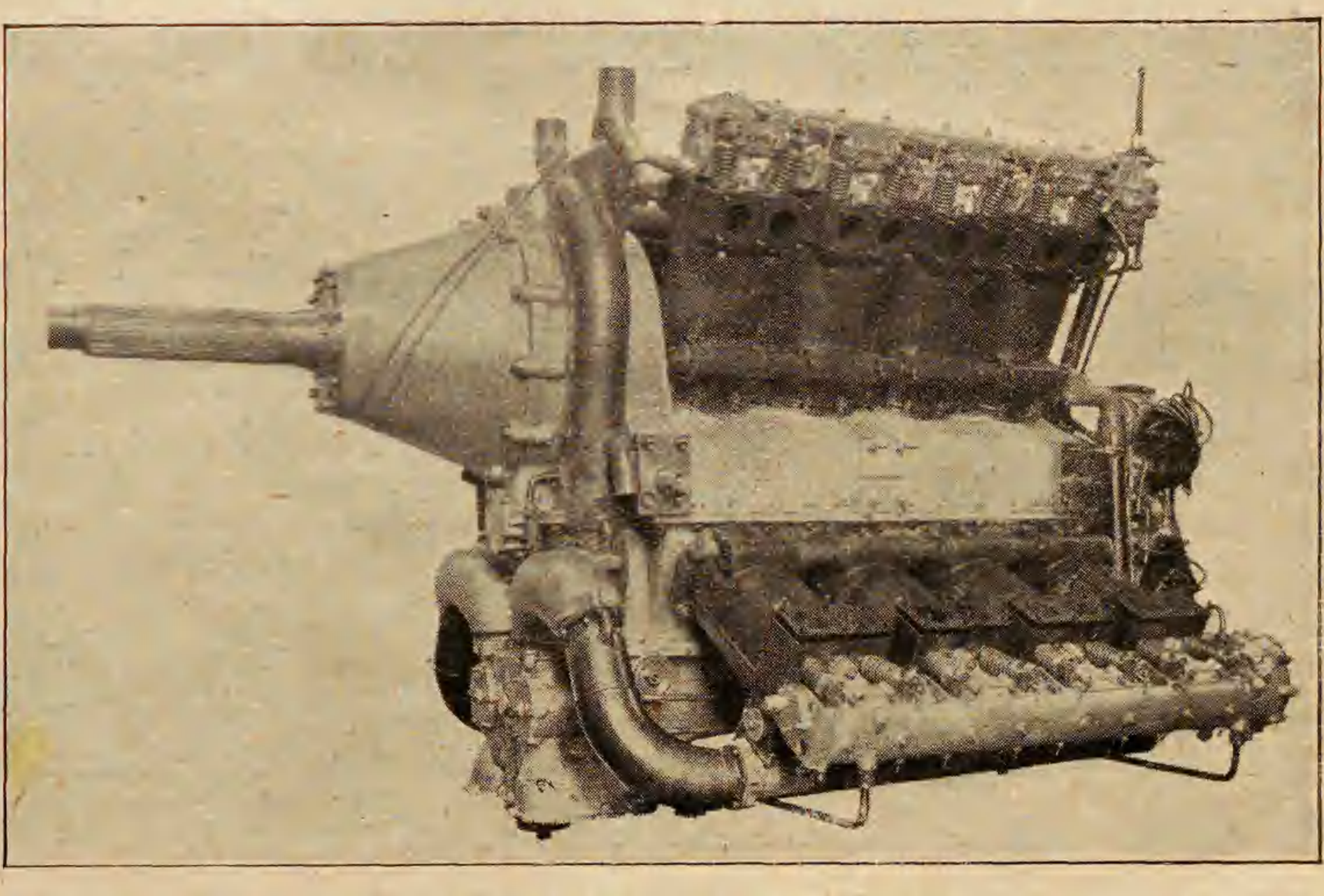
Ever since, the history of the Napier " Lion " is an uninterrupted record of successes, among which space permits only of mentioning a very few. Thus in the Air Ministry Competition of 1920 the Napier " Lion " was fitted in the machines obtaining the highest prizes in each of the three classes. The " Lion " engine also has been fitted in the record-breaking " Mars I." It is also a noteworthy fact that the Supermarine " Sea Lion " which Biard piloted



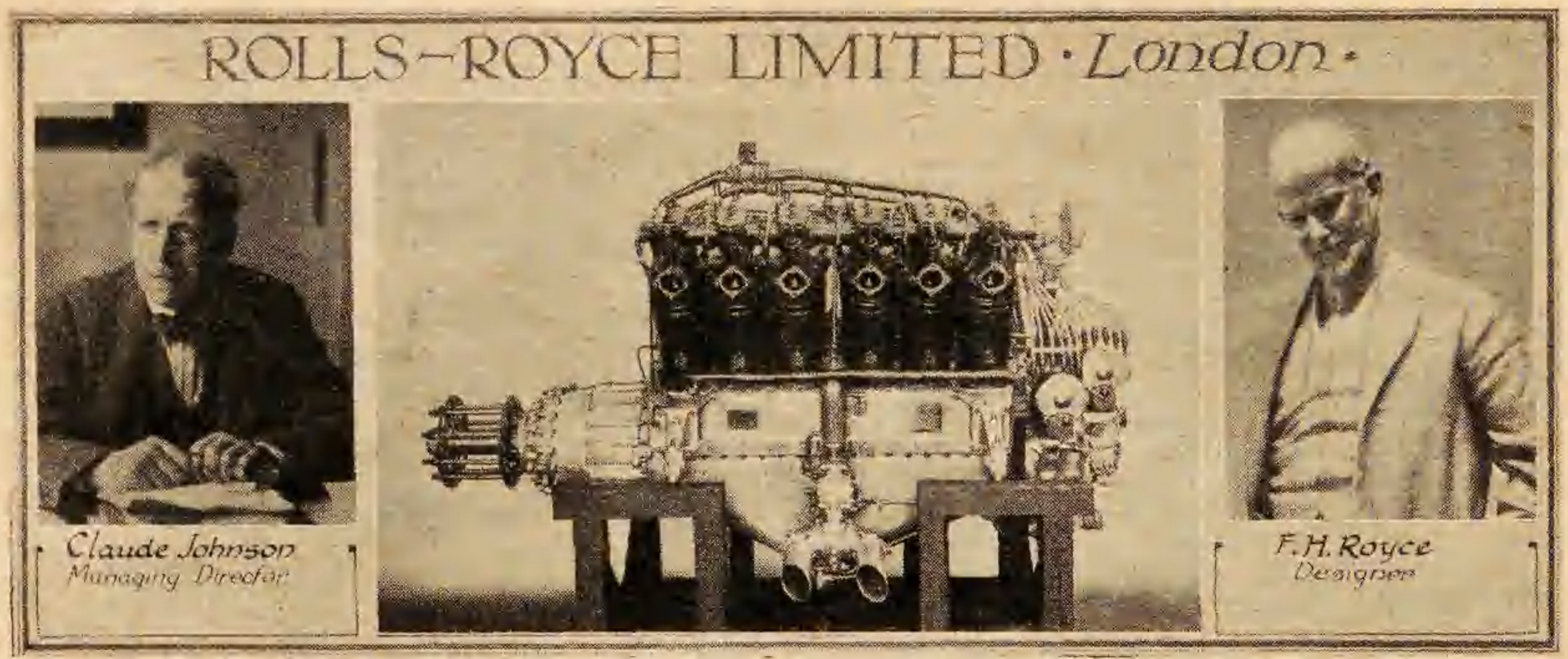
The 450 h.p. Napier "Lion" aero engine.

to victory in the Schneider Cup race at Venice this year was fitted with a "Lion" engine. On the score of reliability the Napier "Lion" also has some remarkable performances to its credit. Thus it may be remembered that an Alliance biplane made a non-stop flight from London to Madrid, a distance of 900 miles, in 7½ hours, while recently, in a D.H.34 commercial biplane, one of these engines ran for 200 flying hours without overhaul.

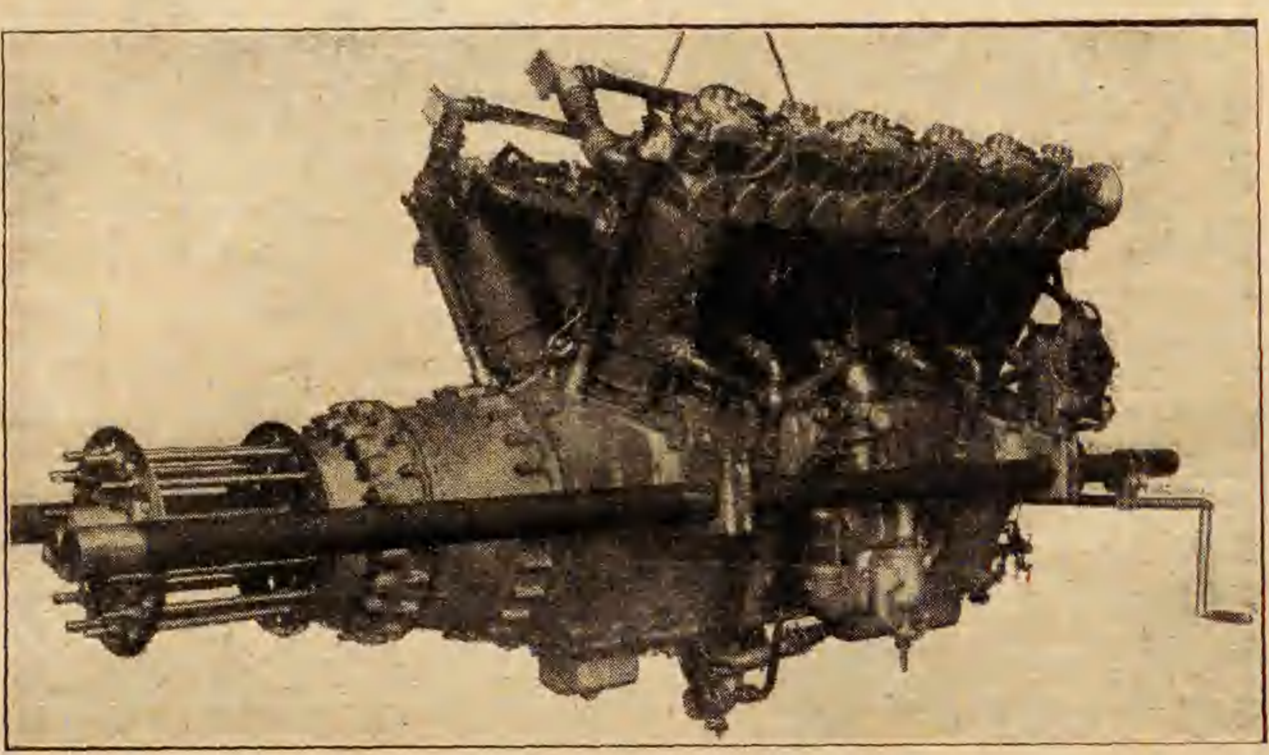
Not content with the excellent reputation—world-wide at that—established by the "Lion," Mr. Napier and Mr. H. T. Vane, managing director of the firm, pursued their vigorous development policy and produced, about a year ago, one of the most remarkable aero engines ever turned out, *i.e.*, the 1,000 h.p. Napier "Cub." This engine has not yet had an opportunity of proving itself to the same extent as has the "Lion," but it has now been fitted in one of the Avro "Aldershot" machines, and within the next few weeks it is hoped to carry out extensive flying tests. On the test bench the "Cub" has proved very satisfactory, and there is no reason to suppose that it will not prove as successful in the air as has the smaller "Lion." Of "X" formation, the 16-cylinder "Cub" is very compact for its size, and already designs are contemplated by various aircraft manufacturers for utilising the most powerful aero engine in the world.



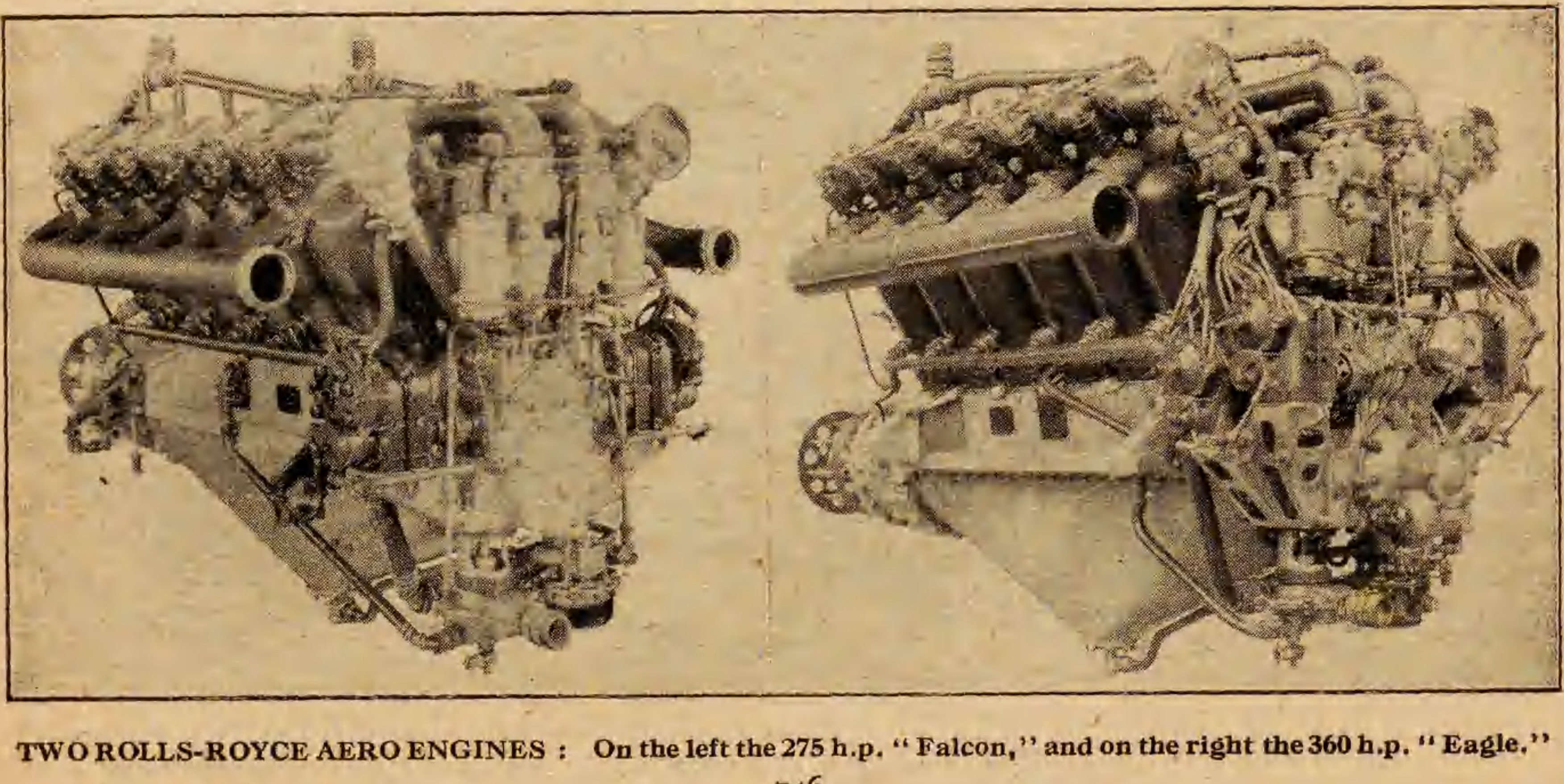
The 1,000 h.p. Napier "Cub" aero engine



Side View of the New Rolls-Royce "Eagle IX."



The 600 h.p. Rolls-Royce "Condor," which has been fitted in the De Havilland "Derby" and Avro "Aldershot."



TWO ROLLS-ROYCE AERO ENGINES : On the left the 275 h.p. "Falcon," and on the right the 360 h.p. "Eagle."

For a great number of years Rolls-Royce, Ltd., have held a leading place in the automobile world, and during the War the firm undertook the development of aero engines with the idea of establishing a similar reputation in that branch. With what success this task was undertaken is now familiar to readers of this journal all over the world, the Rolls-Royce engines having done an enormous amount of war service as well as having to their credit some of the most remarkable flights since the cessation of hostilities.

Probably the first aeroplane into which the Rolls-Royce "Eagle" was fitted was the early Handley Page 0-400 bomber, and since that time this type has been used in a variety of machines, to enumerate which would take up more space than we have available in this issue.

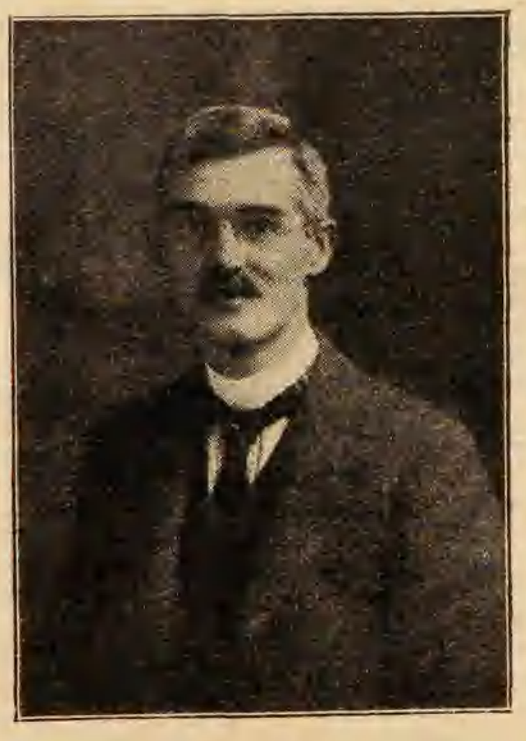
The smaller size, the 275 h.p. "Falcon," is as reliable as its bigger brother the "Eagle," but owing to its smaller power it has not had such general application. Lately, however, it has been fitted in the fast touring machine built by the de Havilland Aircraft Co. for Mr. A. S. Butler.

The largest of the Rolls-Royce family is the 680 h.p. "Condor," which resembles in general lay-out the smaller models. This engine has been fitted recently in such machines as the Avro "Aldershot," the Short "Cromarty" and the de Havilland "Derby."

Among the many famous flights made by Rolls-Royce engines may be mentioned the transatlantic flight by the late Sir John Alcock and Sir Arthur Whitten Brown in the Vickers "Vimy," the London to Australia by the late Sir Ross Smith and Sir Keith Smith, also on a "Vimy," and the Cairo to Cape Town flight.

A recent model introduced by Rolls-Royce, Ltd., is the "Eagle IX," which is generally similar to the famous "Eagle VIII" but differs from that type in certain details. The new model has been designed to be equally suitable for peace and war purposes, and to that end the following improvements have been effected:—Two carburettors are fitted instead of four, so that tuning is considerably facilitated. The placing of the carburettors low down allows of using direct-gravity feed, the float feeds having been re-designed. The engine will now function satisfactorily with a "head" of only 8 ins. above the centre-line of the crankshaft. In view of the tendency in modern commercial aircraft of employing direct-gravity petrol feed from the main tanks in order to avoid pumps, piping, etc.), this should be a great advantage, and should help to ensure for the "Eagle IX" as great popularity as that enjoyed by the previous model.

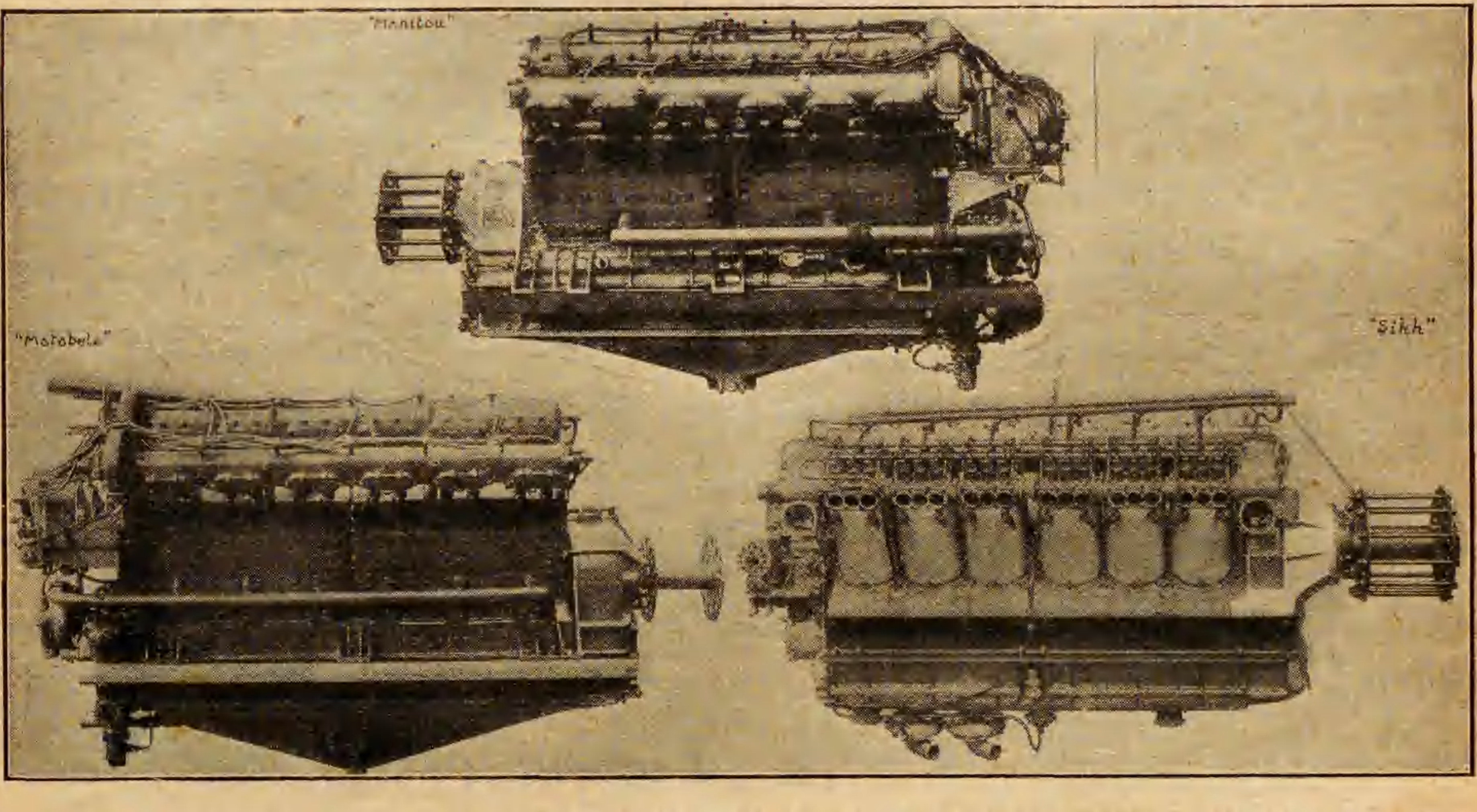
While on the subject of Rolls-Royce engines it should be mentioned that Mr. J. Rowledge, who had a large share in the design of the Napier "Lion" and "Cub" engines, has now joined Rolls-Royce, Ltd., to assist Mr. F. H. Royce in dealing with aero engine design. The combined experience of these two expert designers should result in some very interesting engines during the next few years.



J. Rowledge.

THE SUNBEAM AERO ENGINES

The earliest association of the Sunbeam Motor-Car Co., Ltd., of Wolverhampton, with aviation was towards the latter end of 1912, when an eight-cylinder side-valve engine, of 150 h.p., of the type known as the "Crusader," was produced. It must be remembered that this was in the early days of the industry, when little or no encouragement was forthcoming, and consequently the company showed considerable initiative in themselves purchasing a Henry Farman biplane of early type and experimenting with their own engines installed in same, piloted by the late Sir John Alcock.



THREE SUNBEAM ENGINES: Above, the 300 h.p. "Manitou." On the left, the 400 h.p. "Matabele," and on the right, the 800 h.p. "Sikh."

The development of aviation was early foreseen by the company, and the value of their three years' experimental work was evident when the War broke out, for at that time the Sunbeam Company were one of the very few firms which had ready, standardised and in production, aircraft motors of sufficient power to raise and propel seaplanes.

From this time forward the company never looked back, and with the full concurrence of the Admiralty, War Office and Air Ministry it evolved and produced a wider range of aircraft power plant than any other firm in the country, and these were supplied not only to the British Government, but, in the early days of the War, to the Russian Government and also to the French War Office and the French Ministry of Marine for use in the large seaplanes which carried out patrol work on the Mediterranean coast. Some of the original engines are still in use in these French seaplanes.

Sunbeam engines were associated with a number of picturesque incidents, not the least prominent being at the Battle of Jutland, where Sunbeam-Coatalen engined aircraft gave accurate information to Admiral Jellicoe, and also at the siege of Kut, where a number of seaplanes, equipped with 12-cylinder side-valve "Mohawk" engines of 275 h.p., carried flour and other provisions to the besieged garrison.

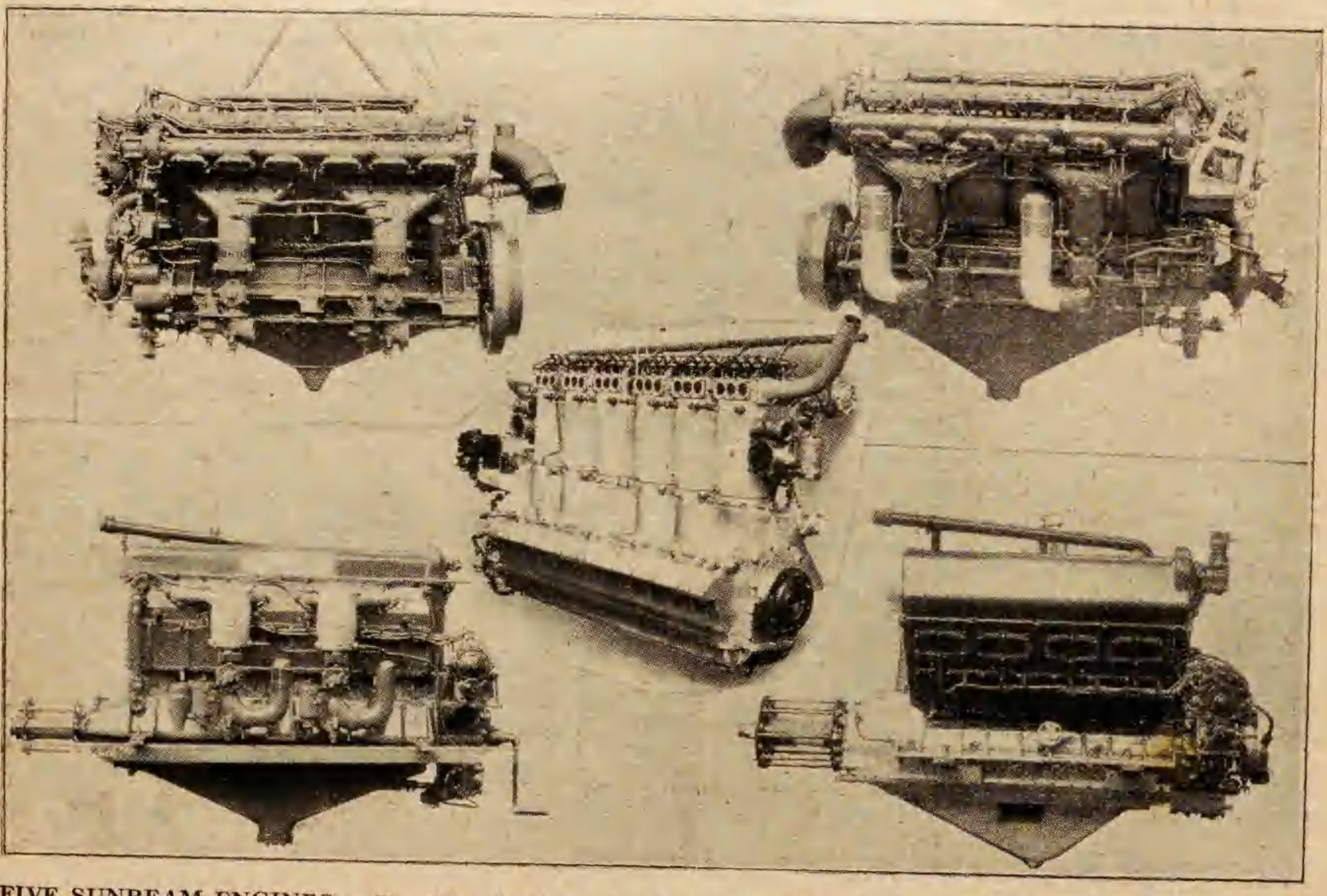
Shortly after the outbreak of war the introduction of the overhead-valve system had the effect of very much increasing the efficiency of the Sunbeam-Coatalen aircraft engines, and it was eventually with engines of this type that the British airship "R.34" made its wonderful flight across the Atlantic and back again in July, 1919. Those in charge had nothing but praise for the engines, which were of the "Maori" type, with 12 cylinders in "V" formation, each engine developing 275 h.p.

Other well-known engines have been the "Cossack" 350 h.p., which, in a slightly modified form to render them suitable for airship work, were fitted to all the later British rigid airships, the "Matabele" 400 h.p., and the "Dyak" six-cylinder in line vertical engine, developing 100 h.p. This latter, in addition to being largely employed in "Blimps" during the War, has been in use by the Japanese Navy in some of its airships, and also fitted to a number of Avro machines, in which it has been very successful, particularly in Australia and Norway.

It is to the chief engineer of the Sunbeam Motor-Car Co., Ltd., Mr. L. Coatalen, that the evolution of all these varied types of aircraft engines is due; the company is still engaged in the development of different types of aircraft engines, and experiments are being made with the "Sikh" 12-cylinder "V" engine, with separate cylinders, developing 1,000 h.p.

L. Coatalen, designer of the Sunbeam aero engines.

It may not be out of place to refer also to the fact that "Matabele" engines have been largely adapted for hydroplanes, and motor boats.



FIVE SUNBEAM ENGINES: Top left, the 275 h.p. "Maori." Top right, the 350 h.p. "Cossack." Centre, the 400 h.p. "Sikh." Bottom left, the 100 h.p. "Dyak." Bottom right, the 200 h.p. "Arab."

BRITISH AERO ACCESSORIES

The Aerograph Co., Ltd.

43, Holborn Viaduct, London, E.C. 1.

THIS firm, who are pioneers in the spraying method of applying paints, have specilised in the aviation side of this class of work, and have produced several successful plants suitable for the various requirements of aircraft painting, varnishing and doping, etc. This method of applying paint and the like not only has the advantage of saving labour and time, but it enables the job to be executed with remarkable control—as compared with the ordinary brush method—with the result that the paint, etc., is applied evenly and continuously. Furthermore, it does not drag the surface of the object under treatment, which in certain cases is of considerable advantage. Last but not least, it is economic with the medium. We understand that a new and improved device is being developed by this firm, about which we hope to have something to say very soon.

The Anglo-American Oil Co., Ltd. (Pratt's).

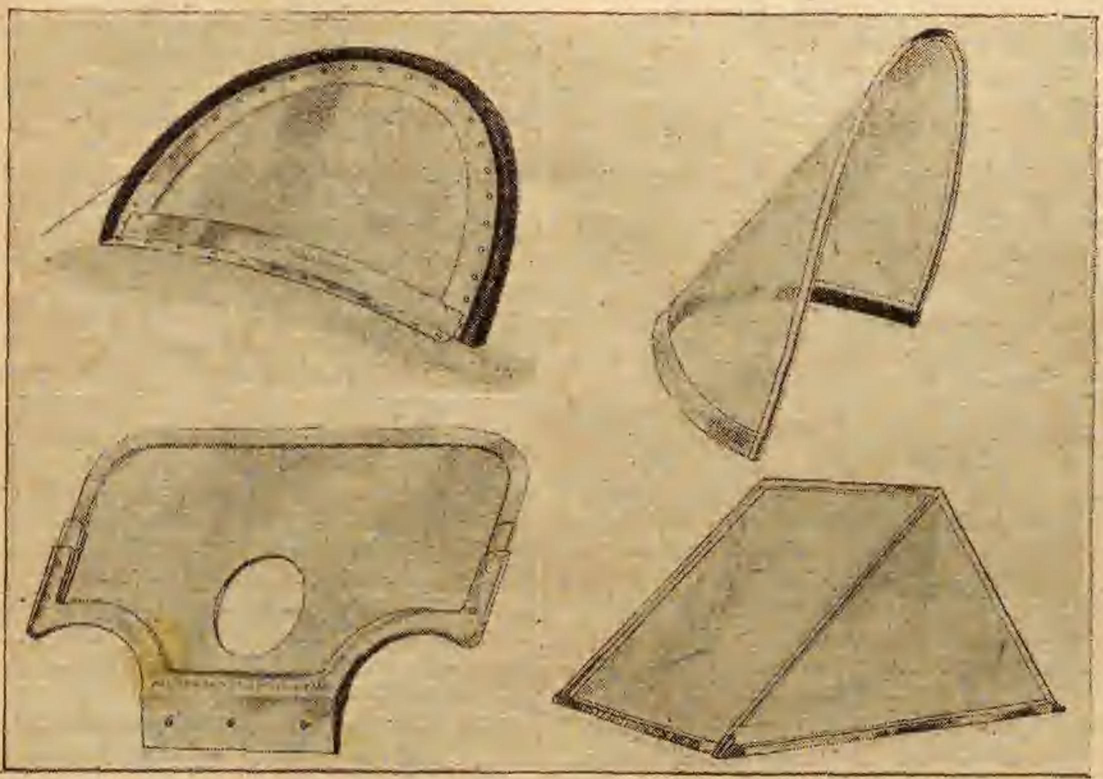
Queen Anne's Gate, London, S.W. 1.

FIRMS such as the above are always at a disadvantage in a *résumé* of the kind herewith presented, for there is so little one can say about their products in the way of a description, neither can they be illustrated very well! However, the Anglo-American Co.'s well-known "Pratt's" aviation petrol hardly needs any introduction to our readers, for besides being known throughout the world, it is *used* as well. This firm also specialises in bulk storage outfits, consisting of underground storage tanks connected up with self-measuring pumps.

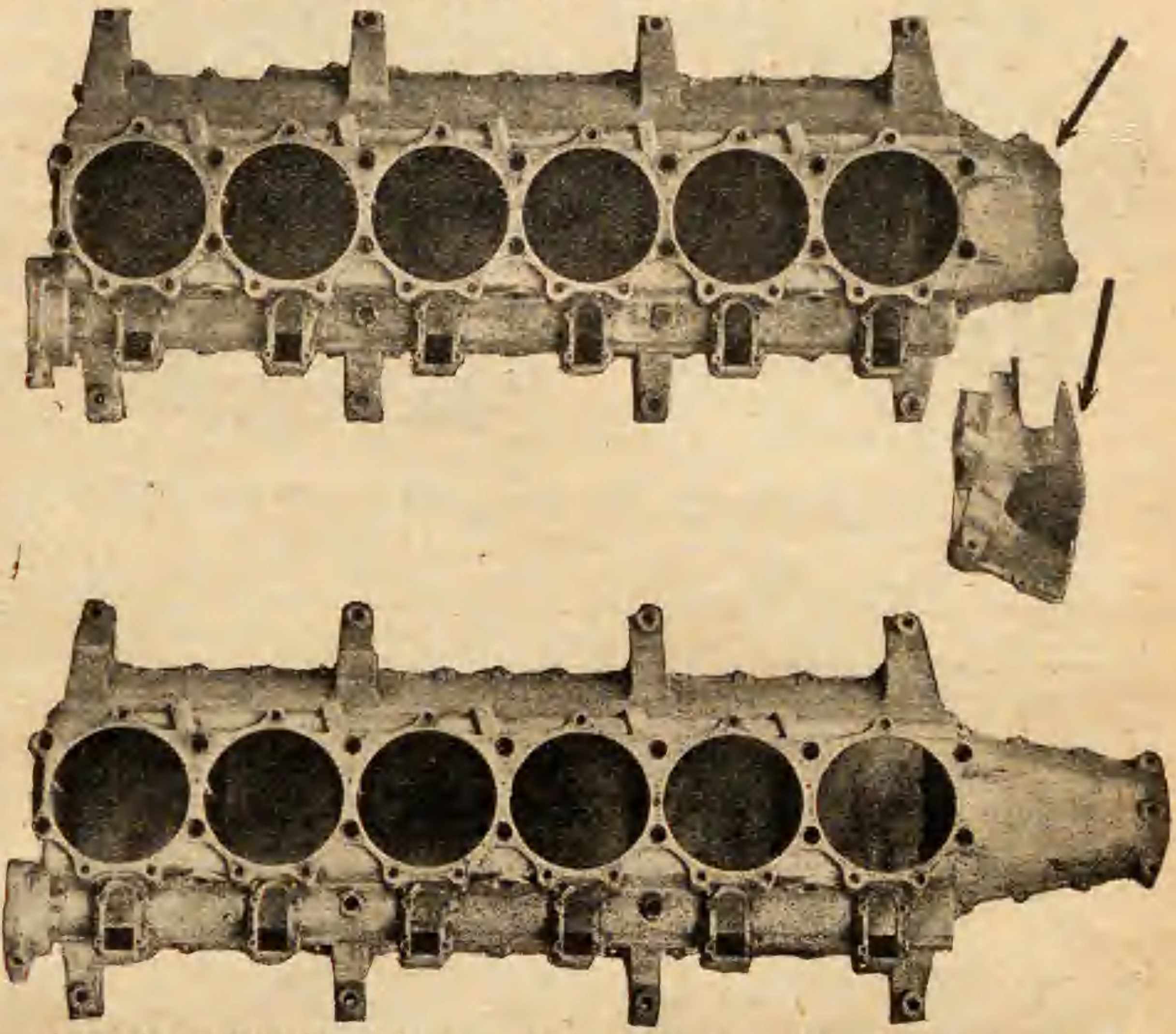
Auster, Ltd.

133, Long Acre, London, W.C. 2, and Birmingham.

THE well-known makers of wind-shields and motor-body accessories are also the manufacturers of the celebrated Auster-Triplex and Auster-Nonflam aero wind-shields, which during the Great War were adopted as the standard fitment to practically all makes of aeroplanes, seaplanes, kite-baloons, etc. These windshields are made in a great variety of models to suit the different types of aircraft. Unfortunately, space will not permit a description of these here, but we illustrate a few of these to give an idea of the different patterns that can be supplied. Auster, Ltd., will, however, be pleased to submit drawings and quote against specification for wind-shields for all types of commercial aircraft, etc.



Four patterns of Auster Aero Wind-Shields, specially designed to suit various types of aircraft.



A Barimar Repair. Above, a damaged aero engine crank-case, some broken parts missing. Below, the same crank-case mended, with the missing pieces replaced and welded into position.

Barimar, Ltd.,

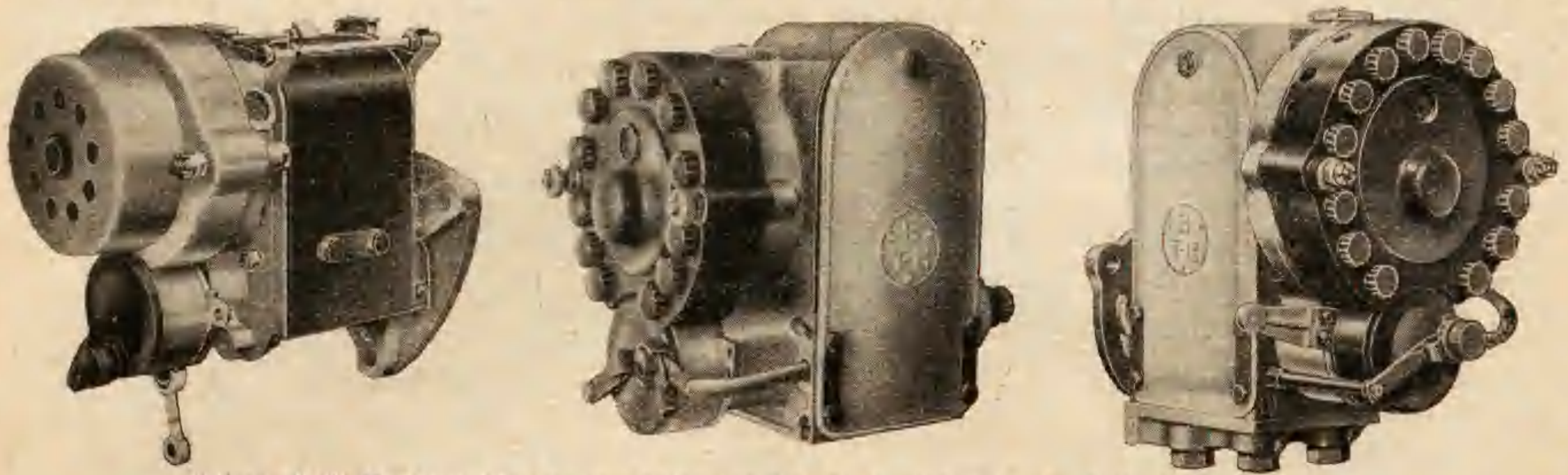
10, Poland Street, London, W. 1.

SCIENTIFIC welding has played a great part in the construction and repair of aero engines and engine parts. Barimar, Ltd., the scientific welding engineers, of 10, Poland Street, London, W. 1, and branches, have on their books the record of many different makes of aero engine parts which have been successfully repaired by them. The Barimar special process for welding aluminium is invaluable for this class of repair work, as aluminium is used so extensively in the construction of aero engines. Two illustrations are shown of a typical example of Barimar craftmanship—an aero engine crank-case, before and after repair.

The British Thomson-Houston Co., Ltd.,

Rugby.

THE British Thomson-Houston Co., Ltd., started manufacturing magnetos in the very early days of the War, producing magnetos for aircraft, motor-vehicles and motor-cycles, but eventually decided to concentrate solely on the production of aircraft magnetos for four, six, and eight-cylinder engines. Much trouble was experienced at this time, due to the fact that a large proportion of the materials used in the construction of magnetos had only been produced previously in Germany. Magnet steel, moulded insulation, and



Three B.T.H. Aero Magnetos, from left to right, the A.O. 9, A.V. 12 and A.V. 14

many other materials were unobtainable in this country, and it was, therefore, not only a question of manufacturing magnetos, but also of finding firms who would undertake the manufacture of suitable materials, or for this company to manufacture the materials in addition to the magnetos, the latter course being the only one open in many cases. Under these great difficulties the manufacture of magnetos was started within the first two weeks of the War, and, as little was known about magneto design in this country at that date, it was only natural that the first magnetos manufactured were similar in design to those of German origin. As engine conditions became more onerous on the magneto, however, it was found that it would be necessary to design an entirely new magneto, and this work was undertaken on behalf of the Government during 1916, the type A.V. magneto being produced, on the inductor principle. The B.T.H. type A.V. magneto was first built for 8 and 12 cylinder engines, and was found to give very much more satisfactory results than could be obtained with the previous models. Magnetos of this type were extensively used during the latter part of the War, and not only were they the first 12-cylinder magnetos manufactured in this country, but the British Thomson-Houston Co. was the only firm who supplied 12-cylinder magnetos during the War. About 50,000 magnetos were supplied by this firm for aircraft purposes during the War, and the A.V. magneto is extensively used today for aircraft engines of 8, 12 and 14 cylinders. The magneto is provided with a stationary armature and a rotating polar inductor; the current generated reaching a maximum value four times during each complete revolution of the polar inductor, and thus producing four sparks per revolution of the armature shaft. The rotating inductor shaft is of the "straight through" type, which forms an excellent mechanical construction specially adapted to withstand the severe vibrations which are encountered in service on aeroplane engines. Safety spark-gap electrodes are mounted on the half-speed wheel of the magneto, and thus, when the machine is in operation, these electrodes are constantly sweeping through the air, and ionisation is entirely avoided. B.T.H. magnetos were the first to embody the "jump-spark" distributor, a feature which eliminates the use of a carbon distributor brush. A rotating metal brush is used in conjunction with raised distributor segments, and, in addition to eliminating the leakage due to the rubbing action of the old type of carbon brush, this distributor ensures that the current is retained until sufficiently intense to spark across a leaky or sooty plug.

A nine-cylinder magneto, type A.O. 9, was designed by this Company during the early part of 1918, for nine-cylinder radial engines, which were being built at that time, and this magneto is standard today for all 9-cylinder engines. The excellence of B.T.H. magnetos is continually being demonstrated by the record which they help to achieve, and, to quote one illustration of this fact alone, these magnetos have been used by all machines which have won first and second places in the Aerial Derby for four consecutive years.

British Petroleum Co., Ltd.,

22, Fenchurch Street, London,
E.C. 3.

THIS firm's contribution to the aviation industry is "B.P." aviation spirit, and also underground systems of storage for same. One of these storage plants has been installed at the Croydon Aerodrome.

The British Oxygen Co., Ltd.,

Angel Road, London, N. 18.

WITH the growth of the all-metal machine, welding will become a more and more important item in aircraft construction. For welding work oxygen is employed very largely, and the above firm supply oxygen in large quantities, promptly, for this purpose. They have oxygen works distributed over various parts of the country, which greatly facilitate the delivery to all localities.

Brown Bros., Ltd.,

Great Eastern Street, London,
E.C. 2.

THE special Aircraft Fittings and Materials Department of Brown Bros., Ltd., established about ten years ago, now occupies an unique position in the industry. This house is one of the largest, if not the largest, supplier of aircraft parts to practically all British manufacturers, in addition to exporting a considerable amount of material to foreign Governments and aircraft manufacturers. A very good opinion can be formed of the extensive range of material handled by a perusal of their comprehensive 96-page quarto catalogue which, in addition to covering aircraft fittings and materials, instruments, tools and aerodrome equipment, contains numerous useful British Standard and Air Board specifications. We understand copies of this catalogue are available for Government Air Departments and aircraft contractors. In addition to specialising in A.G.S. material, Brown Bros., Ltd., are prepared to supply presswork and built-up metal fittings, also to make to order machine parts in special steel, and they possess facilities for handling throughout export orders of any magnitude with despatch.

Brunton's,

Musselburgh, Scotland.

BRUNTON'S are an old-established firm having a world-wide reputation for wire and wire ropes for all classes of work. They were one of the first to specialise in the aviation side of their business, and as early as 1907 supplied steel tie-rods to the British Government for use in the construction of airships and aeroplanes. Their special knowledge of the details of aircraft rigging has placed them in a position to provide many details used in that branch of aircraft construction, and has enabled them to introduce several designs of their own, which have been approved of and used by the British Government. Everything in the nature of wires, cables, or appertaining to the bracing of aircraft, may be obtained from Brunton's.

Bullivant and Co., Ltd.,

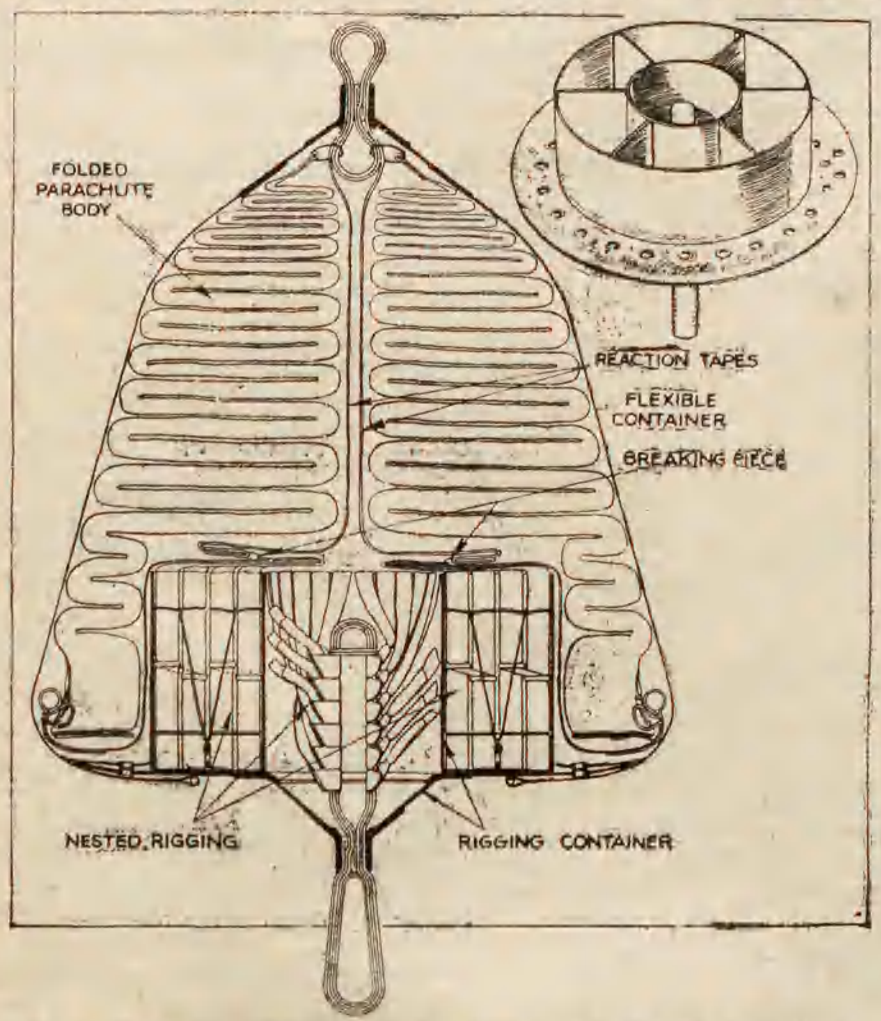
72, Mark Lane, London, E.C. 3.

BULLIVANT'S are specialists in stranded steel wires and cables, and are pioneers in this work in connection with aviation. They have done a considerable amount of research work with a view to producing stranded cables to meet the various requirements for aircraft, and in 1908 they drew up specifications which included some 96 different constructions of strand and cord for use with aircraft. Further experiment and experience ultimately resulted in the first Aircraft Cable Schedule ever issued being compiled in 1912. This schedule was subsequently adopted *en bloc* by the then Royal Aircraft Factory. During the War this firm did valuable service in the production and improvement of cables for aircraft, and were responsible for solving one or two difficult problems that arose. Further experiments are now being carried out with *flat* cords—as distinct from round—and they have patented a new design. They will be pleased to give further information in this connection to those interested.

E. R. Calthrop's Aerial Patents, Ltd.

423A, Edgware Road, London, W. 2.

THERE is very little one can say here as regards this firm other than the fact that the "Guardian Angel" parachute is undoubtedly an exceedingly well-designed and thoroughly thought-out proposition, and that it has demonstrated by innumerable "flights," that it is as reliable an apparatus as it is humanly possible to obtain. Mr. Calthrop has been at work—and worked hard—on the development of the parachute for a good many years now, and it should not be long now before the aviation world will wake up to the fact that there is in the "Guardian Angel" a very important and useful "accessory" for aircraft.



The Calthrop Type H "Guardian Angel" Parachute.

Cellon (Richmond), Ltd.,

22, Cork Street, London, W. 1.

THE first Cellon dope manufactured in this country was made in a small works at Clapham, the manufacture of the material starting at the beginning of 1911. Although at that time there was not a large demand for dope, the requirements soon outgrew the facilities available at Clapham, and in the following year arrangements were made with Messrs. Thomas Tyrer and Co., chemical manufacturers, at Stratford, to manufacture the dope on behalf of the Cellon Company. In the year 1912 every important competition held in this country was won by machines doped with "Cellon," and large orders were executed for the War Office and the Admiralty. At the end of 1913 the concern was turned to a Limited Company under the name of Cellon, Ltd., but Messrs. Tyrer still continued to manufacture for the new company. During the early part of the War, the plant at Stratford was found sufficient, and by means of certain additions to it and arranging night and day shifts, the amount of Cellon required by this country and the Allies was forthcoming. It was, however, necessary to continually increase plant in order to meet the ever-growing demands for dope, and also for the newly introduced dope coverings. In 1916 it was realised that it was impossible to further increase the output of dopes and dope coverings, with the result that extensive works were taken at Richmond, Surrey. The works themselves comprise large mixing rooms, storage houses, laboratories, etc., etc., and are generally acknowledged to be the most complete of their kind in this or any other of the Allied countries, and many foreign Commissions visited them during the War. Some of these Commissions, too, asked for and were allowed access to plans of the works, afterwards erecting plant on similar lines in their own countries. In 1918, Cellon (Richmond), Ltd., the present company, was formed to take over the works. Naturally, the termination of hostilities considerably reduced the quantity of dope required in this country, but, on the other hand, the export of dope was again permitted, and there was an immediate demand from the principal foreign Governments for Cellon materials. This demand has grown considerably, and still continues. With the slackening demand for dope, the Research Department of the works were able to devote more time for experiments on other uses and properties of cellulose solutions, with a result that a number of these have been introduced, and are at present being manufactured in large quantities. The chief amongst these are the "Cerric" black lacquers, which are made in all grades to give from a dead matt to a highly glossy finish. These, like all the "Cerric" materials, are rapidly applied by means of spray, and dry very rapidly. They are now being used in a large number of works to replace stoving enamel. Other "Cerric" materials include transparent lacquers, wood solutions, coloured solutions for decorating tins, boxes, furniture, etc., and bronzing medium. Another speciality of the firm is "Porcelac" white solution, which is used very largely for the covering of bathroom and hospital fittings, bath taps, etc. Although considerable experiments have been carried out on the "Cerric" materials, experimental work on dopes has not been overlooked, and Cellon Scheme "B" pigmented dope is claimed to be the most economical and efficient scheme of doping obtainable. Continual improvements have been made

A part of the Stores Section of the Cellon Works at Richmond.

in this scheme, particularly in regard to providing materials which can be applied either by brush or by spray, and now that so many aircraft works have spray plants installed, this latter point is of particular importance.

R. W. Coan,

219, Goswell Road, London, E.C. 1.

WHERE lightness is of such importance as it is in aircraft construction aluminium naturally plays a prominent part in many ways, not only in the engine, but with various fittings, etc. The name of Robert Coan is too well known in connection with all kinds of aluminium castings to need anything further being said than that Coan's castings are notable for their cleanliness and accuracy, and that the aviation side of this class of work is well catered for.

The Falcon Airscrew Co.,

113, Cottenham Road, London, N. 19.

THIS firm has a well-equipped factory, and a staff of highly-skilled workmen, for the production of airscrews of all types. These are built up from the best selected wood, and the finish given to each "prop." leaves little to be desired. Three-bladed airscrews—a difficult proposition—form a speciality, whilst they have recently brought out a new scheme for metal-tipping the blades of airscrews, by means of a series of independent metal "clips" placed one next to the other along the edge of the blade. This system is claimed to be a considerable improvement on the single metal strip method.

Fox Bros. and Co., Ltd.,

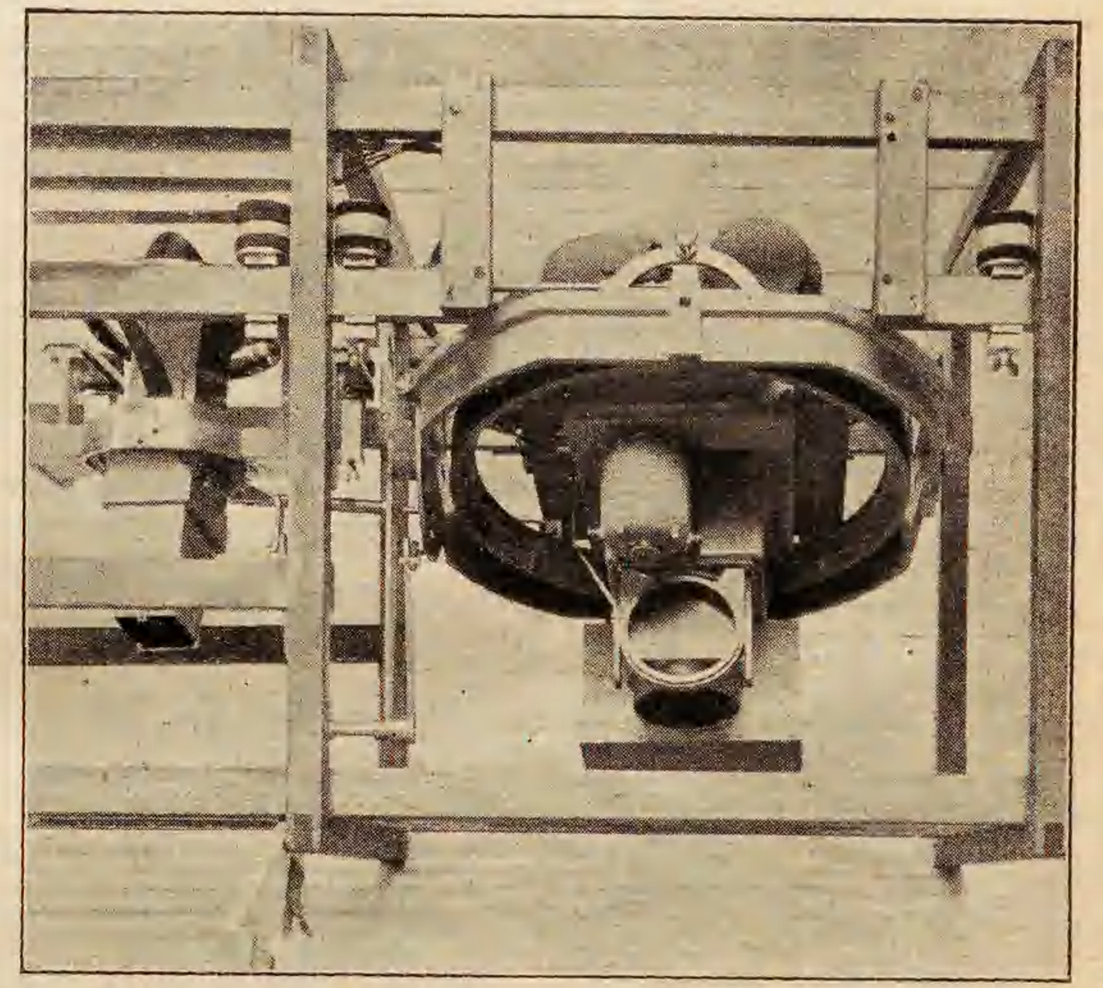
Wellington, Somerset.

THE above firm is one of the oldest woollen manufacturers in this country, and are the originators of the "Puttee." "F.I.P." (Fox's Improved Puttees) are well known in the Royal Air Force, to pilots, sportsmen and many others. It is not only the high quality of the material with which these Puttees are made that makes them famous, but the manner in which they are shaped, etc. It is something more than "just a strip of cloth wrapped round and round the leg."

The Hoyt Metal Co. of Great Britain, Ltd.,

Deodar Road, Putney, London, S.W. 15.

AMONG the main factors which have contributed to the success of the Hoyt Metal Co., manufacturers of anti-friction (Babbitt) metals, are their earnest endeavours not merely to meet all existing requirements, but to keep a little in advance of the immediate needs of designers and users of all classes of machinery, and thus, so far as is possible as manufacturers of lining metals, to assist in the development of mechanical construction. An important result of this policy is found in their Number Eleven Alloy, a metal familiar to all engineers interested in the construction and maintenance of aviation engines. When those entrusted with the development of the Allied Air Services were testing and selecting materials for this important work, Hoyt Number Eleven was found to be incomparably superior both intrinsically and mechanically to anything else, and was the bearing metal adopted. During 1918 alone orders for some 1,750 tons were placed by the Allied Air Departments. Over 380 tons were used for the bearings of 49,893 Hispano-Suiza aviation engines. The distinctive features of Hoyt Number Eleven are its exceptional toughness and unequalled durability. The former characteristic is important, rendering it much less liable than any other babbitt to crack up and break away. The tin component is over 92 per cent. The company maintain a department designed to assist and advise, gratuitously, on all matters relative to bearings, white-metalling and lubrication. Enquiries from France are invited by Société Française du Métal Antifriction "Hoyt," 44, Rue de Prony, Paris (xvii).



A New Kodak Automatic Aero Camera, suitable for survey work.

Kodak, Ltd.,

Kingsway, London, W.C. 2.

THE aviation section of this famous photographic firm has developed to quite an important one. During the war this firm carried out a considerable amount of research work in connection with aerial photography, as a result of which they have now several efficient aero cameras suitable for various purposes. We illustrate herewith one of their latest models, an automatic camera suitable for survey work. It is not possible to describe this camera here—we hope to do so in a future issue—but may mention that it embodies all the features of the well-known Kodak Topographic camera as regards automatic film wind, shutter wind, and release, and in addition includes a mechanism for the photographic recording on each negative of the time, altitude and inclination of the camera when the photograph was taken, and serial number of the negative. A special mount is provided enabling the inclination of the camera to be controlled very exactly.

Lang Propeller, Ltd.,

Weybridge, Surrey.

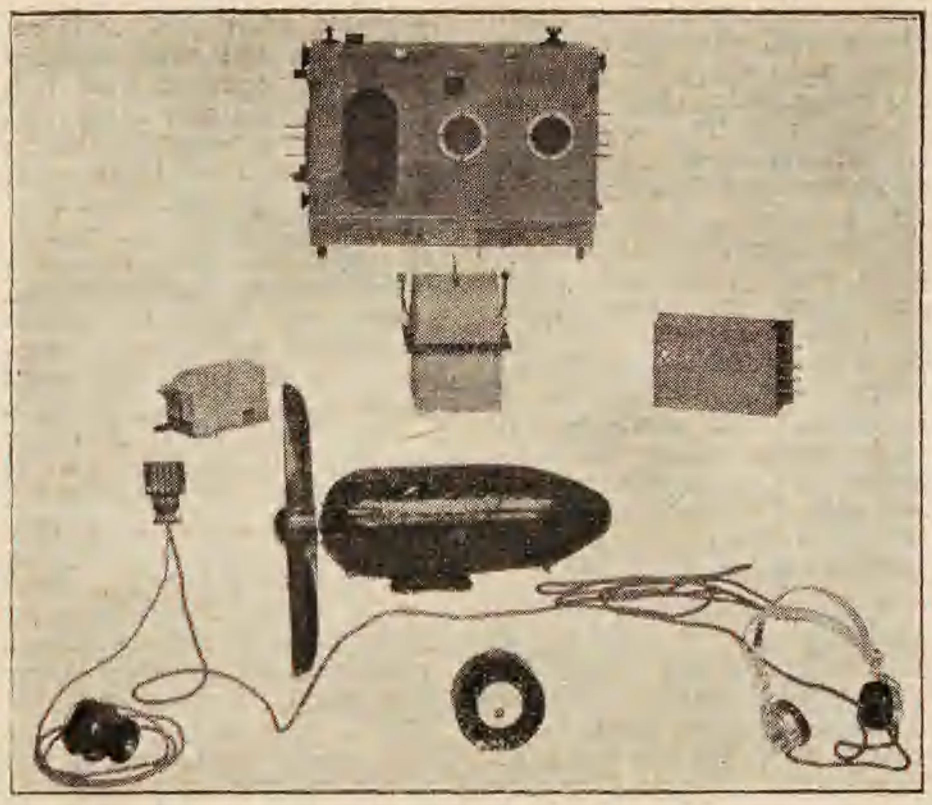
THE design and manufacture of airscrews for all types of aeroplanes and seaplanes is undertaken by this firm. Unfortunately, at the time of writing, we have not received any particulars as to any special work now carried out by this firm.

Marconi's Wireless Telegraph Co., Ltd.,

Marconi House, Strand, W.C. 2.

THE activities of the Marconi Co. in connection with aircraft wireless date back to pre-war days. Early experiments in the transmitting of messages by wireless from aircraft to the ground were conducted at Brooklands in 1913. During the war much progress was made and larger quantities of apparatus manufactured at the company's works. After the Armistice an aircraft department was formed, and a special staff (who had had much experience of aircraft wireless during the war) was organised to handle the development of this important branch of the company's business. One of the greatest achievements in the development of aircraft wireless was the evolution of wireless telephony as a practical means of communication between one aeroplane and another, and those on the ground. This system was originally evolved for war purposes, but its great value for commercial flying being realised by the Marconi Co., a great amount of experimental work was undertaken in order to produce an efficient and reliable wireless telephone set, specially designed for use in commercial aircraft.

Another important aspect in connection with aircraft wireless is direction finding, and in this case the Marconi Co. has adapted the valuable Bellini Tosi system for use on aircraft flying



Marconi's Aircraft Wireless Telephone, Type AD2. This set weighs only 60 lbs., yet has a telephone range under normal conditions of about 150 miles.

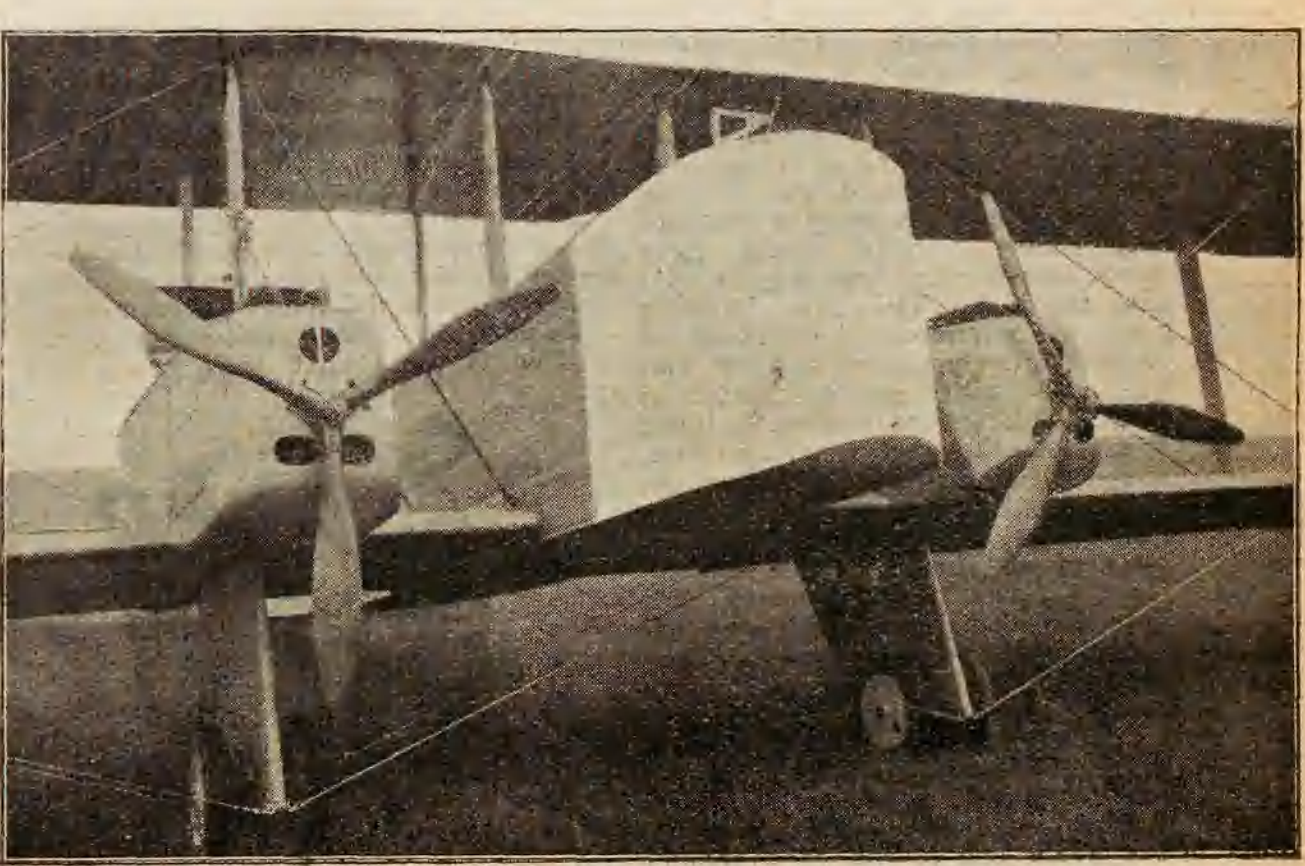
over long distances on land and water, where this means of navigation is a very valuable aid. During the early stages of the growth of civil aviation in 1919 and 1920 much development work and extended demonstrations were undertaken by the company on the machines of both Messrs. Handley Page Transport, Ltd., and Messrs. The Aircraft Transport and Travel, Ltd., these being equipped and maintained by specialised engineers whose duty it was to study the conditions of working and behaviour of the apparatus with which these aircraft were equipped. At the present day all British aircraft flying regularly on inland and Continental air routes are equipped with this company's standard aircraft wireless telephone apparatus, and maintained by the special service organisation at Croydon Aerodrome. At this aerodrome also exists an organisation for development which has been specially created to study the results obtained, and to indicate what improvements from time to time may be effected, thereby making for continual progress. In addition to aircraft apparatus this company also makes a speciality of aerodrome stations, and has installed for the Air Ministry the present station existing at Croydon Aerodrome. This station has a power of $1\frac{1}{2}$ kilowatts, and is equipped with directional reception and facilities for connecting through the wireless telephone to the land line system. Stations similar in many respects to this one have been supplied to several of the Continental aerodromes. In addition to its activities in the development of wireless for commercial aviation, the Marconi Co. specialises in equipments for Service requirements to meet the needs of the British and foreign Governments.

J. MacLennan and Co.,
115, Newgate Street, E.C. 1.

FABRICS, yarns, insulating materials, tapes and webbing, as required in the construction of aircraft, are the specialities of this well-known firm.

The Metal Airscrew Co., Ltd.,
Regent House, Kingsway, London, W.C. 2.

AFTER an arduous period of research, experiment and close investigation, the metal airscrew has now "arrived" as a commercial proposition. The prediction of the *French Bulletin de Renseignements* of the Service Technique de l'Aéronautique made in March, 1921, that the metal airscrew, by the tests made on the experimental ones produced by the Metal Airscrew Co. (associated in this country with the names of Mr. Leitner and Dr. Watts), "marks a great stage in the development of aviation," is thus being fulfilled. It now only remains for the Metal Airscrew Co. in this country to establish its series of dies and press tools for various standards and for its allied firm in France, Etablissements Lumière under M. de Monge to do likewise, for metal airscrews to be as obviously and universally a component of aircraft as metal marine screws are for ships. At the Paris Exhibition we hope to find them not only in evidence on the stand of Etablissements Lumière, with the two propellers that established the Duration Record, but also on several of the leading French aircraft, such as the Farman-Goliath air liners; Breguet, Nieuport and Schneider (Creusot), and it will be gratifying that some of these will be of British manufacture as well as, of course, of French. Substantial orders for these metal airscrews have, we understand, been placed by the British and French Air Ministries, and it is noteworthy that this new—and we hope world—industry is due to British brains and enterprise.



A pair of Leitner Watts 3-bladed metal airscrews, fitted to a Farman Goliath.

Naylor Bros. (London), Ltd.,
Slough.

have been established since 1800, and for many years their reputation has stood very high as makers of decorators' and painters' materials, and also for motor and coachbuilders' finishes. When aircraft came into being, therefore, this firm were able to utilise their large store of experience for the benefit of the aircraft manufacturer; helping him to obtain the very best finishes for his particular purpose. During the war the firm were, of course, engaged almost entirely on Government work, and besides supplying large quantities of material for the R.A.F., they have also carried out much work in conjunction with, and for, the Royal Aircraft Establishment. Since the war the output of aircraft finishes has, of course, fallen off considerably, but Messrs. Naylor have supplied materials to many of our leading firms for their aircraft.

Palmer Tyres, Ltd.,

Shaftesbury Avenue, W.C. 2.

ALTHOUGH the aggregate time that an aeroplane functions on the ground forms, or should do, but a small proportion of its daily routine, the conditions that have to be met during that time call for none the less arduous requirements. It is only to be expected, therefore, that a firm of such repute in connection with motor-car tyres as the House of Palmer should also be to the fore where tyres for aircraft are concerned. Their wide experience in tyre construction, together with a thorough examination into the problems arising in connection with aircraft, has enabled them to produce special aero tyres of all sizes to meet all requirements, and what is more, tyres that have achieved a world-wide reputation, and have contributed their full share towards many aviation successes. It should be pointed out that the Palmer Tyre Co. have not confined their activities to the *tyre* alone, but to the wheel as a whole—rims, spokes, hubs, etc., as well.

The Robinhood Engineering Works, Ltd.,

Putney Vale, London, S.W. 15.

IT is, we believe, safe to say that no single firm has been more intimately connected with the history of British aviation than the Robinhood Engineering Works, Ltd. For " K.L.G." sparking plugs for aeroplane engines originated in the days when flying was still an experimental science, and were then recognised as the only plugs for aeroplane and super-efficient racing engines. Then came the war, and for four and a-half years the entire resources of the Robinhood Engineering Works, Ltd., were at the disposal of the Government, and the output of " K.L.G." plugs for aeroplanes increased in volume and importance. In reviewing the great deeds of the Air Force it is as well to realise that much of their success was due to sparking plug dependency, for failure over enemy country would have meant disaster, and loss of both men and machines. The Air Ministry knew the paramount importance of sparking plug efficiency, and for that reason the entire war production of " K.L.G." Plugs was reserved for them. It may be of interest to mention that, in spite of concentrated effort and the employment of over 1,000 hands, the firm never succeeded in satisfying the demands of even the Air Ministry for " K.L.G." plugs, although they were then being produced at the rate of two million plugs per year. Their unquestionable supremacy at the conclusion of hostilities has remained unchallenged until today, and " K.L.G." sparking plugs are still used as standard fitment by every British aviation engine manufacturer. For every one of the epoch-making flights of 1919-20 " K.L.G." plugs were chosen, not only for use in the actual machine which was the successful participant, but also by every British entrant. In fact, it is no exaggeration to say that every British achievement in the air since the War has been accomplished with their help. The makers of " K.L.G." plugs have their splendidly equipped works at Putney Vale, in South West London, on the main Portsmouth road. The outside appearance of the works is very deceptive, as they actually cover quite a large area, although a direct view of the main shops is impeded by the old house, which they now use for their offices. The works are absolutely self-contained, there being a canteen with seating accommodation for 1,000 people, a power house by which the Company will shortly generate its own power and light, ambulance rooms, and even more land for future extention. The management of the Robinhood Engineering Works, Ltd., are nothing if not progressive, and experimental work is continually taking place, so that as aeroplane engine design improves so will the development of " K.L.G." plugs keep pace with it until finality is reached.

Rubery, Owen and Co.,

Darlaston, Staffs.

IN addition to a full range of standard aeroplane fittings, such as A.G.S. turn-buckles, eye-bolts, bolts and nuts, etc., this firm specialises in pressed steelwork as applied to aircraft construction—all-steel spars, ribs, struts, etc. They also have several fittings of their own design possessing certain noteworthy features.

Shell-Mex, Ltd.,

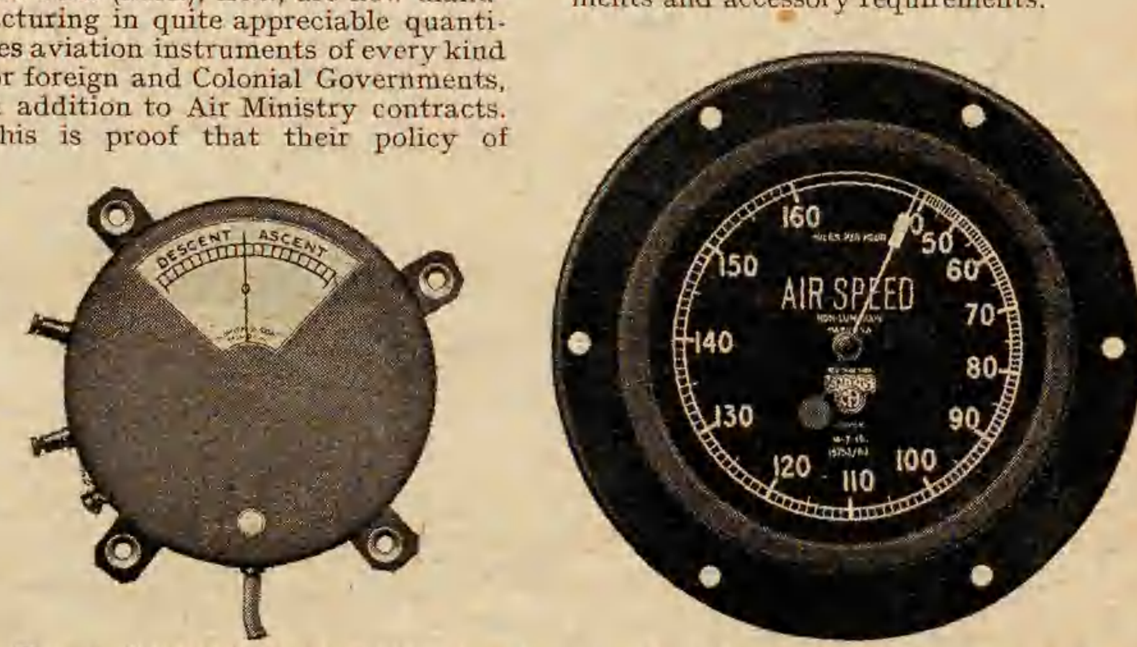
Shell Corner, Kingsway, London, W.C. 2.

THE excellent qualities of the various " Shell " brands of petrol could not be demonstrated better than by the list of the aviation records and successes in which " Shell " has played a part. It is to be regretted, however, the space will not permit us giving such a list—especially as it includes nearly all of them !

S. Smith and Sons (M.A.), Ltd.,

Cricklewood, London, N.W. 2.

IT is interesting to hear in these times of a firm who is really making headway in the aviation world. After passing through, with others, the depression of the last few years, S. Smith and Sons (M.A.), Ltd., are now manufacturing in quite appreciable quantities aviation instruments of every kind for foreign and Colonial Governments, in addition to Air Ministry contracts. This is proof that their policy of maintaining at whatever cost an experimental department continually at work on perfecting the Smith aviation instruments has proved of value to them in the long run, as they are now in a position to supply, not one or two, but every type of instrument for both experimental and general purposes. During the war they made not less than a quarter of a million air-speed indicators and revolution indicators, and since that time have gradually increased their programme until they can now supply revolution indicators, air-speed indicators, altimeters, radiator thermometers, oil and fuel gauges, petrol contents gauges, compasses, clinometers, air sextants, etc., etc.—a very comprehensive range which, with the K.L.G. plugs added, makes the most complete equipment for aircraft ever offered by one firm. Among the latest instruments are the Smith petrol contents gauge, which has been previously described in FLIGHT, and the new Campbell Bennett apperiodic compass, which is manufactured by Messrs. Henry Hughes and Son, for whom Smith's are the sole selling agents for the world. This compass is rapidl gaining favour, and will fill a long-felt want. In addition to ordinary standard instruments, Smith's can also supply special apparatus for testing and calibrating instruments, including altimeter testing apparatus with vacuum pump and bell jar, special gauges for bench test, etc., etc. The record of past successes reveals the fact that when any important flight or competition takes place in any part of the world Smith's instruments have always been fitted to the successful machine. The first instance was on the late Sir John Alcock's flight across the Atlantic, and the late Sir Ross Smith's flight to Australia—in each case the machines were fully equipped with instruments of Smith manufacture. In the Aerial Derby for the last three years every machine has carried Smith's instruments, and the Daimler hire liner G-EBBS, built by the De Havilland Aircraft Co., which up to October 7 last had travelled over 79,000 miles, was also fully equipped with Smith's instruments ; sufficient testimony, therefore, of the fact that aircraft manufacturers cannot do better than go to Smith's always for their instruments and accessory requirements.

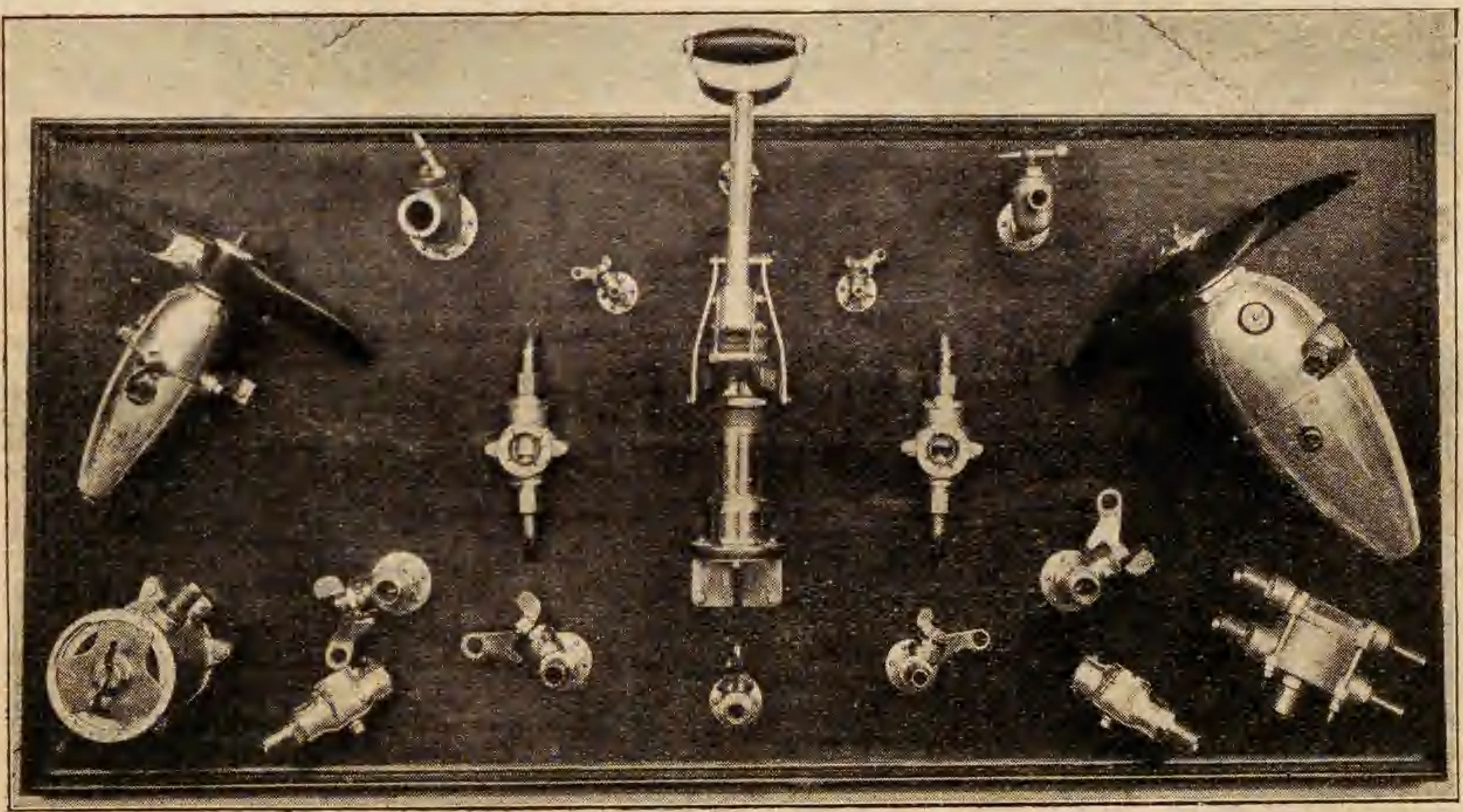


Two " Smith " Aero Instruments. On the left the inclinometer and on the right an air-speed indicator.

Titanine, Ltd.,

175, Piccadilly, London, W. 1.

THE growth of Titanine, Ltd. (in its early days the British Aeroplane Varnish Co.), is by way of being a business romance. Titanine Dope came to life at the commencement of the Great War. At this time the presence of tetrachlorethane in the " dopes " then used was taking an alarmingly increasing toll of the workers' lives. The Titanine firm developed their dope along the lines of elimination of the deleterious ingredients, and produced the original non-poisonous dope with such satisfactory results that the British Government later prohibited the use of tetrachlorethane. The troubles of Messrs. Titanine were, however, by no means at an end; the, at that time, experts had an unswerving predilection for dopes of acetyl cellulose base. (Titanine having nitro cellulose as its basic ingredient.) Irrefutable proof, however, was tabled that titanine possessed four of the fundamental qualities of a dope in a markedly higher degree than other dopes, these qualities being adhesion, flexibility, durability and constancy of tautness under varying atmospheric conditions. Also, titanine was so manufactured that it withstood flame to a greater extent than other dopes. This was the result of a discovery of firms' chemists. The claim of durability was amply justified by the fact that practically the whole of the "Avro" machines, used so often and extensively for training work, were doped with titanine. Adhesion is strongly characteristic of titanine, the tendency to crack and peel off so noticeable after a time with acetate dope being entirely absent. Approximately 1,000,000 gallons of titanine were manufactured during the Great War, the Company maintaining three large factories in this country in the North, Midlands and South, in order to expedite the distribution of the dopes and finishing materials. In addition, a factory was erected in New York to meet the increasing demand of our American allies. The post-War activities of this firm have not been without interest; they have continued their research, and have discovered a new type of titanine, of, we understand, even greater merit, but at the moment we are not permitted to give further details. An outstanding feature among their activities is the fact that the "Bamel" or "Mars I," the Gloucestershire Aircraft Co.'s record-breaking machine, was coated with the titanine special racing scheme for the Aerial Derbies of 1921 and 1922 and for its great flight at Martlesham early this year. The foreign trade of Titanine, Ltd., has also grown apace, several large foreign Governments now use titanine doping schemes for military and naval aeroplanes almost exclusively; also may of the largest hire and passenger carrying firms are doing likewise. Messrs. Titanine inform us that their affiliated company in the U.S.A., known as Titanine Inc., whose works are in New Jersey, are also fully occupied, several large Government orders having been received by them.



Some of the Vickers patent petrol accessories, fittings, etc., for aircraft.

Vickers, Ltd.,

Vickers House, Westminster, London, S.W. 1.

THE aviatic energies of this go-ahead firm are not confined to the design and construction of aircraft alone, but includes their accessories and components as well. First, there is the raw material for aircraft in the form of special steels and the famous "Duralumin." Then, as regards the accessories, they have specialised in the improvement in the petrol system as a whole, and have produced fittings and components—pumps, relief and by-pass valves, cocks, etc.—for this important section of considerable efficiency. Other Vickers "accessories" include the Reid Control Indicator, which has been installed in many of the machines on the London-Continental Service, as well as being in use in Japan and other countries; and the Davis Navigation Lights for aircraft. These latter include a very comprehensive range of lamps—head, tail, port and starboard, etc.—suitable for equipping an aeroplane for night flying in as efficient a manner as possible.

The Victoria Rubber Co., Ltd.,

Edinburgh.

FABRICS for use in connection with aircraft, especially rubber-proofed for airships and balloons, are manufactured by this firm. It may be of interest to note that they were the makers of the material for the first kite balloon sent to France at the commencement of the war.

T. Wheeler,

217, Goswell Road, London, E.C. 1.

THE firm of T. Wheeler is an old-established one manufacturing aneroid barometers, and scientific instruments. They have recently put on the market a new altimeter having an anti-lag device, which makes a very important improvement in altimeters as used for aircraft. This anti-lag altimeter should be of considerable value for long distance and night flying.

C. C. Wakefield and Co., Ltd.,

Cheapside, London, E.C. 2.

IT is safe to say that with the history of British aviation no individual product has been so closely associated as Wakefield Castrol "R." For that world-famous aero-engine lubricant has played its own important part since the beginning of flying on practically every type of aeroplane, seaplane, flying boat and airship. Working as it often must under greatly varying pressures and temperatures, the aero-engine oil has to withstand the severest tests. Indeed, the whole problem of efficient lubrication is one of a highly complicated and technical nature. In this connection Wakefields were able to draw upon their great experience already gained on high-powered racing motor-cars and motor-boats. So that with the data they had gathered they were able to set their research department, with its well-equipped laboratories, to a task which was not so much a new problem as a development; and, of course, the firm enjoyed the active co-operation of engine builders in the form of practical experiments and tests—on the bench and in the air. The outcome of this pioneer work was the production of Castrol "R," the fame of which has extended throughout the entire world of flying The feature of this lubricant is that it is an absolute blend (not merely a mixture of ingredients), the constituents of which do not separate however long they are allowed to stand. Possessing all the lubricating properties of castor oil, and reducing to the minimum the tendency to carbonisation, which is present in all vegetable oils, Castrol "R" has a higher "flash point" and a remarkably low "freezing point." The latter feature is, of course, of vital importance. Castor oil becomes too thick to lubricate at zero Fahrenheit, but Castrol "R" retains its fluidity at a temperature of -26 degrees F., or 58 degrees of frost. This means that the engine continues to be lubricated at any altitude or in any temperature at which flying is practicable—at the time of writing, anyhow!

THE BRITISH AIR-LINES

The history of British civilian flying, as regards the running of regular services over specified routes, commenced in 1919, when the A.T.T. (Aircraft Transport and Travel) commenced operating a service between London and Paris, using converted war type of machines for their purpose. Partly owing to the uneconomical nature of the machines, and partly owing to the lack of any Government assistance, this firm had to cease operations, but not before a very great deal had been learned about the conditions to be met with in running such a service, and, incidentally, having proved the feasibility of keeping to a fixed time-table and flying with good regularity, coupled with safety to passengers.

Handley Page Transport, Ltd., also commenced operations in 1919 on the London-Paris route, while during 1919-20, a service was also run between London and Brussels and London and Amsterdam. It is worthy of mention that these services were run without Government assistance in competition with foreign subsidised services.

Last year three British firms were operating subsidised services on the London-Paris route, but this resulted in a great deal of undesirable competition between the British firms, and caused a certain amount of overlapping and duplication of ground organisation.

A few months ago it was decided to allocate to each of the three British operational companies a separate and distinct route, and the present arrangements are that Handley Page Transport, Ltd., operate the London-Paris service; the Instone Air Line, Ltd., have had allocated to them the London-Brussels-Cologne route, and the Daimler Airway are breaking new ground with a service between Manchester and London, and London-Amsterdam, the latter to be extended to Berlin as soon as the necessary arrangements can be made.

The Daimler Airway

The moving spirit of the Daimler Airway is Colonel Frank Searle, who was associated with Aircraft Transport and Travel in its pioneer services between London and Paris. Col. Searle is ably assisted by Major Woods Humphrey, who had previous experience of air lines with Handley Page, Ltd. The Daimler Airway is a branch of Daimler Hire, Ltd., and the machines used are D.H.34's, with Napier "Lion" engines. These machines have seating accommodation for ten passengers, and have proved economical to run, considering their high performance. A daily service in each direction is maintained between London and Manchester on the one hand and London (Croydon) and Amsterdam on the other.

Handley Page Transport, Ltd.

With the exception of a short interruption in 1921, due to the impossibility of running unsubsidised services in competition with French subsidised ones, Handley Page Transport, Ltd., have operated the London-Paris service since 1919. The Manager of the firm is Mr. E. Cogni, and the machines used are Handley Page W.8B's with two Rolls-Royce "Eagle" engines. This type has been chosen because the firm is of the opinion that a twin-engined machine reduces to a minimum the risk of forced landings on unsuitable ground, the one engine being sufficient to enable the machine to reach a good landing ground, even if not able to reach its destination. As a matter of fact, unless the machine carries full load, it should be able to complete its journey on one engine. The seating accommodation of the H.P. W.8B is for 12 passengers, but next year the W.8C will be put on the service. This machine will have seating accommodation for 16 passengers.

Instone Air Line, Ltd.

Messrs. S. Instone and Co., Ltd., bought a D.H.4A early in 1918 for the purpose of rapid communication between their various offices in England and on the Continent. This marked the beginning of this firm's interest in aviation, and a number of different machines were gradually acquired, and used on the London-Paris service. In April, 1922, the firm was made into a limited company under the title Instone Air Line, of which Sir Samuel Instone is chairman, and this line is now operating a daily service (in each direction) between London-Brussels-Cologne. Several types of machines are used, such as the D.H.34, with Napier "Lion" engine, the Vickers Vimy-Commercial, with two Rolls-Royce engines, and the Vickers Vulcan eight-seater, with one Rolls-Royce "Eagle" engine.

LONDON TERMINAL AERODROME

Monday evening, December 11, 1922

Passenger traffic has remained good in spite of the fact that the usual thick December weather has done its best to interfere with the running of the air services during the past week. Between 135 and 140 passengers have been carried by the six lines which run services from London, the most striking feature of these figures being the way in which the traffic on our new inland service is being maintained.

During the past week no fewer than 48 passengers have travelled on the Daimler Airway machines between Manchester London and Amsterdam, a bigger total than on any other route, and of these 38 were passengers between London and Manchester.

With the figures for passengers carried by the K.L.M. added, there was a total of 65 passengers—out of a grand total of 135 for all lines—on the Manchester-London-Amsterdam route.

The C.M.A. Air Lines are having great success with their early morning newspaper service from Lympne to Paris. During the past week the machines have flown every day in spite of the fact that the regular passenger services to Paris have been very erratic.

The new Handley Page torpedo-'plane, which is to be at the Paris Aeronautical Exhibition this week, was to have flown over from Cricklewood to Croydon, and on to Paris, on Friday, but, owing to a thick smoke-mist which hung over Croydon, the machine was unable to land there. The sound of the Napier engine could be heard as the torpedo-plane circled round the aerodrome, and on one occasion the machine was sighted flying low over the sheds at a very slow speed, but the pilot was evidently unable to see down through the mist, and, after circling round for some time, he eventually alighted at Kenley, which was quite clear.

A Question of Customs

In the morning a D.H.34, *en route* from Amsterdam, and piloted by Mr. Herne, was unable to find Croydon through the smoke-barrage and finally alighted at Stag Lane. He had one passenger on board, and, owing to delay on the part of the Customs' officials in that district, this passenger was kept waiting, with a policeman in close attendance, from 12.15 p.m. to 4.30 p.m. It is about time that better arrangements were made for dealing with passengers who, by reason of weather, are landed at some aerodrome other than Croydon. There are only about three places where alternative landings are made, and it is surely not impossible to arrange that someone who is always there could be invested with sufficient authority by the Customs to clear the few passengers so landed without all this delay.

Mr. Lloyd, the manager of the Trust House, has now arranged for luncheon-boxes for any passenger who feels that he or she would like to relieve the monotony of an air journey by taking a meal.

Mr. Lloyd tells me that great extensions to the Trust House are now contemplated. It is proposed to take over the old officers' mess at the entrance to the aerodrome, and equip this with a first-class lounge and dining-room, with the addition of a billiard-saloon and other luxurious arrangements. It is proposed, also, to build a false-front on to the building, and provide an open-verandah where teas will be served in summer; and I hear that it is further planned that a band shall be provided on Saturday and Sunday.

A party of booking-clerks from the provincial branches of Messrs. Thomas Cook and Son are having a "Cook's tour" of their own, and visited the aerodrome on Friday in order to see for themselves how air services are run, and thus be able to give enquirers for air travel a first-hand idea of how the comfort and convenience of passengers is catered for.

THE ROYAL AIR FORCE

London Gazette, November 28, 1922

Stores Branch

The follg. are granted short service commns. as Flying Offrs. for three years on active list, with seny. of dates indicated in brackets; (Oct. 1):—F. R. Berresford; April 1, 1918. J. C. Daniels; May 28, 1919. W. A. O. Honey; Dec. 23, 1919. A. J. Roberts; April 1, 1918. B. E. H. Wright is granted short service commn. as Flying Offr. on probn. for Accountant duties, with effect from, and seny. of, Nov. 15.

Medical Branch

Sqdn. Leader J. F. Carruthers, M.D., relinquishes his temp. commn. on account of ill-health contracted in the Service; Nov. 29.

Memoranda

Hon. Sec. Lieut. T. H. Davies relinquishes his hon. commn. on joining Army.

London Gazette, December 1, 1922

General Duties Branch

The follg. Pilot Offrs. on probation are confirmed in rank (Nov. 1):—G. W. Dean, J. V. Holman, B. V. Reynolds, T. A. Verney-Cave. Observer Offr. A. W. C. Bayes is transfd. to Reserve, Class B; Dec. 1. Sqdn. Ldr. C. C. Miles, M.C., is placed on half-pay, Scale A; Nov. 10.

Memorandum

Lieut. C. L. Mundey, M.C., R. Fus., is granted rank of Maj., R.A.F., on retirement from Army; May 29.

London Gazette, December 5, 1922

His Royal Highness Edward Albert Christian George Andrew Patrick David, Prince of Wales and Duke of Cornwall, K.G., K.T., G.C.S.I., G.C.M.G., G.C.I.E., G.C.V.O., G.B.E., M.C., is granted a commn. as a Group Captain.

General Duties Branch

The following are granted permanent commns. in ranks stated, with effect from dates indicated. *Gazettes* of dates indicated in brackets, appointing these officers to short service commns., are cancelled:—*Flight Lieut.*—R. T. Leather, A.F.C.; Aug. 8, 1921 (Aug. 16, 1921). *Flying Offrs.*—H. F. V. Battle, Sept. 16, 1919 (Sept. 16, 1919); K. L. Boswell, Sept. 14, 1920 (Oct. 1, 1920).

The following are granted short service commns. in ranks stated, with effect from, and with seny. of, dates indicated:—*Flying Offrs.*—G. C. Lugg; Nov. 27. W. D. Vernon-Knibbs; Nov. 22. *Pilot Offrs. on Probation.*—I. B. Gray, F. S. Henderson, R. G. Rickman, G. Terrell; Nov. 27.

Air Commodore C. L. Lambe, C.B., C.M.G., D.S.O., is restored to full pay from half-pay; Dec. 4.

The following are transferred to the Reserve:—

Class A.—*Flt. Lieut.*—W. R. S. Humphreys, A.F.C.; Dec. 5. *Flying Offrs.*—J. C. Bulteel, G. S. Coggan, C. B. M. Dale, G. C. W. Dufty, J. Edmunds, W. I. Hannon, R. Lamb, F. D. Travers, D.F.C.; Dec. 5. G. A. Gowler; Dec. 8.

Class B.—*Obr. Offrs.*—B. G. Drake, L. W. Kitt, M. J. Wyatt, M.C.; Dec. 5.

Class C.—*Flt. Lieuts.*—A. H. S. Baker, O.B.E., C. Musgrave, A.F.C.; Dec. 5. *Flying Offrs.*—P. Bailey, K. F. Jones, D. M. I. Macarthur, S. F. A. Welsh, G. W. Wilson, A.F.C.; Dec. 5.

Flying Offr. F. F. Tattam relinquishes his short service commn. on account of ill-health contracted on active service and is permitted to retain rank of Lieut; Dec. 6.

Stores Branch

Flying Offr. (actg. Flt. Lieut.) C. C. J. Croydon is granted permanent commn. as Flt. Lieut. for accountant duties; Aug. 29. His name will be placed on the gradation list immediately below that of Flt. Lieut. W. H. Hoile, M.B.E.

Chaplains' Branch

The Rev. J. H. P. Still, B.A., is granted permanent commn., with the relative rank of Sqdn. Ldr.; April 1, 1920. (*Gazette* of May 14, 1920, appointing him to a short service commn., is cancelled.) The Rev. J. F. Cox, M.C., B.A., is granted short service commn., with relative rank of Sqdn. Ldr; Nov. 22.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Air Commodore: C. L. Lambe, C.B., C.M.G., D.S.O., from half-pay list to Headquarters, Coastal Area (Supernumerary). 4.12.22.

Wing Commander: W. H. Primrose, D.F.C., from Headquarters, Iraq Command to command Armoured Car Wing Headquarters, Iraq Command. 3.11.22. J. C. Halahan, C.B.E., A.F.C., from R.A.F. School (India) to Headquarters, R.A.F. India (Supernumerary). 1.11.22. A. H. W. E. Wynn, O.B.E., from Air Ministry (Dept. of C.A.S.), (D.O.I.) to R.A.F. Depot (Inland Area). (Supernumerary). 1.12.22.

Squadron Leaders: A. G. R. Garrod, M.C., D.F.C., from School of Army Co-operation (Inland Area) to Air Ministry, Department of A.M.P. 4.12.22. R. P. Willock, from Headquarters, Iraq Command, to command No. 4 Armoured Car Company Iraq Command). 3.11.22. F. H. W. Guard, C.M.G., D.S.O., from Headquarters, Iraq Command to command No. 3 Armoured Car Company (Iraq Command). 3.11.22. J. W. Cruikshank, O.B.E, from Headquarters, Iraq Command, to command No. 6 Armoured Car Company (Iraq Command). 3.11.22. D. Harries, A.F.C., from Headquarters, Iraq Command, to command No. 5 Armoured Car Company (Iraq Command). 3.11.22. G. S. M. Insall, V.C., M.C., from R.A.F. Depot (Inland Area) to Armament and Gunnery School (Inland Area). 8.12.22.

Squadron Leaders: C. C. Durston, from R.A.F. School (India) to Headquarters, R.A.F. India (Supernumerary). 1.11.22. A. G. R. Garrod, M.C., D.F.C. The notification which appeared in R.A.F. Bulletin No. 89, dated 28.11.22, where in this officer was posted from School of Army Co-operation to Air Ministry (Dept. of A.M.P.), with effect from 4.12.22, is hereby cancelled. I.T. Lloyd, from No. 2 Flying Training School (Inland Area) to command No. 56 Squadron (Inland Area). 25.11.22. Substituted for the notification which appeared in R.A.F. Bulletin No. 88, dated 21.11.22, wherein this officer was posted as stated above, with effect from 15.11.22. P. A. Shepherd, from No. 267 Squadron (Mediterranean) to Command R.A.F. Unit, H.M.S. "Ark Royal" (Mediterranean). 15.11.22.

Flight Lieutenants: J. Duminy, from R.A.F. Depot (Inland Area) to No. 2 Flying Training School (Inland Area). 1.12.22. J. W. Harper, M.D., from No. 14 Squadron Palestine Command) to Palestine General Hospital (Palestine Command). 27.10.22. M. Moore, from Headquarters, Constantinople Wing to Headquarters, R.A.F., Middle East. 31.10.22. R. P. M. Whitham, M.C., from Headquarters, Constantinople Wing, to Headquarters, R.A.F., Middle East. 31.10.22. M. J. James, M.B.E., from Headquarters, Constantinople Wing, to Egyptian Group Headquarters (Middle East). 31.10.22. O. Armer, from No. 2 Squadron (Detached Flight), (No. 12 Wing, Ireland) to M.T. Repair Depot (Inland Area). 30.11.22. H. G. Bowen, from Headquarters, Iraq Command, to No. 3 Armoured Car Company (Iraq Command). 3.11.22. G. F. P. Warren, from Headquarters, Iraq Command, to No. 4 Armoured Car Company (Iraq Command) for duty as Adjutant. 3.11.22. H. M. K. Brown, from Headquarters, Iraq Command, to No. 4 Armoured Car Company (Iraq Command). 3.11.22. D. O. Mulholland, A.F.C., from Headquarters, Iraq Command, to No. 5 Armoured Car Company (Iraq Command) for duty as Adjutant. 3.11.22. C. E. Wardle from Headquarters, Iraq Command, to No. 6 Armoured Car Company (Iraq Command). 3.11.22. H. A. J. Wilson, O.B.E., from Headquarters, Iraq Command, to No. 6 Armoured Car Company (Iraq Command) for duty as Adjutant. 3.11.22. H. V. Rowley, from Headuqarters, Iraq Command, to No. 5 Armoured Car Company (Iraq Command). 3.11.22. F. Hudson, M.C., from No. 2 Squadron (Inland Area) to No. 2 Squadron (Detached Flight), (No. 12 Wing, Ireland). 1.12.22. H. E. P. Wigglesworth, D.S.C., from No. 2 Squadron (Detached Flight), (No. 12 Wing, Ireland), to No. 2 Squadron (Inland Area). 5.12.22. H. G. W. Lock, D.F.C., from R.A.F. Depot (Inland Area) to Inland Area Aircraft Depot (Inland Area). 1.12.22. P. H. Young, M.B., from No. 208 Squadron (Middle East) to C. and M. Party, Moascar (Middle East). 28.9.22. P. H. Young, M.B., from C. and M. Party, Moascar (Middle East) to No. 216 Squadron (Middle East). 31.10.22. F. H. Coleman from No. 2 Flying Training School (Inland Area) to Electrical and Wireless School (Inland Area). 8.12.22. J. H. O. Jones, from R.A.F. Base, Gosport (Coastal Area) to R.A.F. Base, Gosport (No. 210 Squadron), (Coastal Area). 21.11.22. M. Keegan, O.B.E., M.M., from Boys' Wing (Cranwell) to School of Technical Training (Men), (Inland Area), (Supernumerary). 1.12.22.

Lieut.-Col. (Local Col.) H. G. Reid, C.M.G., C.B.E., D.S.O. (R.A.S.C.), to Command Headquarters, Palestine. 9.3.22.

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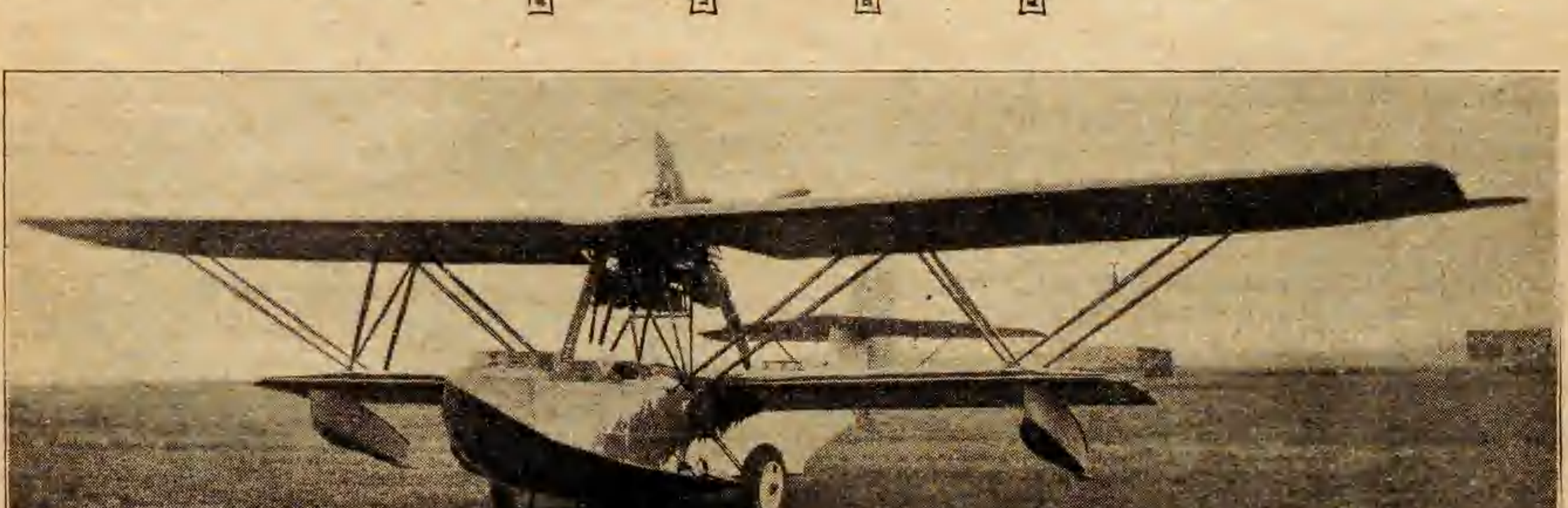

A NEW FOKKER AMPHIBIAN: This machine, which has been built for the Dutch Navy, has just undergone its first test flights. The boat hull is built entirely of Duralumin. The engine is a Napier "Lion."

IN PARLIAMENT

Civil Aviation

REAR-ADMIRAL SUETER on December 5 asked the Secretary of State for Air whether he is aware that, as a result of money grants made by the French Government to French civil aviation companies, British newspapers and freight are carried by French aircraft between London and Paris at rates with which it is impossible for British aviation companies to compete; and whether some arrangements can be made to prevent this obvious undesirable state of affairs continuing and for traffic to be carried by British machines?

Sir S. Hoare: The answer to the first part of the question is in the affirmative. As regards the second part, the future policy in regard to civil aviation is now being considered, and I will bear in mind the suggestion of my hon. and gallant friend when reviewing the question of the future subsidies to be granted to the air transport lines.

Mr. Murchison asked the Secretary of State for Air whether the original air line subsidy, based on mileage and weight, was changed for a flat rate of £15,000 a year merely for 300 effective return flights, the majority of which may be run in the summer months alone; and, if so, why was this done?

Sir S. Hoare: The answer to the first part of the question, which I take to refer to the London-Paris route, is in the affirmative, but I would add that under the agreement a specified number of flights must be carried out during the winter months. With regard to the second part, the former subsidy arrangement proved to be unsatisfactory, the traffic available not being sufficient for the three British companies who were competing for it on this one route, and the whole scheme was therefore recast in order to make the best possible use of the money available.

Mr. Murchison asked the Secretary of State for Air whether the new subsidy given as a monopoly to Handley Page Transport, Limited, for the London-Paris air route provides for the early daily carrying of British newspapers as well as for passengers; and whether the transport of passengers cannot be remunerative without subsidy?

Sir S. Hoare: The answer to the first part of the question is that the new subsidy granted to the Handley Page Transport Company for the operation of the London-Paris route does not specifically differentiate between the carriage of passengers and goods, but leaves it open to the firm to carry that class of freight which they find most remunerative. The answer to the second part is that the transport of the comparatively small number of passengers at present travelling cannot be self-supporting without some form of direct financial assistance, but as the volume of traffic increases this position will improve and should ultimately right itself.

Mr. Murchison asked the Secretary of State for Air whether he is aware that the sale of British newspapers in France and Italy has been increased five-fold during recent months owing entirely to their early arrival by aeroplane in Paris and their distribution thence by early trains; and whether he is prepared to recommend giving a subsidy to air lines, which would be well supplied in thus fostering international understanding?

Sir S. Hoare: I fully appreciate the advantages of carrying British newspapers to the Continent by air, but while I recognise the importance of the early distribution abroad of these newspapers, I am not in a position to say whether it will be possible to find funds to provide a sufficient subsidy to enable these newspapers to be transported in British aircraft.

London Air Stations

MR. GILBERT on December 7 asked the Secretary of State for Air whether any further progress has been made as regards using the River Thames, near Westminster, for an air station; whether it is proposed now to have such a station on the River Thames; and, if not, is it proposed to establish an air station at any other place near the centre of London so as to save the delay in reaching the present station at Croydon?

Sir S. Hoare: The reply to the first and second parts of the question is in the negative, but any machine can alight on the Thames at Westminster provided that prior sanction is obtained. With regard to the third part, the possibility of establishing an air station closer to the centre of London than Croydon is being at present explored by the Civil Aviation Advisory Board.

* * * *

"Wakefield" Boxing Competitions

THE boxing competitions for the Wakefield Shields, competed for among members of the Royal Air Force, were concluded on December 6 at Henlow before a large number of spectators from virtually every Air Force station in the country. Results of finals:—*Officers*.—Light-heavy-weights: Fl./Officer A. E. M. Milne, Cranwell, beat Obs./Off. K. H. Holley, No. 1 Group, Kenley, on points. Middles: Pilot/Off. C. H. Ratcliffe, No. 1 Group, Kenley, knocked out Fl./Lieut. Nunn, No. 10 Group, Lee-on-the-Solent. Light-weights: Fly./Off C. B. Bucknell, Cranwell, w.o. Catch-weights: Fl./Lieut. S. C. Simpson, Cranwell, beat Fl./Lieut. C. E. H. James, No. 7 Group, Andover, in second round. Fly-weights: Fly./Off. Smith, Halton, knocked out Fl./Lieut. Hindle-James, Cranwell, in third round. Welters: Fl./Lieut. Angel, Halton, beat P.O. Guest, Andover, on points. Bantams: F./O. H. A. C. Atkinson, No. 1 Group, Kenley, w.o. Feather-weights: Fl./Lieut. Smith, Halton, beat P./O. Horsfield, Andover, on points. *Other Ranks*.—Fly-weights: A. C. I. Millington, Halton, beat A. C. Fort, Henlow, on points. Light-heavies: A.C. II. Egginton, Halton, knocked out A.C. II. Prestney, Kenley, in second round. Welters: L. A. C. Franklin, No. 7 Group, Andover, knocked out A/c 2 Williams, Cranwell, in second round. Middle-weights: A/c 2 Ballantyne, No. 7 Group, Andover, knocked out L. A. C. Hedge, M.T. Repair Depot, Shrewsbury, in first round. Bantams: A/c 2 Bridges, No. 7 Group, Andover, beat A/c Davies, Halton, on points. Feathers: A/c Whittaker, Halton, beat A/c 2 Moses, No. 7 Group, Andover, on points. Light-weights: A/c 2 Wyatt, Cranwell, beat A/c 2 Tate, Halton, in an extra round. Catch-weights: A/c 2 Forrester, Halton, beat A/c 2 Lockett, No. 7 Group, Andover, on points. Cranwell won the Officers' Shield with a total of 20 points, and Andover the Other Ranks' Shield with 42½ points.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association)

THE Concert at Headquarters last Friday was a great success, the good programme provided by Mr. Louch being very much appreciated by the large number of members and friends present.

The following report has been received from the official reporter of the Paddington and District Aero Club (which is affiliated to the above): Messrs. Dixon, Evans, Green and Levy were present on Saturday afternoon on the Flying Ground, Sudbury, Mr. Green timing. Mr. Dixon's machine showed promise, and put up the best performance we have yet seen from him. Mr. Evans' new double-surfaced glider did well, but seemed heavily loaded for calm weather. His best times were 20⅖ secs. and 22⅗ secs. This machine would undoubtedly do much better in a 10 to 15-mile breeze. Mr. Levy accomplished some good flights of 32 and 38⅕ secs., and finished up with 48⅕ secs. (215 paces), thus establishing a record for the Paddington Club.

A large number of members made an attempt to improve the official Gliding Record on Parliament Hill on Sunday morning last. Unfortunately, the weather conditions were unfavourable for such an attempt. Some excellent gliding was done by the members, a new recruit of the Society, Mr. C. Bayard Turner, putting up some excellent performances with an enclosed *fuselage* model, with double-surfaced wings. Mr. Hatfull made great efforts with his enclosed *fuselage* model, also with double-surfaced wings, his best performance being 30⅗ secs. Messrs. Burchell, Davies, Evans, Levy, Rippon, Whelpton, and many others tried very hard to put up a new record, the best attempt being Mr. Burchell, who put up 44 secs.

Members will meet at the Windmill, Wimbledon Common, on Sunday morning next to attempt to improve the Model Aeroplane records for 1922. Judges will be on the ground at 11 a.m. punctual.

Friday next at Headquarters, Mr. W. E. Evans will give his lecture on "Some Points on Wood." All interested should be present.

A. E. JONES.
Hon. Sec.

* * * *

Parliamentary Appointment

LIEUT.-COL. THE RIGHT HON. SIR SAMUEL HOARE, Bt., C.M.G., M.P., Secretary of State for Air, has appointed Maj. Viscount Sandon, M.P., as his Parliamentary Private Secretary.

R.A.F. Club—Christmas Holidays

BY direction of the Committee, the Club premises will be closed from midday, Sunday, December 24, until 8 a.m. on Tuesday, December 26, 1922, except in so far as affects sleeping accommodation and light breakfasts for *resident* Members.

Fined for Low Flying

THE first case in Essex under the Air Navigation Act was heard at Epping Police Court last Monday, when Frank Neale was summoned for trick-flying over the town, and fined £1. It was stated that Neale looped and rolled so low that his biplane nearly crashed into the roof of a grocery store.

A Separate Air Service for France

A BILL has passed the French Senate establishing the Military Air Service as a separate arm on the same footing as the artillery or cavalry.

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(*Continued from* p. xxxii.)

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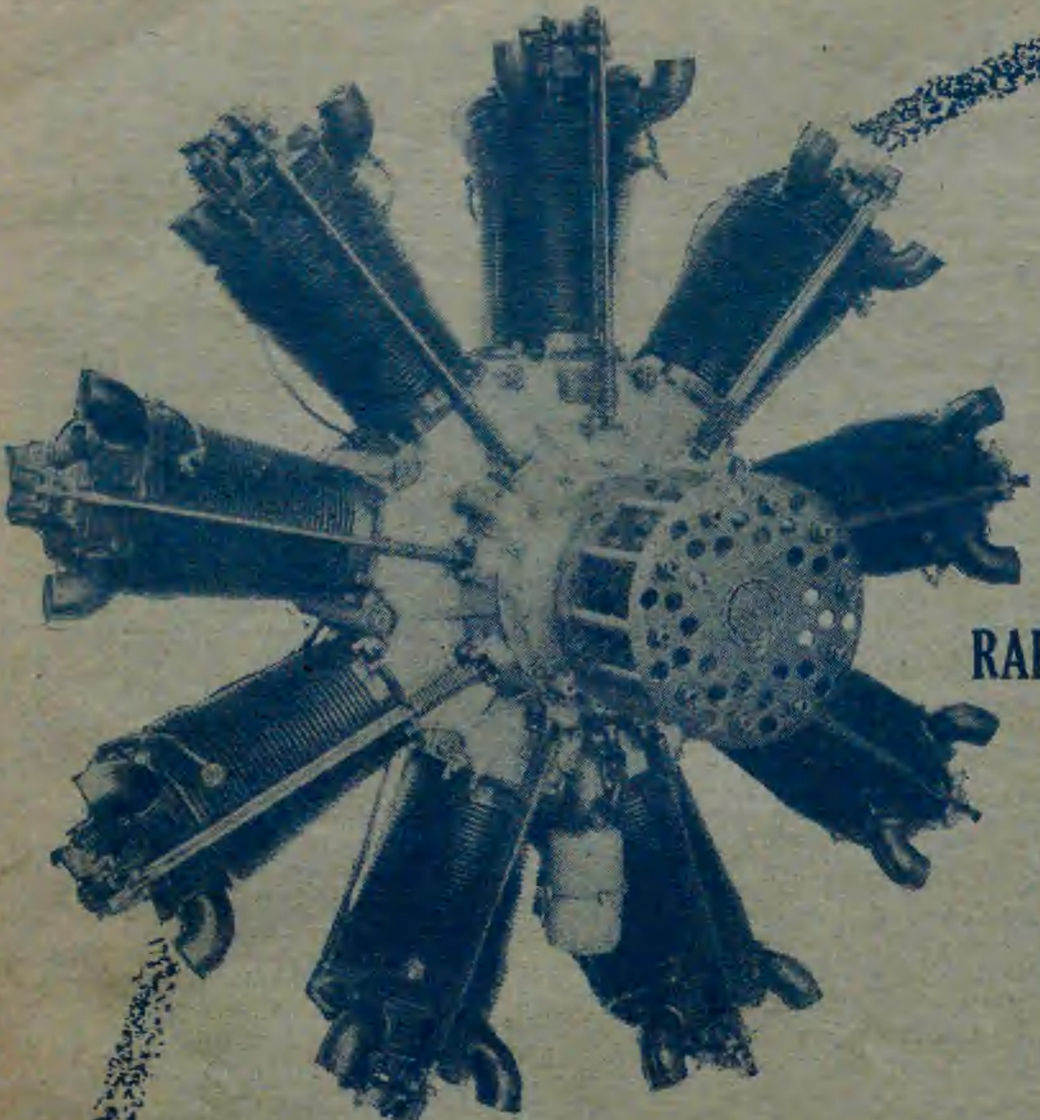

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Dec. 15– Jan. 2....	**Paris Aero Exhibition**
1923.	
Jan. 3	**F.A.I. Paris Conference**
Jan. 12	**Lecture, "Seaplane for Commercial Duties," by Maj. D. C. M. Hume, before I.Ae.E.**
Jan. 26	**Lecture, "Wind Tunnel Work at the N.P.L.," by W. L. Cowley, before I.Ae.E.**
Feb. 6–7....	**Third Air Conference at the Guildhall**
Feb. 9	**Lecture, "Seaplane Design," by W. O. Manning, before I.Ae.E.**
Feb. 23	**Lecture, "Aerofoils," by Dr. A. P. Thurston, before I.Ae.E.**
Mar. 15	**Entries close for Dutch Height Indicator Competition.**
Apl. 12	**Lecture, "Some Controversial Points in Aircraft Design, by F. T. Hill, before I.Ae.E.**
May 11	**Lecture, "Experimental Flying," by Maj. M. E. A. Wright, before I.Ae.E.**
June	**International Air Congress, London**
Dec. 1	**Entries close for French Aero Engine Competition.**

EDITORIAL COMMENT.

The Paris Aero Show

JUDGING by the exhibits at the Paris Aero Show, the Duralumin age has been reached in France. A surprising number of the machines exhibited are built either largely or entirely of this metal. The reasons for this tremendous increase in metal construction, and preference for Duralumin, are several, and as the use of Duralumin has never been the vogue at home, a few remarks on the causes, such as they appear to a student of French aviation, may be of assistance.

First, as regards the use of metal construction, France has a tremendous belief in the possibilities of aviation generally, and Colonial aviation in particular. Climatic conditions in the majority of the French Colonies are such that the ordinary wood construction is likely to suffer, and as Colonial aviation is looked upon as one of the most fruitful directions in which aviation can develop, the problem of using metal in place of wood becomes an intensely practical one, and not of the rather academic interest which we in this country accord it.

Now, although it is not, perhaps, generally realised in England, France does not produce the special steels, at any rate in sufficiently thin sheets, which are required for all-steel aircraft construction. If the steels have to be imported, the price becomes so excessive as to make it cheaper to use Duralumin. Then there is the further advantage that Duralumin can be used in much thicker sections, which is merely another way of saying that it is easier to make a machine of Duralumin than of steel. Consequently, although Duralumin construction is dear (there is probably not a single metal machine in the Show which can be regarded as a commercial proposition), it is chosen in France in preference to steel, which would be dearer still and more difficult. At the same time, French constructors are getting a great deal of experience in metal constructions, and this is not confined to one or two firms, but is being taken up seriously by a very large proportion of the constructors. As to whether or not French methods agree with our ideas does not greatly matter. What does matter is the evident determination to progress, of which there is so much evidence at the Show.

Popularity of the Schoukowsky Aerofoil

Another very noticeable feature of this year's Salon is the increasing popularity of the Schoukowsky type of aerofoil, or Göttingen section, as it is now usually called. This section is to be found not only on monoplanes of the cantilever type, but also on more than one biplane. Whether the latter application is wise is, perhaps, open to discussion, as it would appear to be difficult to save sufficient weight in the wing structure to make up for the relatively higher resistance of this section plus wing bracing. Theoretically a very light wing structure should result.

◆ ◆ ◆

Commercial Aeroplanes or Troop Carriers?

Going through the list of "commercial" machines at the Show, it is not possible to discover traces of any tendency to attempt improvements in economy; 60, 70, or even 80 h.p. per passenger carried is still cheerfully expended, and one cannot help wondering whether France has lost faith in aviation as a commercial possibility, and all the so-called "commercial" machines are in reality camouflaged troop-carriers: if not the actual machines, then at any rate the general type which they represent. Otherwise one fails to understand the continued production of machines which, excellent though they may be, regarded as aeroplanes, could never hope to pay their way without heavy Government subsidies.

◆ ◆ ◆

Superchargers

One field in which France is going ahead, probably ahead of the rest of the world, is in the matter of supercharged engines. The Rateau turbo-compressor no longer seems to be the laboratory experiment it used to be, and a number of machines are being fitted with supercharged engines. So much is this the case that several machines at the Show are stated to be designed specially for high-altitude work. Combined with a variable pitch airscrew the supercharger allows of very considerable increases both in ceiling and in speed at great heights. M. Louis Breguet has visualised the possibility of realising what appears to us now quite phantastic speeds, and their application to commercial aircraft. While these may be regarded as dreams of future achievement, the application to military aircraft is a matter of immediate concern. One is tempted by this activity on the part of France to ask: What are we doing? Has our Air Ministry sent out specifications for machines to be used habitually at altitudes at or above 30,000 ft.? Are we allowing ourselves to be outdistanced in this particular sphere, and thus becoming inferior to any nation which likes to take the trouble of providing itself with a small fleet of machines capable of "sitting" about at a height which our machines cannot reach, excellent though they be at lower levels. We do not for one moment suggest, of course, that France is a menace to us. That would be unthinkable. But we do maintain that this country cannot, must not, lag behind in any single development which makes for superiority in the air. Do not let us forget that during the last war the pilot who could reach an altitude slightly greater than that of his adversary always had the whip hand. He could give battle when and where he chose to, and he could rest immune if he did not wish to fight. A hundred aeroplanes capable of reaching 40,000 ft. would be more than a match for ten times that number of machines whose ceiling was 30,000 ft. While the latter were staggering around near their ceiling, the former would be able to manœuvre with a considerable reserve of power, and could outclimb the others whenever they chose. Do not let us be lulled into a false sense of security by the fact that the supercharger is not yet all that it might be. It is gradually being improved, and it will not do for us to be outdistanced.

In conclusion, we would like to thank the organisers of the French Aero Show, the Chambre Syndicale des Industries Aéronautiques (which corresponds to our S.B.A.C.) for granting us the necessary permits to enable us to compile a very full report on the exhibition, and for their unfailing courtesy in rendering every assistance in their power in order to facilitate our work.

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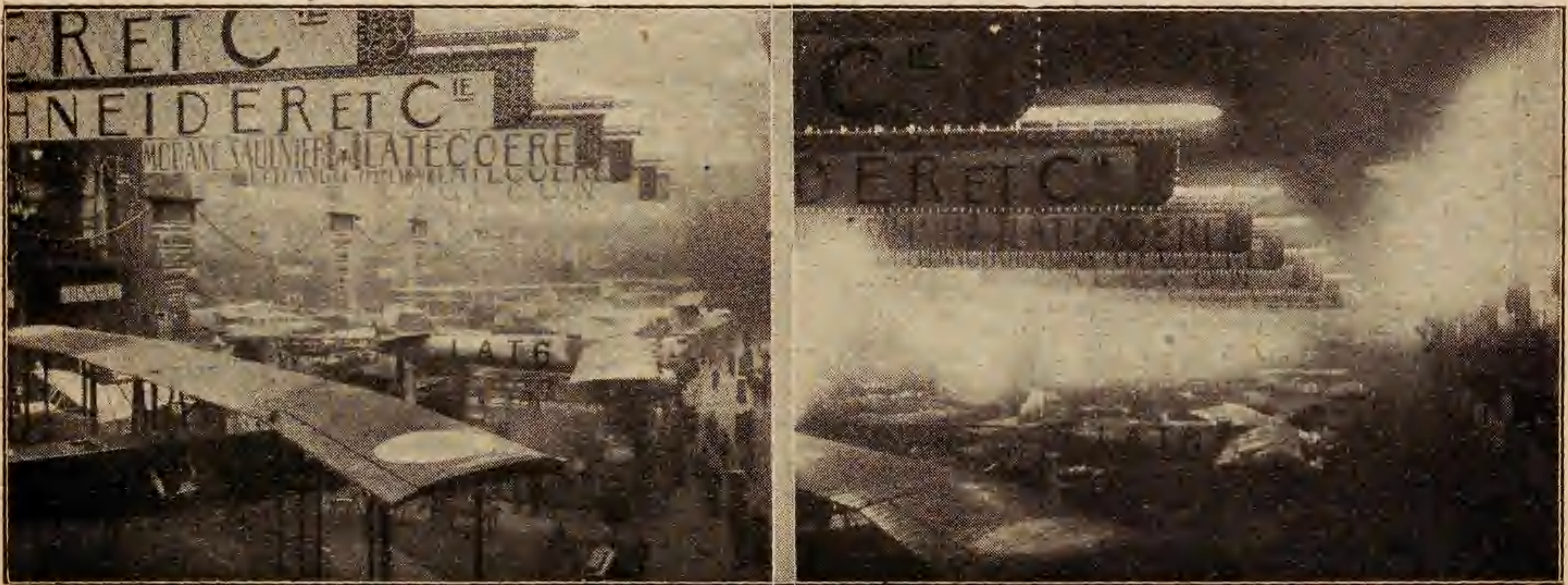
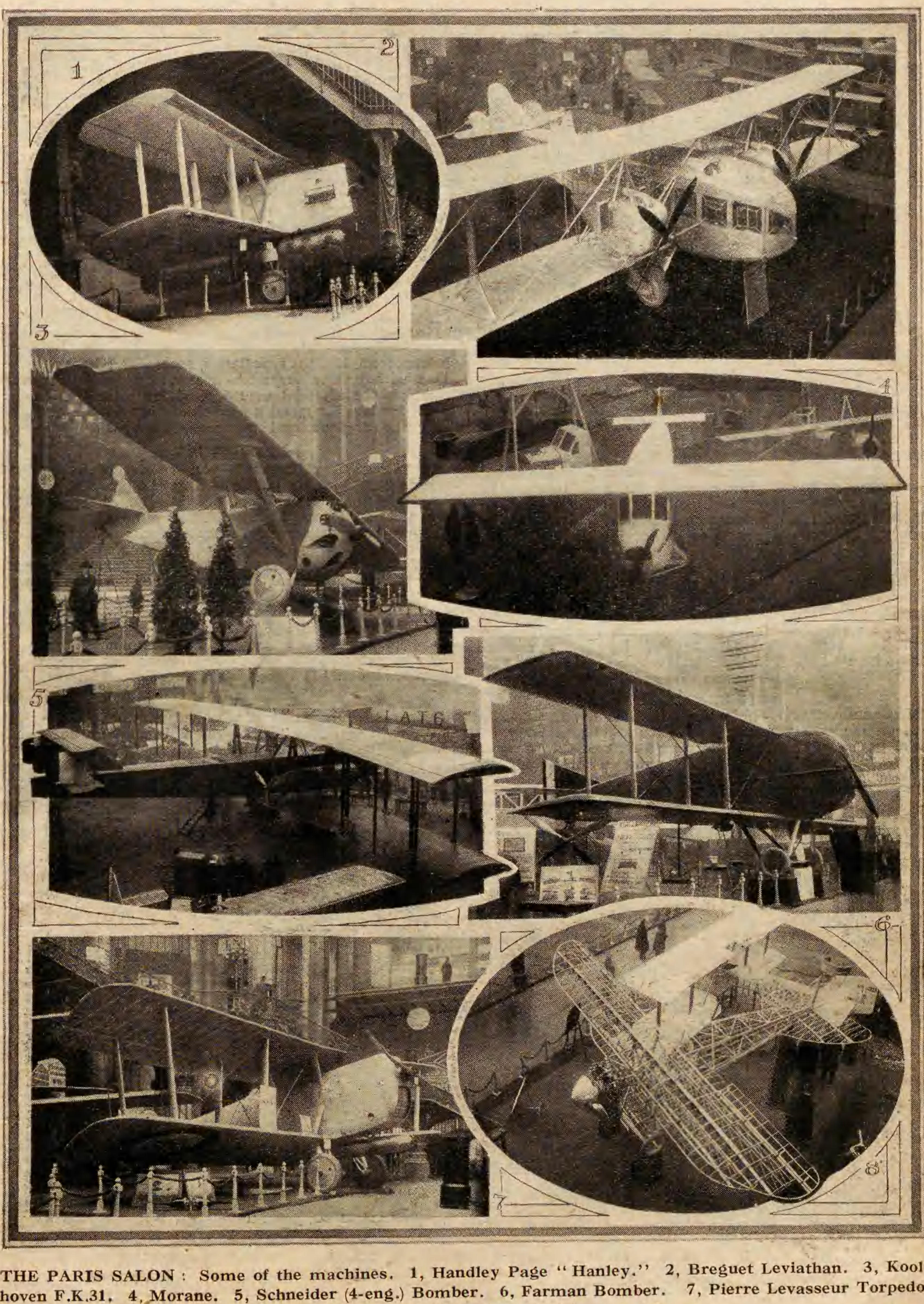


THE PARIS SALON: General views, by night and by day.

THE PARIS SALON



THE PARIS SALON : Some of the machines. 1, Handley Page "Hanley." 2, Breguet Leviathan. 3, Koolhoven F.K.31. 4, Morane. 5, Schneider (4-eng.) Bomber. 6, Farman Bomber. 7, Pierre Levasseur Torpedo-plane. 8, Hanriot All-metal.

·THE·PARIS·AERO·SHOW·1922

Preliminary Report

BELLANGER FRÈRES

A NEW-COMER to the Paris Aero Show is the firm of Bellanger Frères, who are exhibiting a twin-engined flying boat, designed by Denhaut. In addition to the complete machine, which, it is stated, is " *destiné à la Marine Nationale,*" a similar hull is shown which presumably is intended for commercial work, as it has a " conservatory " cabin top added.

The flying boat is characterised by a peculiar mounting and cowling of the Hispano engines, which are placed high in the gap between the planes, and as close together as the propellers will allow. This arrangement is, of course, adopted in order to reduce the turning couple set up when one engine stops. The hull of the machine is flat-sided, but the wing roots of the lower plane are rounded into the sides. There is a Vee bottom but no step.

The wings are of approximately crescent-shaped plan form, or, more correctly speaking, the trailing edge is straight and the leading edge swept back in a long curve to meet it at the tips. The machine is nicely finished, but one somewhat doubts its ability to get off without a step to assist it. The workmanship and finish appear to be very good.

BOREL, S.C.I.M.

M. GABRIEL BOREL this year appears as Borel, S.C.I.M., the letters following the name of the famous pioneer being the initial letters of the firm: *Société Générale de Constructions Industrielles et Mécaniques.* The machine exhibited (in skeleton form) is of the type Cap. 2, 1922, with Hispano engine fitted with Rateau turbo-compressor. The construction is all-metal, the material used throughout being Duralumin. In the fuselage the metal is used chiefly in the form of tubes, but in the wings stamped sheet sections are used.

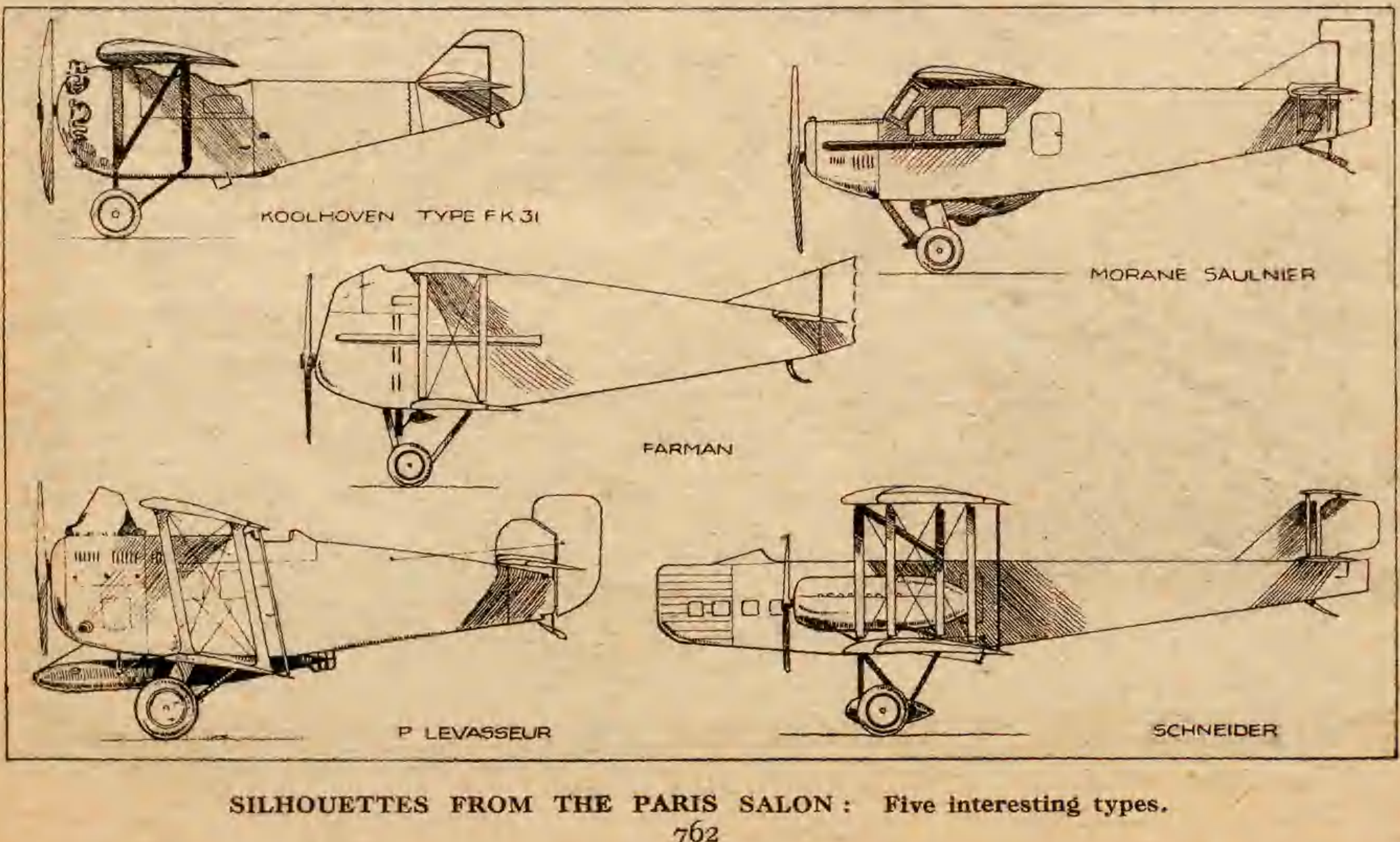
L. BREGUET

THE Breguet exhibits this year consist of a complete " Leviathan " type XXII, the fuselage of a type XX " Leviathan," and one of the old type 14T bis seaplane, fitted with a large and beamy central float of Duralumin. The type XXII is a very large twin-engined machine, built entirely (except for the fabric wing covering) of Duralumin. The power plant, when fitted, will consist of two of the " groupe bimoteur" Breguet-Bugatti engines. The covering of the huge fuselage is the same as that of the Sesquiplan shown last year, and consists of narrow strips of Duralumin, with edges turned inward to form channel sections.

The fuselage of the type XX Leviathan is shown in skeleton. It is a very pretty piece of work, but must be very expensive indeed. The 14T bis is already well known.

C.A.M.S.

AMONG the French firms who had entered machines for the " Coppa Schneider " at Naples was, it may be remembered, the Chantiers Aéro-Maritimes de la Seine, of which Mr. D. Lawrence Santoni is *administrateur-délégué.* This firm has not



SILHOUETTES FROM THE PARIS SALON: Five interesting types.

been in existence more than a year or so, and has already produced several types of flying boats. The designer is M. Conflenti, who was with Mr. Santoni on the Savoia firm. The machine exhibited is a two-seater flying-boat school 'bus, with a Hispano engine mounted in a neat little power "egg." Large photos. of other types are also shown.

CAUDRON

Numerically the Caudron exhibits are the largest in the Show, no fewer than six types of Caudrons being represented. While most other manufacturers have given up making sporting aeroplanes, Caudrons are showing at least two which fall under that category, while two more, or even three, can be regarded as such, although intended primarily for school work. The sixth machine exhibited is the three-engined commercial passenger carrier shown last year, but incorporating several improvements.

The C.61, as the passenger machine is called, is driven by three Hispano engines, two of which are mounted on struts between the wings, and the third in the nose of the fuselage. The main improvement, and one which was suggested in Flight last year, consists in removing the petrol tanks from the cabin (where they were placed under the passengers' seats) and building them into the centre section of the top plane. This should materially lessen the danger to passengers of fire on board, and at the same time has the advantage of giving gravity petrol feed to the engines.

The two sports type Caudrons are a single-seater (type C.67) with 30 h.p. inverted Y-type Anzani engine, and a two-seater (C.68) with 45 h.p. six-cylinder Anzani. The wings of the latter are made to fold, and the machine can then be trailed behind a motor-car, or even a motor-cycle.

Three school machines are shown, representing various stages in the tuition of flying. The first is the famous G.3, with tail booms and skids. The second is a type C.27 two-seater fuselage biplane with le Rhone engine, and the third a two-seater with Hispano motor. Thus the pupil gradually works up from the G.3 to the standard tractor biplane with water-cooled engine.

FARMAN

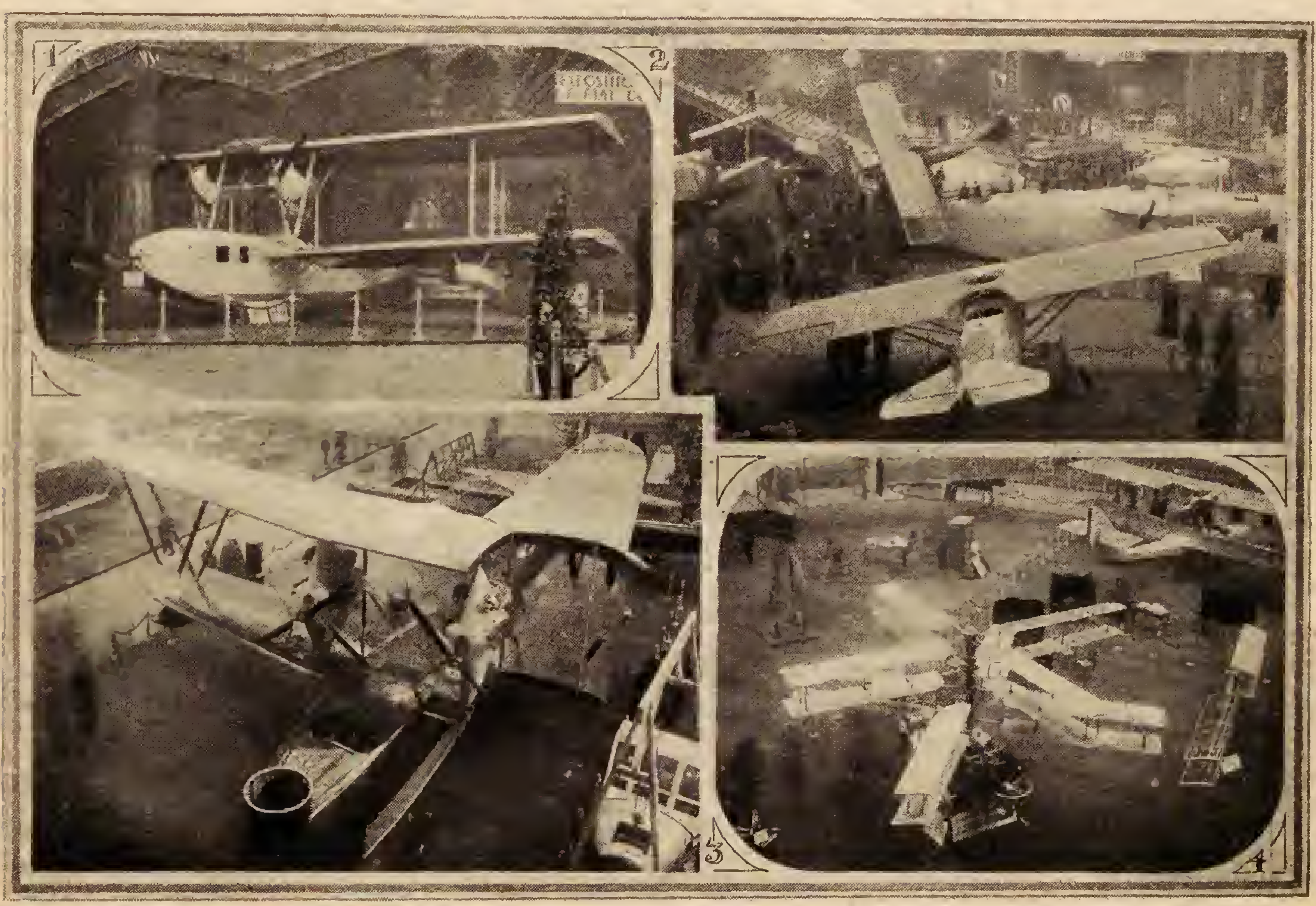
Henry and Maurice Farman show three machines this year, neither of which has been exhibited before. One of these, the largest, is a "commercial" passenger carrier, and may be described as a "Goliath" with the two Salmson engines removed from the wings and a 600 h.p. Farman engine placed in the nose of the fuselage instead. The cabin seats eight passengers, but a power expenditure of 75 h.p. per passenger can scarcely be regarded as a commercial proposition.

The second Farman is a day bomber with very deep fuselage, and the pilot and gunner placed respectively in front of and behind the top plane. The nose of the fuselage is rounded off, as the radiator is carried under the fuselage, just behind the front struts of the undercarriage.

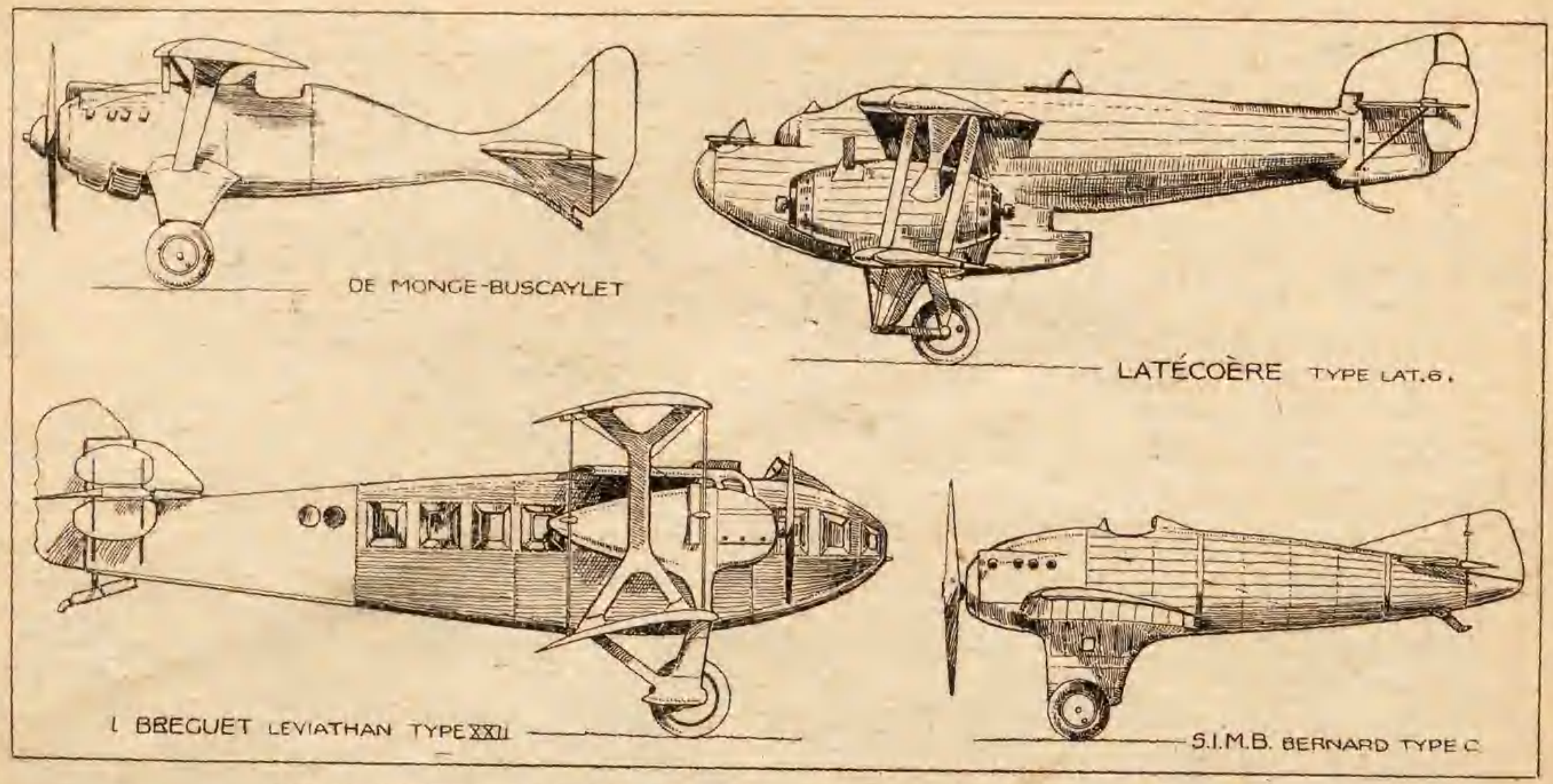
By far the most interesting of the Farman machines is a monoplane two-seater, with the highly tapered, thick cantilever wing placed low on the fuselage, and pilot and passenger enclosed in a "conservatory" cabin. The chassis is similar to that of the B.A.T. "Bantam," giving a very wide track. An objection to this arrangement in the Farman monoplane is that landing shocks are taken by the cantilever wings. However, the depth of these at the root must be close upon 2 ft. It appears that the occupants enter and leave the cabin by walking along the root of the wings from the trailing edge, and the only support appears to be the exhaust pipe, which might conceivably give the adventurous passengers a shock.

F.B.A.

The Franco-British Aviation Co. are showing a type 16 H.E.2 flying-boat intermediate school machine. The 140 h.p. Hispano engine rests on a pair of "trouser" struts rising from the deck of the boat hull, and a semicircular radiator curves over the nose of the power "egg." Instructor and pupil sit side by side in front of the wings. The boat is flat-bottomed and has but a single step. In its general design the machine follows lines which are now more or less familiar.



THE PARIS SALON: Some of the machines. 1, Loire and Olivier flying boat, which has two engines. 2, The Nieuport stand, showing the fuselage of the large cabin machine, and, in foreground, the Koolhoven F.K.31. 3, Bellanger twin-engined flying boat, which has folding wings of crescent-shaped plan form. 4, Pescara Helicopter.



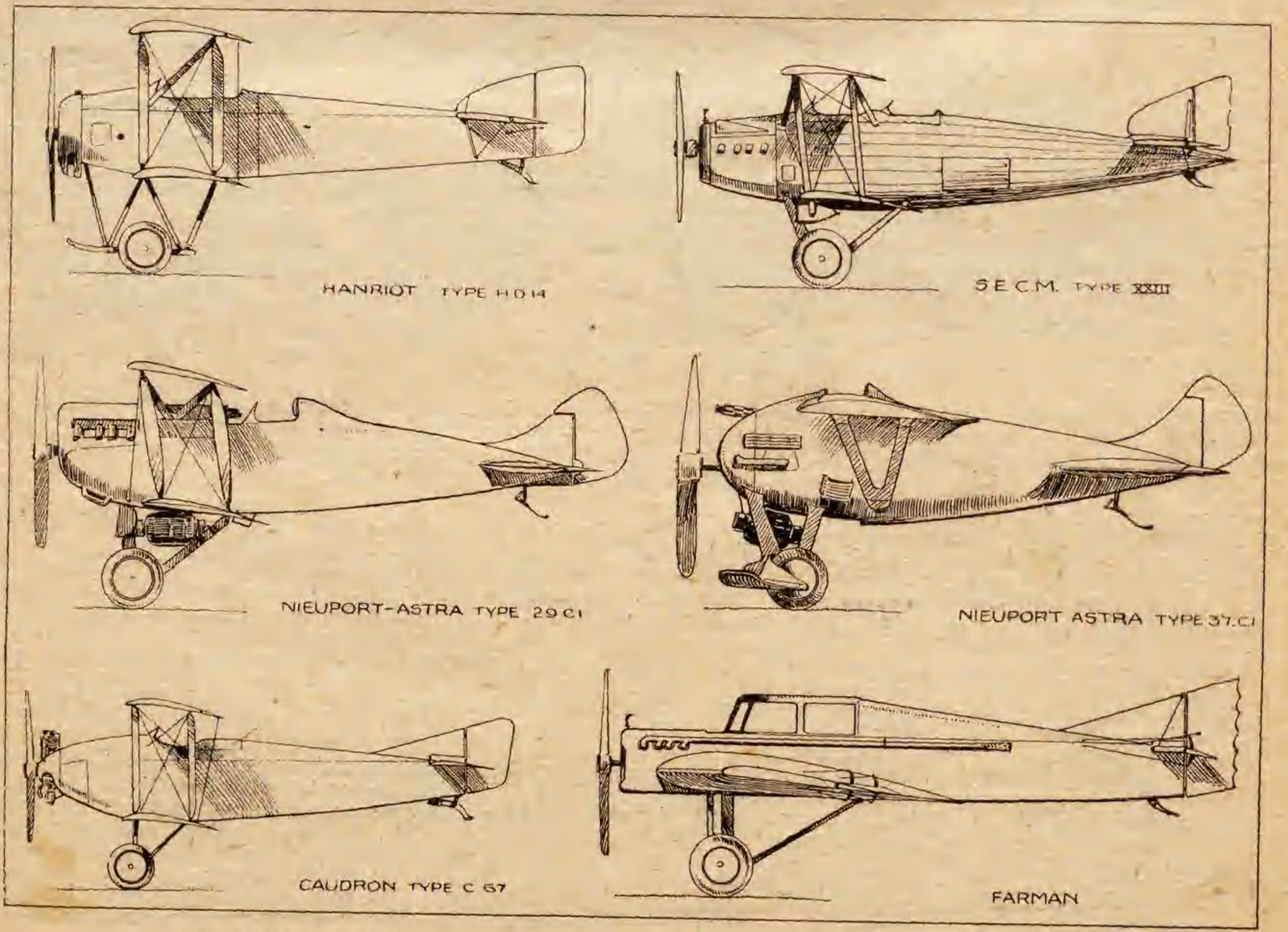
SILHOUETTES FROM THE PARIS SALON: Four all-metal machines.

HANDLEY PAGE

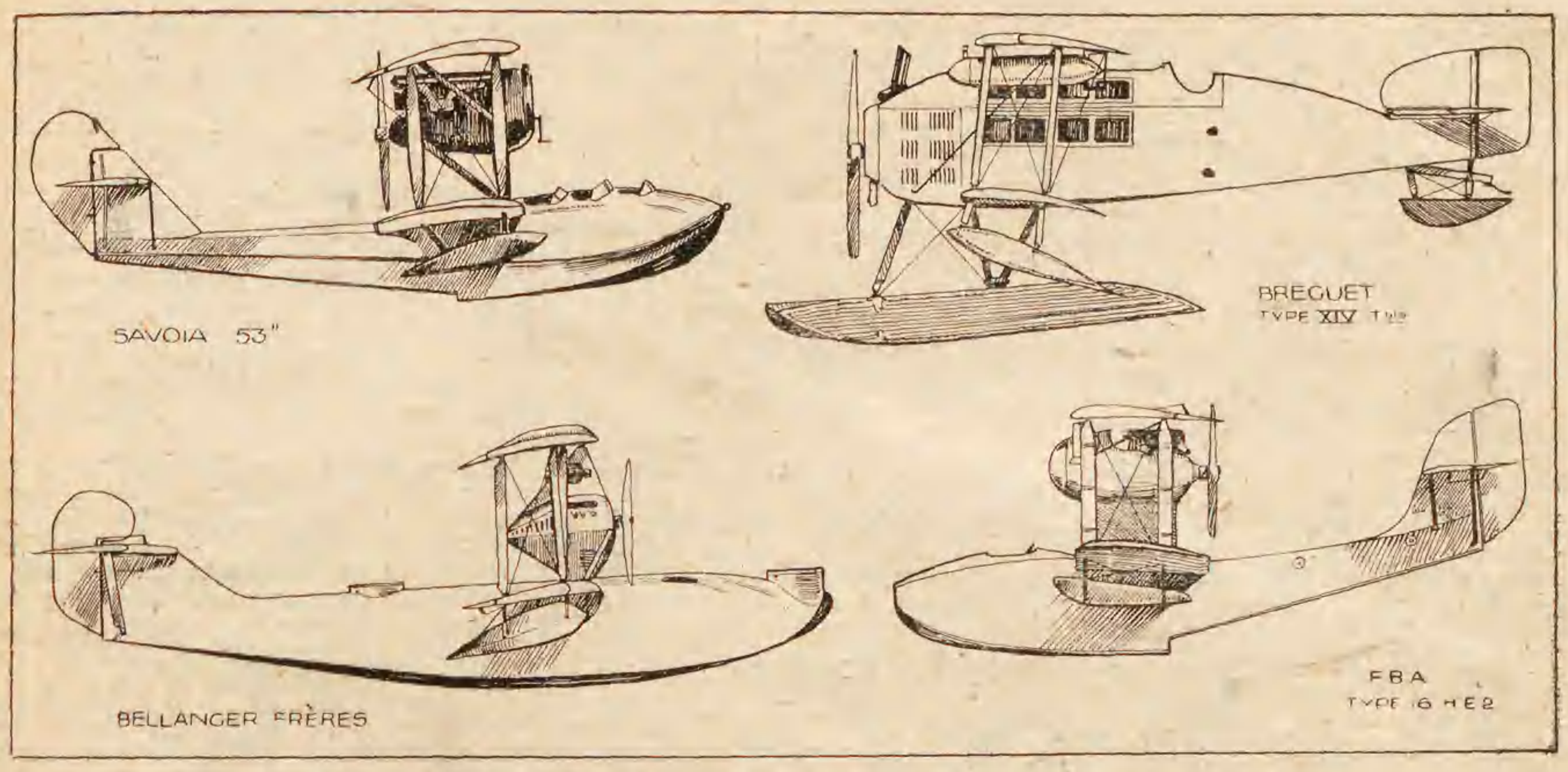
THE only British constructor exhibiting is Handley Page, who is represented by the "Hanley" torpedo-'plane with Napier "Lion" engine. As this machine was very fully described in FLIGHT quite recently, there is no need to do more here than record its presence at the Show, and the fact that it was flown over from Cricklewood to le Bourget. M. Laurent-Eynac, on his visit to the Grand Palais, spent considerable time on the H.P. stand (which, incidentally, is badly placed under the gallery), and was very interested in the slotted wings.

HANRIOT

MARCEL HANRIOT is represented this year by two machines, of which one is the well-known school type H.14, with a few 1923 modifications, which calls for no detailed comment, while the other, shown in skeleton, is a very interesting piece of



SILHOUETTES FROM THE PARIS SALON: Some of the smaller machines.

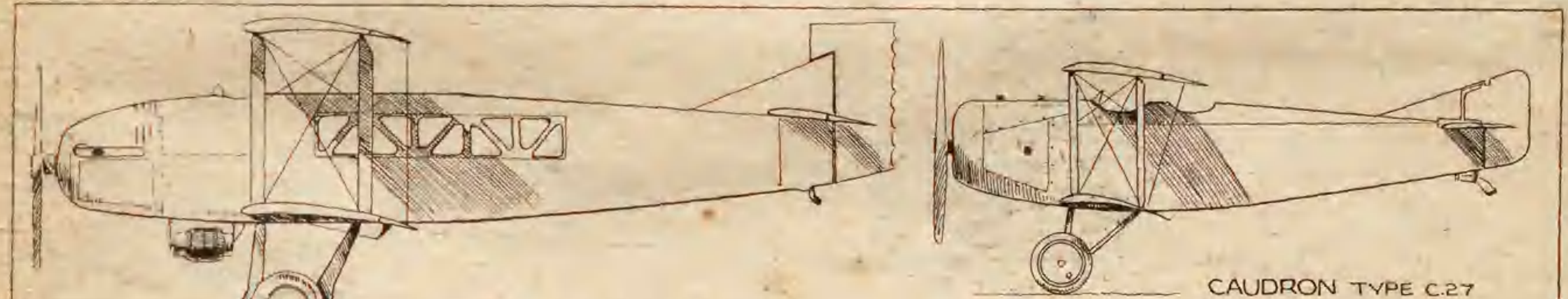


SILHOUETTES FROM THE PARIS SALON: Four seaplanes.

all-metal (Duralumin) work. This is an "Avion de Chasse" with Salmson engine. The wing bracing is unusual in that, although the machine is a biplane, there are no struts. There is a single main spar, although a tube between it and the trailing edge of the Göttingen section helps to a certain extent, and a single lift wire (streamline) runs from the undercarriage to the top plane, passing *via* a large steel clip on the lower main spar *en route*. In a subsequent issue of FLIGHT we hope to deal with this machine in some detail.

F. KOOLHOVEN

FRITZ KOOLHOVEN makes his re-entry into aviation with a two-seater fighter monoplane of unusual design. This machine was, we are informed, built in 20 days, and consequently it may be forgiven if the machine looks somewhat rough and lacks some of the high finish found on many French machines. The F.K.31 incorporates a number of unusual features, some of which will be dealt with at greater length in a subsequent issue of FLIGHT. In the meantime, it may



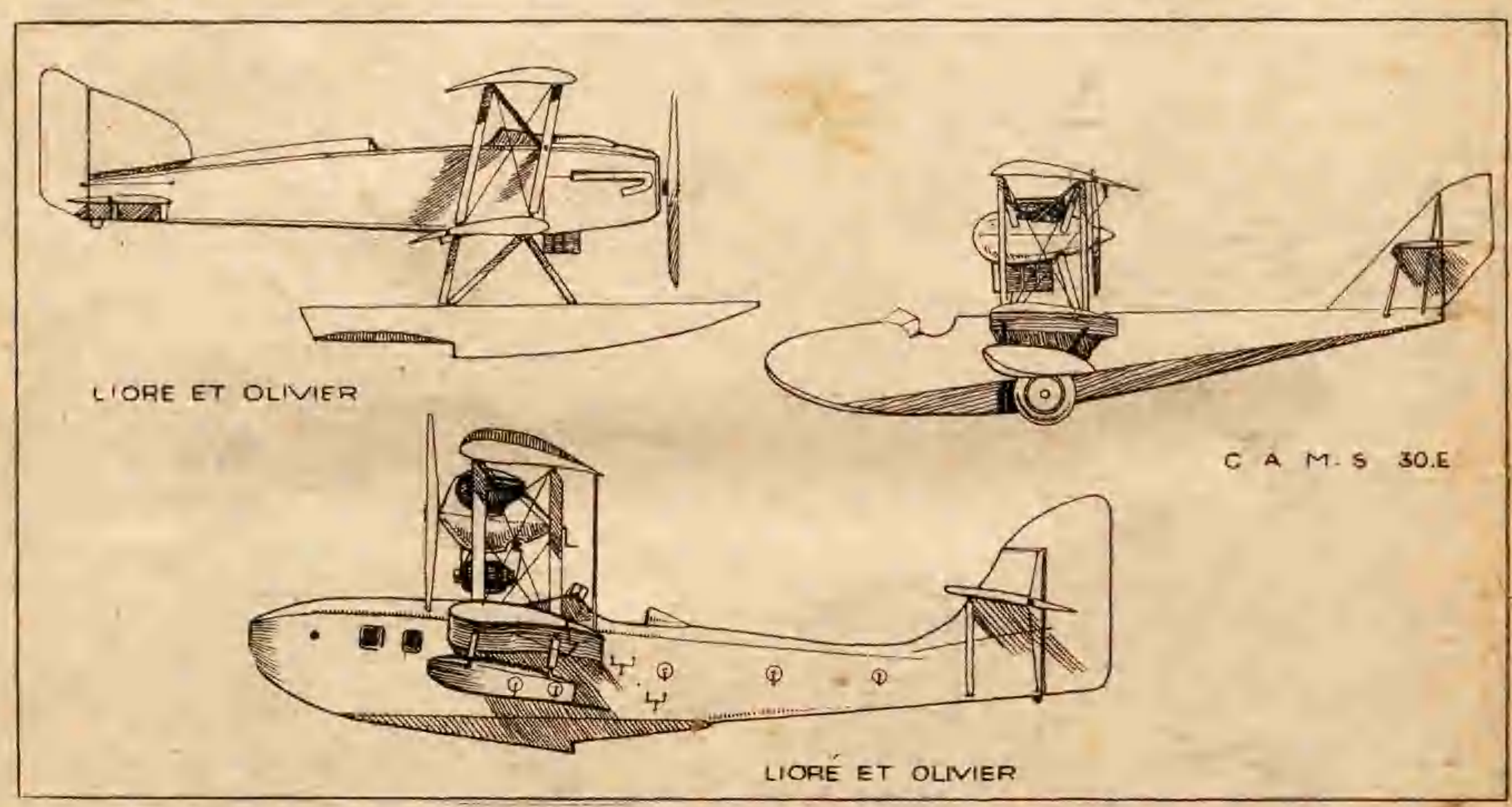
SILHOUETTES FROM THE PARIS SALON: Some of the large and medium-sized machines.

be stated that the machine, which is fitted with a 400 h.p. Bristol "Jupiter" engine, is a parasol monoplane, with the pilot seated in a circular cut-out portion of the wing, as in the Bat "Bantam," while a gunner's cockpit is placed just aft of the wing. In order to improve the pilot's view, the centre-section of the wing is kept quite thin, so that he can look over or under the plane. A gun mounting of special design is provided, which enables the gunner to train his machine guns very quickly in any direction.

The undercarriage is of wide track, provided by fitting a small auxiliary wing to the undercarriage struts and housing the wheel axle in this, the wheels forming baffle plates for the ends of the plane. The wing, which is parallel except for the ends, is of Göttingen section, and is braced by two struts. Finally, it may be mentioned that the total weight of the machine is 3,300 lbs., of which the military load forms 1,500 lbs., or 45 per cent. of the total.

LATÉCOÈRE

SOCIÉTÉ INDUSTRIELLE D'AVIATION LATÉCOÈRE are showing this year the complete Lat. 6, the fuselage of which was exhibited last year. The machine is a huge four-engined *avion de protection*, built entirely of Duralumin, even to the wing covering. The undercarriage of this year's machine has been redesigned, and now incorporates transverse tubular struts of about 15 ft. length, with a diameter of some 4 ins. We cannot say we particularly like the machine, but conditions in France are so different from those at home that it is difficult to assess the merits of the design. The scheme is certainly ambitious, and time only will show whether the designer is on the right track.



SILHOUETTES FROM THE PARIS SALON: Three seaplanes.

PIERRE LEVASSEUR

Two machines are shown on this stand, one of which is very similar in general appearance to the Blackburn "Dart." This machine is an *avion torpilleur*, type AT. 1, with 600 h.p. Renault engine. Shortly before the Show the machine completed its flying tests, fitted with the older type Renault which develops about 100 h.p. less than the new model. In spite of this, however, the machine is stated to have flown very well, and when the new engine is fitted it is hoped that a considerable increase in performance will be obtained.

The second machine exhibited is shown in skeleton. It is more or less a development of the sporting type exhibited last year, and is remarkable for the fact that its fuselage is built up of four panels of thick ply-wood, forming struts as well as bracing. The sides thus formed are joined together by a few transverse struts on wire bracing. The machine should be extremely cheap to build, although it might be objected that in case of damage to an undercarriage strut (which are parts of the front panels) a whole new panel would be required to repair the damage. The fuselage is to be covered with plywood so as to form a watertight hull, so that if the machine (which is designed for naval use) has to alight near the aircraft carrier it will float until it can be picked up.

The 370 h.p. Lorraine-Dietrich engine is mounted on a separate structure, built up as a complete unit.

LIORE AND OLIVIER

THE Etablissements L. & O. have been unfortunate this year in the allocation of stands, having been pushed underneath the gallery, where they have had the greatest difficulty in finding space for the two machines shown. One of these is a twin-float seaplane, built entirely of Duralumin, even to the floats. This machine, a biplane, has unusual wing strutting, which causes the wings, when folded, to be tilted at a considerable angle. The wing section used is one of the Joukowsky-Göttingen series.

The second machine is a small twin-engined flying boat, with a cabin in the front portion of the hull. The pilot is placed aft of the wings, where he will probably have a rather uncomfortable time of it, what with the indifferent view and the slip stream from the tips of the two propellers. The best feature of this machine is, perhaps, the close spacing of the two engines, which are only just sufficiently far apart to allow the tips of the two propellers to clear one another.

DE MONGE-BUSCAYLET

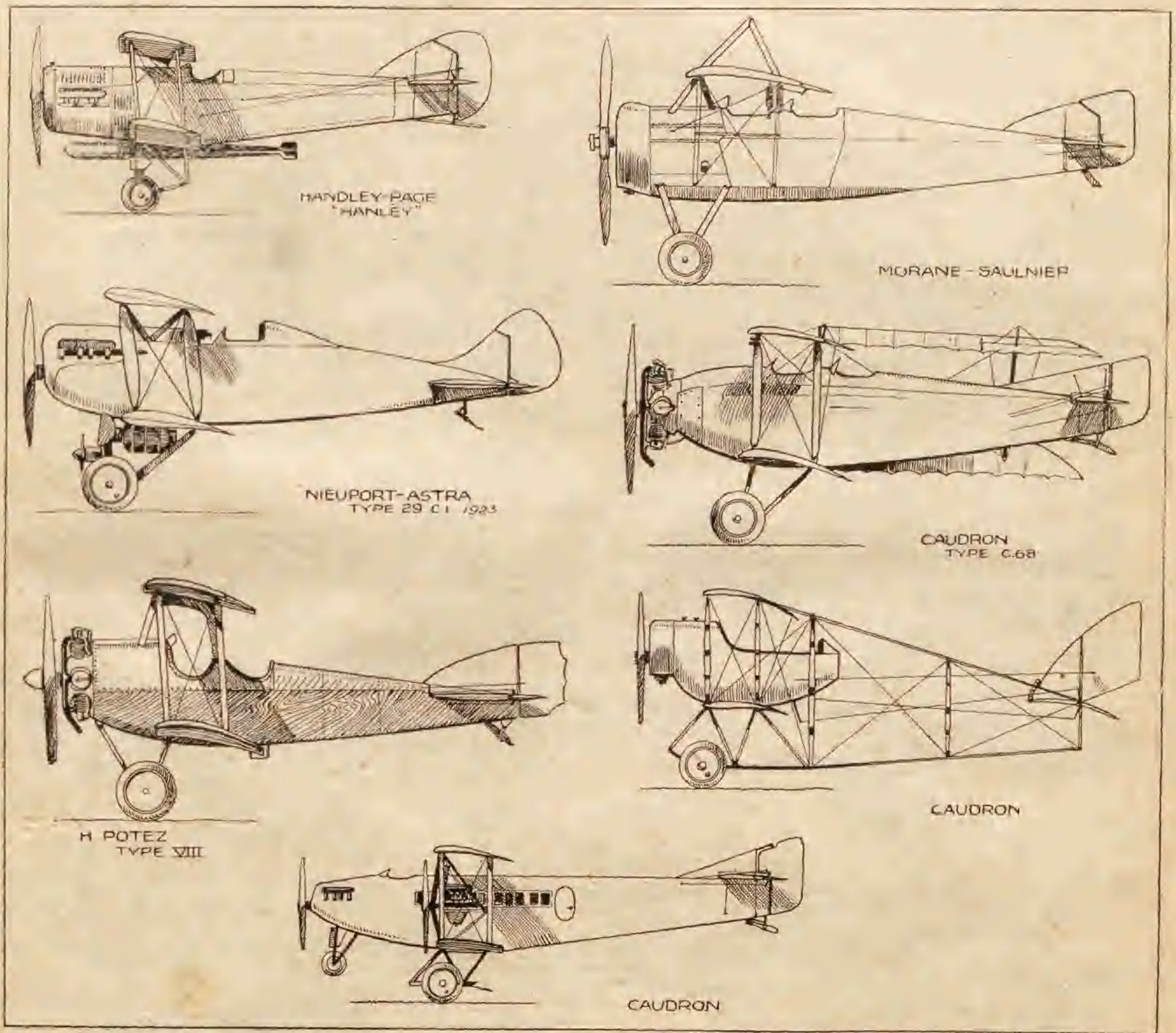
A VERY interesting monoplane, mainly of Duralumin construction, is shown in a bad corner under the gallery, where it is apt to be passed by without receiving the attention it deserves. M. Louis de Monge has very original ideas on aircraft design, and in this machine he has incorporated a number of unorthodox ideas. The fuselage is of Duralumin construction in front, while the rear portion, with the tail plane and fin, are *monocoque*. The parasol monoplane wing is mounted on centre-section struts formed by rectangular box section arms projecting upwards from, and being built integral with, a fuselage former or bulkhead. This former has somewhat similar downward extensions, which, however, are hinged to the former and act as undercarriage struts.

The monoplane wing is braced by one single large strut on each side, and there are no lift wires. The wings have a pronounced sweep-back in order to allow of placing the pilot behind the rear spar. The arrangement of the rubber shock absorbers is interesting, short radius rods sloping inwards and upwards from the foot of the struts. The engine of the de Monge *avion de chasse* 52C 1 is a 300 h.p. Hispano, and the Lamblin radiator, which is of special design, curves around the lower half of the nose of the fuselage. The machine has an estimated speed of 270 km./hour at ground level.

MORANE-SAULNIER

THE Morane-Saulnier exhibit this year is smaller than usual, consisting of but two machines. One of these is the familiar parasol monoplane, which does not call for any description. The second machine is a cantilever monoplane of rather unusual design, and may be briefly described as consisting of a Fokker wing, an Ansaldo fuselage and a Bat F.K.26 undercarriage.

The machine, however, has several interesting features. For instance, the Hispano engine is mounted on a separate engine mounting, which is completely separated from the main fuselage structure. It is attached by four bolts only, and the instrument board, with engine controls, forms part of, and is removed with, the engine unit. It should thus be possible to change an engine in about 10 minutes.



SILHOUETTES FROM THE PARIS SALON: **Seven more machines of various types.**

The cabin has four seats, of which the front one on the port side is occupied by the pilot. The front of the cabin is formed by large windows, and as the wing is on a considerably higher level than the top of the engine housing, the view is fairly good.

NIEUPORT-ASTRA

THREE machines are shown by Nieuport, two of which are variations of the well-known type 29C 1, while the third is a "Sesquiplan." The nacelle of an Astra-Torres airship is also shown. The smaller of the biplanes has ordinary thin wings, and a single pair of struts on each side. This machine is designed for fighting at low altitudes. The other 29C 1, 1923 model, has a Göttingen wing section, two pairs of struts, and is to be fitted, we gather, with a Rateau supercharger and Pierre Levasseur variable-pitch airscrew.

The Nieuport-Delage "Sesquiplan," type 37C 1, has a thick, braced monoplane wing, while a small wing surrounds the axle and part of the wheels. In a general way this machine resembles the one built for the Coupe Deutsch, but which could not be coaxed off the ground. The single Lamblin radiator of this machine is fitted with one of the new shutters, which in appearance resembles a four-bladed fan and is operated by a small differential, thus shutting off the air going through the centre of the radiator.

HENRY POTEZ

OF the three machines exhibited by Henry Potez the three-engined type XVIII is, generally speaking, similar to last year's, among the changes made being the shifting of the pilot's seat from behind the cabin to in front of it. Certain other changes have been made, such as to the undercarriage, etc., but the fundamental idea underlying the design remains unaltered. The machine is designed to carry 12 passengers, and as the power plant consists of three Lorraine engines of 275 h.p. each, the power expenditure per passenger carried is very high. Otherwise the three-engine arrangement has much to recommend it.

The second H. Potez machine shown is a two-seater all-metal reconnaissance biplane, fitted with a 370 h.p. Lorraine engine. It is of orthodox design as regards external appearance, and as all the internal construction is covered up it is not possible to express an opinion as to its merits. The machine is of the type XI Cap. 2.

Designed as a touring or school machine with 70 h.p. Anzani engine, the Potez type VIII is a straightforward tractor biplane, with the coaming around the cockpits cut down low and only partly separating the two cockpits. This method appears to be becoming popular in France as far as school machines are concerned, probably because it brings pupil and instructor closer together, and enables the latter to shout directions to the pupil.

SAVOIA

A SINGLE flying boat is exhibited on the Savoia stand. Designed by Marchetti, the machine is of typical Italian lines, with flat sides, and the 300 h.p. Fiat engine, placed high in the gap between the planes, driving a "pusher" airscrew. The machine is mainly remarkable for its economy, six passengers being carried in addition to the pilot. This corresponds to a power expenditure of 50 h.p. per passenger, which is distinctly good for a seaplane.

The passengers are seated in two open cockpits, one behind the other, while the pilot is placed in the extreme nose, where his view is certainly excellent but whence he may have some difficulty in "feeling" his machine, owing to the absence of any considerable portion of hull in front of him by which to judge the attitude of the machine.

SCHNEIDER

THE famous Creusot firm, whose activities are intimately associated with France's military organisation, has turned its attention to aircraft construction, and one of the results is the huge four-engined bomber shown in the Grand Palais. The machine is singularly uninteresting, regarded aerodynamically, being very much like the 1917 Gotha except for the fact that it has four engines instead of two. We believe, however, that the all-metal construction (for which, of course, a firm like Schneider et Cie. have exceptional facilities) is very good, and if the designers apply their knowledge of metal work to modern types the firm should produce something really worth while.

S.E.C.M.

THREE complete machines are shown by the Société d'Emboutissage et de Constructions Mécaniques, all made of metal. One of these is a night bomber (B.N. 2), type X, with Salmson engine. Long narrow radiators are fitted on the sides of the fuselage, and a circular exhaust collector ring forms the actual nose, somewhat after the fashion of the Bristol "Lucifer." The fuselage is of tubular construction, while the wings have lattice-girder Duralumin spars. The machine is equipped with lights under the wings for landing at night.

The second machine shown is a small touring three-seater with 180 h.p. Hispano engine. The pilot is seated in front, and the two passengers side by side behind the wings.

Shown in skeleton is a school machine, type XXII, with Hispano engine. This machine is also of Duralumin construction with tubular fuselage and wing spars of rectangular Duralumin tubes.

SIMB

THE firm Société Industrielle des Métaux et du Bois, formerly known as the Etablissements Bernard, is showing a most unusual and highly interesting monoplane, built entirely of Duralumin even to the covering of the wings and fuselage. In the design triangulation has been used throughout, and the outer covering, formed of thin sheet strips bent into a channel section, is relied upon to take its share in resisting the stresses. Thus in the wing there are no spars and ribs in the ordinary sense of the words, the structure being composed of built-up and riveted formers arranged to give perfect triangulation.

Aerodynamically the Bernard "Ferbois" is interesting in being a cantilever monoplane with wings placed low *à la* Junkers and an "inverted T" undercarriage consisting of a single covered-in "leg" growing out of the fuselage and carrying at its lower end a transverse member in which the axle is housed. The machine is of extraordinarily clean outline, and certainly appears to give hopes of justifying its designer's hope of attaining a speed of 315 kms. (195 miles) per hour. With a 300 h.p. Hispano engine the power loading is about 9 lbs./h.p., while the wing loading is about 15 lbs./sq. ft. A thick, high-lift wing section is used.

WAR INVENTIONS

THE second Report of the Royal Commission on Awards to Inventors is now out, and from the somewhat lengthy list of claims and awards, we notice the following which are connected directly or indirectly with aviation:—

101. Wing-Comdr. F. Ranken ("Ranken" Dart), £2,250.

102. (Baby Incendiary Bomb), £3,500.

103. ("Special Operations" Pistol), Nil.

104. (Relay Tube for Bombs), Nil.

116. Lord Invernairn, Mr. T. C. W. Pullinger, The Galloway Engineering Co., Ltd., and Major F. B. Halford (B.H.P. Engines for Aeroplanes)), £20,000.

131. Mr. J. Imber (Self-sealing Petrol Tank), £2,000.

132. Mr. E. C. Lacey (Self-sealing Petrol Tank), Nil.

137. Mr. F. W. Lanchester and The Daimler Co., Ltd. (Improvements in High Speed Reciprocating Engines (Vibration Dampers)), £3,000.

138. Major G. F. B. Turner and Lieut.-Col. C. R. Firth Noyes ((*a*) Petrol Bombs; (*b*) Fuze Pistols for Bombs; (*c*) Light Cases for High Explosive Bombs), £1,000 jointly.

142. Major F. W. Scarff ((*a*) Ring Mountings for Machine Guns; (*b*) Twin Gun Attachments; (*c*) "Trombone" Attachment for Bomb Sights; (*d*) Equal Distance Bomb Sights; (*e*) Improvements in Lewis Gun Magazine), £5,000 in addition to £1,500 already received from the Air Ministry); (*f*) Gun Cameras, claim abandoned at the hearing.

145. Mr. R. E. Bozon (Aerial Torpedoes), Nil.

146. Mr. A. H. Gledhill (Bomb Release Gears and Control Mechanism), £3,000.

147. Messrs. Vickers, Ltd. (Fabrics for the Gasbags of Aircraft), £1,500.

148. Messrs. Handley Page, Ltd. (Slips forming part of Bomb Releasing Gear), £750.

149. Air Comdr. O. Swann (Twin Float Seaplanes), Nil.

153. Messrs. Henry Hughes and Sons, Ltd. (Aeroplane Compasses), £2,000.

154. Walton Motors, Ltd. ("Wasp" and "Dragonfly" Aeroplane Engines), £48,000.

155. Mr. W. A. Burns (Anti-Aircraft Sights and High Angle Sights), £2,915.

156. Mr. W. A. Burns (Aircraft Compensation Sights), £500.

157. Comdr. D. T. Graham-Brown, R.N. (High Angle Sights), £1,000.

158. Messrs. Barr and Stroud, Ltd. (Anti-Aircraft Height and Range Finders U.B.2), £3,600.

159. Mr. P. W. Willans (Height and Range Finders U.B.2), £400.

170. Lieut.-Col. Moore-Brabazon (Aircraft Cameras), Adjourned with liberty to apply to restore.

183. Messrs. Joseph Lucas, Ltd. (Dynamos for Aeroplanes (Mark 2)), £200.

184. Mr. H. Leitner (Dynamos for Aeroplanes), £3,500.

196. Messrs. Rolls-Royce, Ltd. ("Hawk" Aeroplane Engine), £2,500.

197. Messrs. Handley Page, Ltd. (1) The "O" Type Twin Engine Aeroplane, and (2) the "V" Type Four Engine Aeroplane), £30,000.

203. Lieut.-Col. H. E. S. Holt ("Holt" Landing Light Brackets and Flares for use on Aircraft), £1,000.

209. Capt. G. T. Smith-Clarke (Calibration of Carburettor Jets), Nil. An award of £15 had already been made by the Air Ministry.

210. The Nieuport and General Aircraft Co., Ltd. ("Nighthawk" Aeroplane), £5,000.

220. Lieut.-Col. Hill and Lieut.-Col. Paul (Fuze Range Sight for A.A. Guns), £1,200.

224. Major D. H. Kennedy (Aircraft Radiators), Nil.

An Adelaide Memorial to Sir Ross Smith

IT is proposed by the citizens of Adelaide—his native city—to erect a statue to Sir Ross Smith, to commemorate his flight to Australia. A shilling fund has been established by the *Register*, and £1,500 has been collected, including contributions from many hundreds of school children, some of whom have sent their pennies. In addition to this, the citizens have already subscribed over £2,000, and the organisers are confident that they will receive ample to provide a handsome memorial for the airman's grave, or more probably for the city boulevard. We have not yet heard what definite form it will take.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING

A MEETING of the Committee was held on Wednesday, December 13, 1922, when there were present: Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair, Wing-Comdr. W. D. Beatty, C.B.E., Mr. Ernest C. Bucknall, Lieut.-Col. M. O. Darby, Col. F. Lindsay Lloyd, C.M.G., C.B.E., Lieut.-Col. A. Ogilvie, Lieut.-Col. M. O'Gorman, C.B., Mr. T. O. M. Sopwith and the Secretary.

Election of Members.—The following new Members were elected :—

Major Frederick Thomas Ashford.
Charles Douglas Barnard.
Walter James Beaumont.
Willoughby Lappin.
Frederic Arthur de Vere Robertson.
Arthur Stradling Willmott.

Sub-Committees.—The Reports from the following Sub-Committees were received and approved :—

Racing Committee, Gliding Committee, House Committee, Finance Committee.

"Daily Mail" Gliding Contest.—The Secretary reported that the expenses of the *Daily Mail* Gliding Contest amounting to £1,275 12*s*. 9*d*. had been defrayed by the proprietors of the *Daily Mail*.

Letters were read from the proprietors of the *Daily Mail* expressing their cordial thinks to the Club for carrying out the arrangements for the Gliding Contest, at the same time sending One Hundred Guineas to the Competitions Fund of the Club.

F.A.I. Paris Conference, January 3, 1923.—The following items on the Agenda were considered :—

Tryptique

The Secretary reported that the form of Tryptique approved by the French Customs, and authorised for use in France, had been received, and that the British authorities had been approached to sanction the use of the Tryptique in this country.

The Aero Club de France and the Royal Aero Club would be the responsible bodies in their respective countries for the issue of the Tryptiqne for aircraft travel. The Tryptique would not apply to air transport companies on the regular routes.

Revised Regulations for Admission of Official Timekeepers.—The revised regulations were considered and approved.

Schneider Race, 1923.—The recommendations of the Royal Aero Club were considered and approved.

Delegates.—The delegates to attend the Conference on behalf of the Royal Aero Club were Lieut.-Col. M. O'Gorman, C.B., Lieut.-Col. M. O. Darby and Lieut.-Com. H. E. Perrin.

Air Conference, 1923.—The following were appointed to represent the Royal Aero Club at the Air Ministry's Air Conference to be held in February, 1923 :—

Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., Lieut.-Col. F. K. McClean, A.F.C., Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., Lieut.-Col. M. O'Gorman, C.B., Lieut.-Com. H. E. Perrin.

Aviators' Certificates.—The following aviators' certificates were granted :—

7937 Edmund Arthur Burton, December 5, 1922.
7938 Walter James Beaumont, December 7, 1922.

RACING COMMITTEE

A Meeting of the Racing Committee was held on Monday, November 27, 1922, when there were present :—Maj.-Gen. Sir W. S. Brancker, K.C.B., in the Chair, Commander James Bird, Lieut.-Col. M. O. Darby, Lieut.-Col. F. K. McClean, A.F.C., and Mr. W. O. Manning. In attendance :—Lieut.-Col. M. O'Gorman, C.B., and the Secretary.

Schneider Cup Race, 1923.—The recommendations of the Royal Aero Club for next year's race to be submitted to the F.A.I. Meeting in Paris on January 3, 1923, were drawn up as follows :—

SCHNEIDER RACE, 1923

Recommendations by the Royal Aero Club

Navigability and Watertightness tests shall be one test, and called "Seaworthiness Test," and shall take place on the day preceding the contest, at such time as shall be fixed by the Commissaires Sportifs.

Each aircraft shall cover a course of 5 to 10 nautical miles over the sea, a creek, gulf, estuary or bay, as shall be fixed by the Commissaires Sportifs. After taxying over the starting line, the aircraft shall rise and continue on the course. During this test, the aircraft shall be taxied over two distances of ½ mile (nautical), the limits of each of these distances being indicated by two buoys, the course between each of these two distances shall be covered in flight.

After taxying over these two distances, the aircraft shall rise and complete the course, alighting again before the finishing line and taxying over.

The Commissaires Sportifs may allow any competitor who has not passed this part of the test to make a second and final attempt.

After taxying over the finishing line, the aircraft shall proceed direct to a mooring allotted beforehand, where it must remain afloat for a period of six hours, with no persons on board. Aircraft leaving their anchorage during this period will be disqualified.

No repairs will be permitted during the Seaworthiness Test.

The aircraft must not undergo any modification between the Seaworthiness Test and the Speed Test. The aircraft will be marked to ensure this.

Speed Test

The Speed Test will be contested over a distance of not less than 200 sea miles. The course may, if necessary, be taken over the coast, the controls being on land, care being taken to avoid all arrangements likely to impede competitors.

The contest will take place between April 1 and November 15, 1923.

Competitors may be started all together or at intervals as shall be fixed by the Commissaires Sportifs. If at intervals, the order of starting will be drawn by lot.

The start may be made from the starting line on the water or over the starting line in flight. The finish over the finishing line must be in flight.

Alightings are allowed.

In the event of damage during the Speed Test, the necessary repairs may be carried out at sea, but these must not alter the original condition in which the aircraft was presented.

GLIDING COMMITTEE

A Meeting of the Gliding Committee was held on Monday, November 27, 1922, when there were present :—Maj.-Gen. Sir W. S. Brancker, K.C.B., in the Chair, Lieut.-Col. M. O. Darby, Major O. T. Gnosspelius, Mr. W. O. Manning, Lieut.-Col. F. K. McClean, A.F.C., and Capt. W. H. Sayers. In attendance: Lieut.-Col. M. O'Gorman, C.B., and the Secretary.

Selfridge 50-Mile Gliding Competition.—The Regulations were considered and finally approved.

The following Stewards were appointed to control the competition :—Maj.-Gen. Sir W. S. Brancker, K.C.B., Lieut.-Col. M. O. Darby, Lieut.-Col. F. K. McClean, A.F.C.

DEUTSCH CUP

The Aero Club de France announce that the Deutsch Cup, having been won twice by the Nieuport Co., has been finally awarded to that company in accordance with the rules.

This contest is now closed.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

French Air Routes in Rhineland

IT is stated that a leading French air company will operate shortly the following air services between France and the Rhineland :—

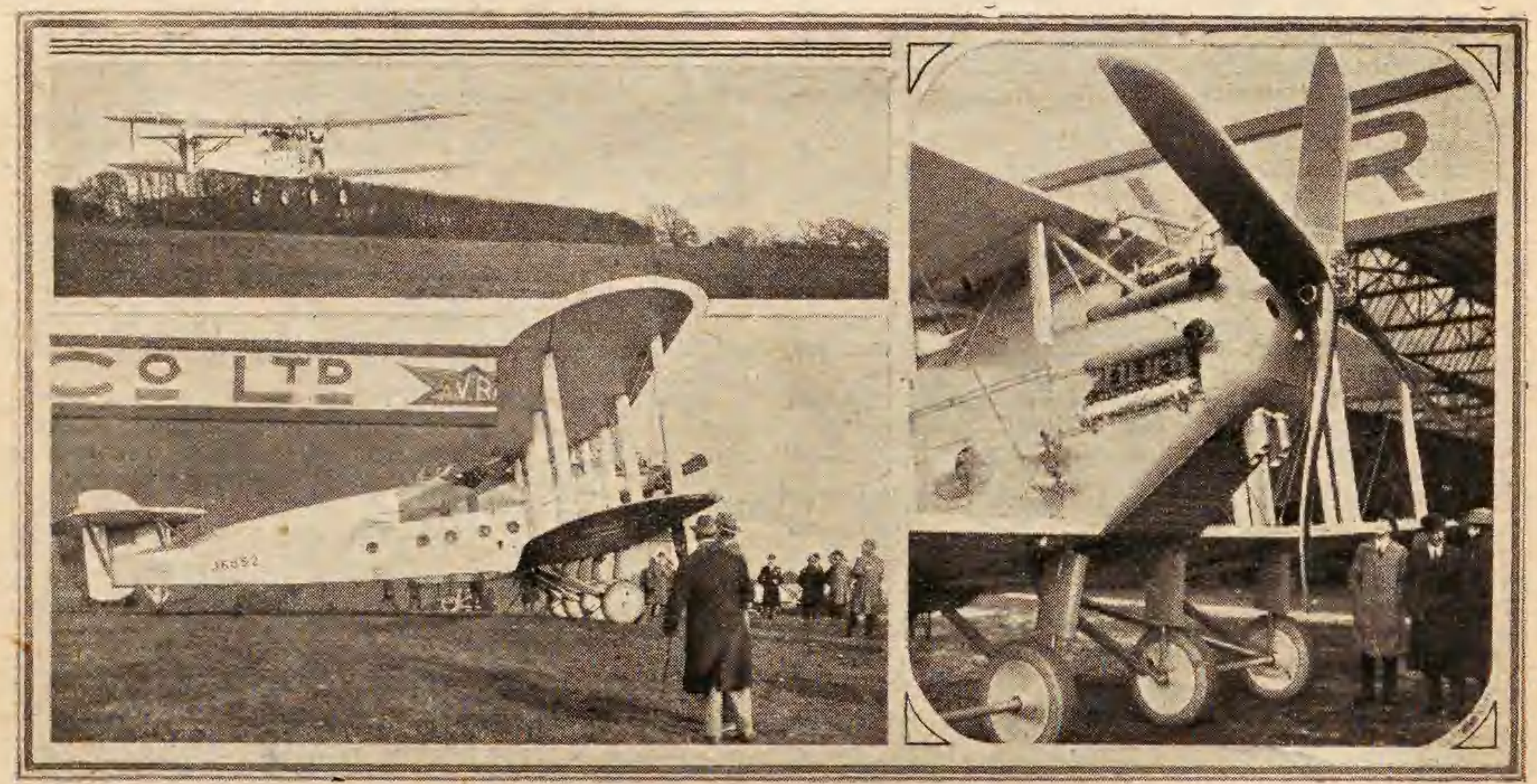
Mainz-Wiesbaden and Paris; Mainz-Wiesbaden and Cherbourg; Mainz-Wiesbaden, Strasbourg and Lyons; Mainz-Wiesbaden and Cologne. The second route should be of service to Transatlantic travellers, whilst the Strasbourg line will connect up the Rhineland by air with Warsaw and Constantinople.

THE NAPIER "CUB" FLIES

AFTER a long and searching series of tests on the bench, the 1,000 h.p. Napier "Cub" carried out, last Friday afternoon, its first official test under actual flying conditions, incidentally marking another eventful day in the history of British—and the world's, for that matter—progress in aviation. This was the first occasion on which an aero engine of such a high power as 1,000 h.p. has ever successfully taken the air—in flight, that is, not for consumption!

Air Vice-Marshal Sir W. G. H. Salmond, K.C.M.G., C.B., D.S.O., Director of Research, and several officials of the Air Ministry were present at Friday's demonstration, and, we understand, that the Director of Research was very impressed by the performance of both engine and machine.

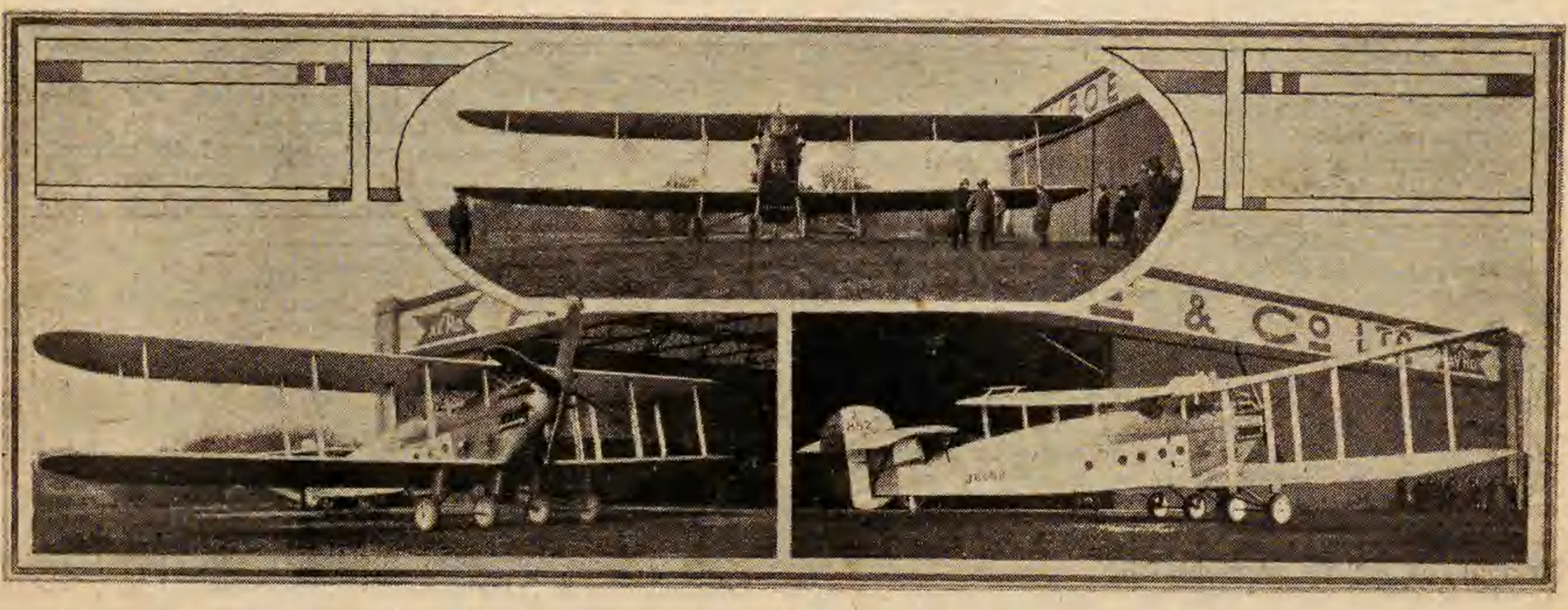
Inasmuch as this Napier-Avro combination is the property of the Air Ministry, we are, unfortunately, unable to give any particulars either of the Napier "Cub" or the Avro Bomber other than those already generally known to our readers from what has been previously published in FLIGHT. For the purpose of placing on record this notable event, however, we give herewith those brief particulars available of engine and machine.



FIRST FLIGHT OF THE 1,000 H.P. NAPIER-AVRO BOMBER: On the left, Bert Hinkler and crew take off at Hamble, December 15, on the Avro Bomber, fitted with a Napier 1,000 h.p. "Cub." Below, just before the flight. On the right, a close-up view of the "Cub" safely installed in its cage.

It is most satisfactory to know that this notable event was achieved by a British firm—or more correctly—firms, for it is not much use designing and building an aero engine of ever-so-many horse-power if you cannot also produce a machine, into which to put it, that will fly. So we must not forget the share of this achievement due to A. V. Roe and Co., Ltd., the builders of the Napier-Avro Bomber which successfully bore aloft the "Cub," roaring, as Shakespeare would have said, "as gently as a sucking dove."

The aeroplane to which this huge Napier is fitted is a specially constructed long-distance Bomber for the British Air Ministry designed and built by Messrs. A. V. Roe and Co., Ltd., of Southampton, one of the oldest aircraft firms,



FIRST FLIGHT OF THE 1,000 H.P. NAPIER-AVRO BOMBER: Three views of the Avro Bomber, with Napier "Cub," a modification of the Avro "Aldershot."

whose machines have achieved a great reputation. It is a further development of the Avro "Aldershot" which made its début at the last R.A.F. Pageant at Hendon, where it won the Air Force Handicap.

This bomber, the most powerful single-engined aeroplane in the world, is designed to give an exceptional wide range of action. In its *fuselage* are two decks. On the top one the machine gunner and pilot are accommodated, whilst the lower deck is fitted with bomb sighting and dropping gear.

To carry out all its functions this machine needs a crew of three, and arrangements are ingeniously contrived that they can change places whilst the machine is in flight. Ladders are in position between the decks, making it easy for the crew to change positions as required. The wings of this machine are designed so that they will fold back, thus economising considerably in space for housing purposes.

The whole machine, with the exception of certain parts of the wings, is constructed of metal. It is provided with dual control, with side-by-side seating, and is fitted with self-sealing petrol tanks.

As this machine is designed for long-distance flights, special electrical equipment is installed for keeping the hands and feet of the crew warm, and at the same time preventing the guns from freezing.

The motive power is a single 1,000 h.p. Napier engine, whose performances on its bench tests have been so satisfactory. It is interesting to note the compactness of the machine, and the small appearance of the nose when one considers that a 1,000 h.p. is stored away in a length of only 7 ft. 6 ins. A petrol engine starter is fitted, and does its job well without any fuss.

The "Cub" was designed and built at the Napier factory at Acton, and although this is the first engine of its type to fly, there are other machines in course of construction for this engine, which will be flown in due course. The principal features in the design of the "Cub" are now well-known. It is built "X" shape of 16 cylinders—4 rows of 4 cylinders—and h.p. for h.p., even better results have been obtained with this engine than with its famous prototype the 450 h.p. "Lion." Although the engine develops over 1,000 h.p., its total weight is only 2,200 lbs.—truly a remarkable achievement. It is particularly economical in oil and petrol consumption considering the power developed.

As regards the performance of the Napier-Avro combination, from our observations of Friday's test both appeared to give entirely satisfactory results. The engine ran with remarkable smoothness and silence. In fact, after the flight, Hinkler said he *could* not realise he had over 1,000 h.p. in front of him. The machine took off after an extremely short run—well under the 200-yd. mark—and climbed very well indeed. Once in the air, Hinkler put it through all kinds of manœuvres, including some fine banked turns. He told us that it is very nice on the controls and easy to manage. In landing the machine runs but a very short distance after first touching.

As for its pilot, the hero of the London–Turin non-stop flight, etc., we all know Bert Hinkler, so need say nothing further about him other than that the *next* time we go to see him fly the Napier-Avro we will take a magnifying glass to find him when *in situ*. After the flight, Hinkler was presented with a handsome cigarette case by the Napier Co.

Later in the afternoon we witnessed a test flight with an Avro "Bison" fitted with a Napier "Lion," and just as we were leaving the aerodrome we saw Hinkler execute a beautiful loop.

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IN PARLIAMENT

German Restrictions on British Aircraft

Viscount Curzon on December 13 asked the Secretary of State for Air whether the German Government has intimated that it will refuse to allow British commercial aircraft above a certain size to fly over the frontier; whether the aerodrome at Cologne will, in consequence of this decision, be closed to air liners carrying on the service between London and Cologne; and whether His Majesty's Government are prepared to tolerate such a situation?

Lieut.-Col. Sir Samuel Hoare: The answer to the first part of the question is that the German Government have made it a condition of according the right of British aircraft to fly to the occupied territory after January 1, 1923, that German machines of equal flying capacity shall be allowed to fly over and land in occupied territory.

As to the second and third parts of the question, His Majesty's Government are fully alive to the urgency of the issues, and are considering them, in consultation with the Allied Governments, with a view to the protection of their interests.

Capt. W. Benn: Does this involve the revision of the Air Clauses of the Treaty of Versailles?

Sir S. Hoare: No, it does not necessarily.

Aircraft Orders

Rear-Admiral Sueter on December 14 asked the Secretary of State for Air whether he is aware that the considerable orders which the late Prime Minister stated, on August 3, 1922, would be placed with aircraft firms in the current calendar year have not yet been placed; and whether he is in a position to state by what date the remaining orders will be given out to the air industry?

Captain Viscount Curzon asked how much of the extra grant for aeroplanes has yet been paid; how much still remains when the orders for the remaining machines have been given out; whether he is aware that Messrs. Napier and many other firms concerned with the manufacture of aircraft and engines will soon have to close down altogether unless more orders can be given out; and whether he is in a position to make any statement about the matter?

Sir S. Hoare: Under the authority given by the late Government, as announced in this House on August 3, orders for aircraft and engines to the value of about £280,000 were placed with a number of private firms during the autumn. As deliveries will not be completed by March 31 next, only a part of this liability will fall due this financial year. Since the present Government assumed office, no further orders have hitherto been given, as the expansion of the Air Force was one of the commitments of their predecessors which they felt bound to examine. The preliminary examination which has already taken place enables me to inform the House that the formation of the additional regular squadrons for home defence will now proceed. As I am aware of the serious position in which certain firms are placed, I am glad to be able to assure my hon. friend that definite orders for additional aircraft and engines will be immediately placed. Pending a fuller review of the situation, however, no further progress will be made with the scheme for an Auxiliary Air Force. I would add that, apart from this, I am making a further close scrutiny of the estimates.

Viscount Curzon: Will the right hon. gentleman carry out the examination, if he has not already done so, of the condition of many firms in the industry, and see to it that they are not allowed to go under, such as the firm mentioned in the question?

Sir S. Hoare: I have already done so, and I can assure my noble friend that I am fully aware of the difficulties in which they are placed, and I have dealt with that point in my answer.

Captain W. Benn: Do the Government adhere to the policy of their predecessors, to find any money which may be required for the Air Force by economies on the other two Services?

Sir S. Hoare: Certainly, so far as possible.

Thames Air Station

Sir Harry Brittain asked the Secretary of State for Air which is the length of notice which must be given to enable machines to alight on the Thames at Westminster; and whether it is the intention of the Ministry to give any further facilities to seaplanes making use of that permission?

Sir S. Hoare: The answer to the first part of the question is that applications to alight on the Thames at Westminster, if approved by the Air Council, would then require consideration and approval by the Port of London Authority. The length of time required to obtain the necessary permission would, I understand, depend upon the circumstances of each individual case. With regard to the second part of the question, no requests have up to the present been received to make use of the Thames at Westminster for a regular air service, and the establishment of a permanent air port in this part of the river is not, therefore, immediately contemplated. In these circumstances I do not think that expenditure upon the provision of any special facilities could be justified at the present stage.

Civil Aviation Records

Sir J. Norton-Griffiths asked what is the total distance accomplished by any British aeroplane engaged on one or other of the passenger air routes, and on what air line the record was made; and the line on which the next best record was achieved?

Sir S. Hoare: The greatest total distance flown by any British aeroplane engaged on the passenger air routes is 100,393 miles by a "D.H.34" aeroplane, operated by the Daimler Hire Co. The next best record is held by an aeroplane belonging to the Air Ministry, type "D.H.18," which has been used by various firms, but chiefly by the Instone Air Line. This aeroplane has flown approximately 70,000 miles. While these performances, of course, reflect credit both on the constructing and operating firms, I should add that the data are as yet insufficient for a definite conclusion as to the respective merits, either of types of aeroplane or of methods of operation.

R.A.F. Harlescott Depot

Viscount Sandon asked whether he can give any further information as to the sites alleged to be vacant in the possession of the Royal Air Force depôt at Harlescott, Salop?

Sir S. Hoare: The accommodation at present vacant consists of about 12 barrack blocks situated at the south-west portion of the camp, adjacent to the railway line. These are required to meet any further increase in the strength of the Royal Air Force at Harlescott. There is also unoccupied at present a portion of the women's hostel, which is needed for conversion into airmen's married quarters as soon as funds can be made available.

Aircraft Insurance Scheme

Lieut.-Commander Kenworthy asked the Chancellor of the Exchequer what is the total amount that was paid in premiums during the War for insurance against damage by enemy aircraft under the Government scheme; how much of this has been paid out in claims; and what is being done with the balance, if any?

Viscount Wolmer: The net premiums received by the Government under the Aircraft Insurance Scheme amounted to £14,086,615, and the amount paid in claims was £3,046,790. The balance of the fund was paid into the Exchequer at the time.

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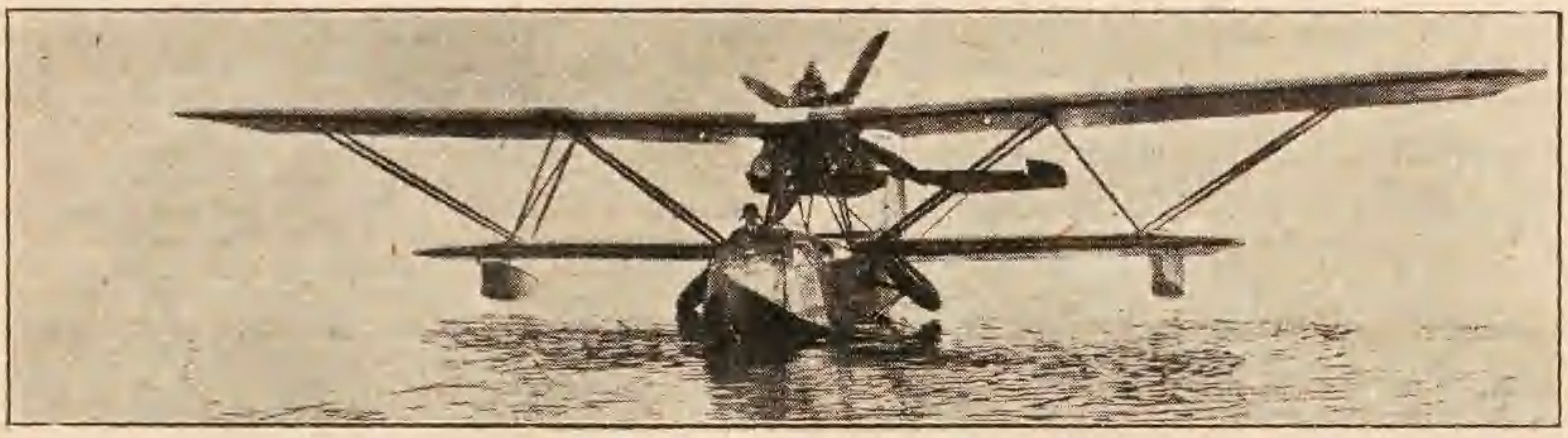
Aerial Survey of Irawaddy Delta

Proposals have been made for the aerial survey of the Irawaddy Delta, in Burma, and this will probably be undertaken in April next. The estimated cost is 330 rupees (£22) per square mile for 777 square miles; if a survey of the whole delta is made, involving an additional 1,000 square miles, the extra cost will be only 84 rupees (£5 12s.) per square mile.

THE NEW FOKKER AMPHIBIAN FLYING BOAT

450 H.P. Napier "Lion" Engine



THE FOKKER AMPHIBIAN : Front view. Note how machine floats on an even keel.

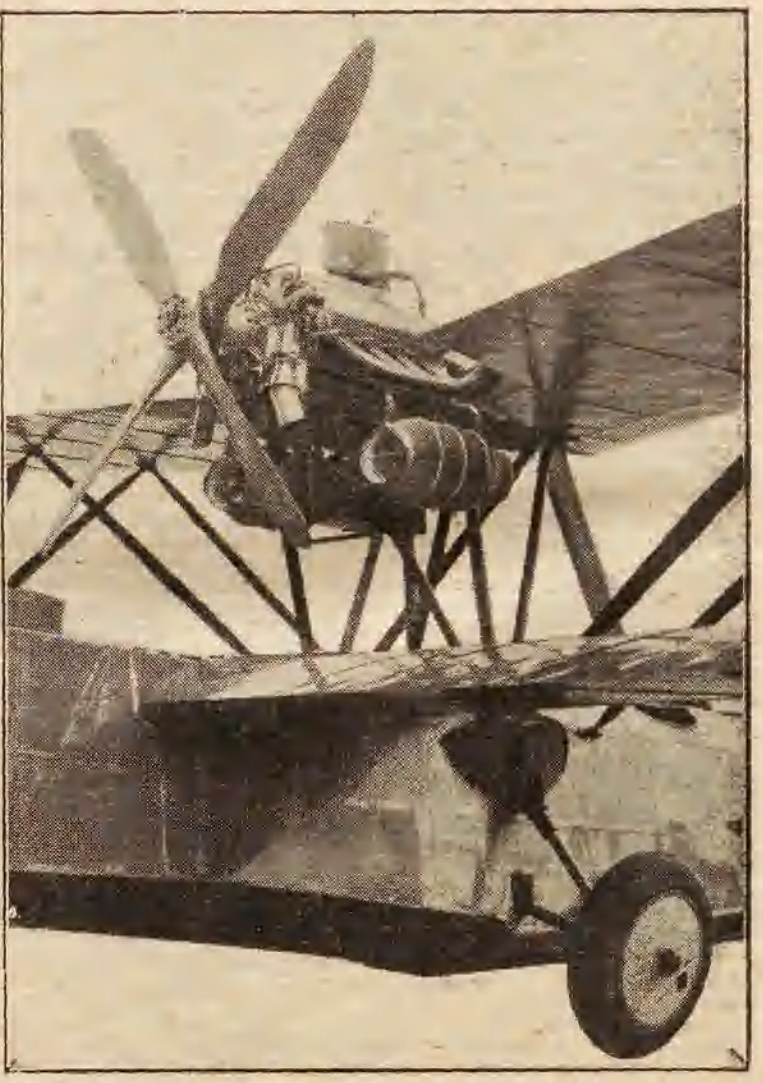
IN September of this year the N.V. Nederlandsche Vliegtuigenfabriek (Fokker) of Amsterdam launched a new machine of somewhat unusual design. This machine, an amphibian flying boat with Napier "Lion" engine, has recently been tested over the Ij, and is said to have given a very good performance. It appears probable that, had the French authorities responsible for the Paris Aero Show not decided to debar the N.V. Nederlandsche Vliegtuigenfabriek from exhibiting this year, the Fokker Amphibian might now have been at the Grand Palais. It may not, therefore, be out of place if we publish in this issue a brief description and some photographs of the machine.

In general arrangement the Fokker Amphibian is a biplane "pusher" flying boat, with a Vee-bottom hull built entirely of Duralumin. To a certain extent it may be said that the hull form resembles that of a Vickers "Viking," but the construction is, of course, entirely different, and the rest of the machine is totally dissimilar. Thus the engine, instead of being mounted between the planes as is usual practice in British flying-boat design, is mounted in the top plane.

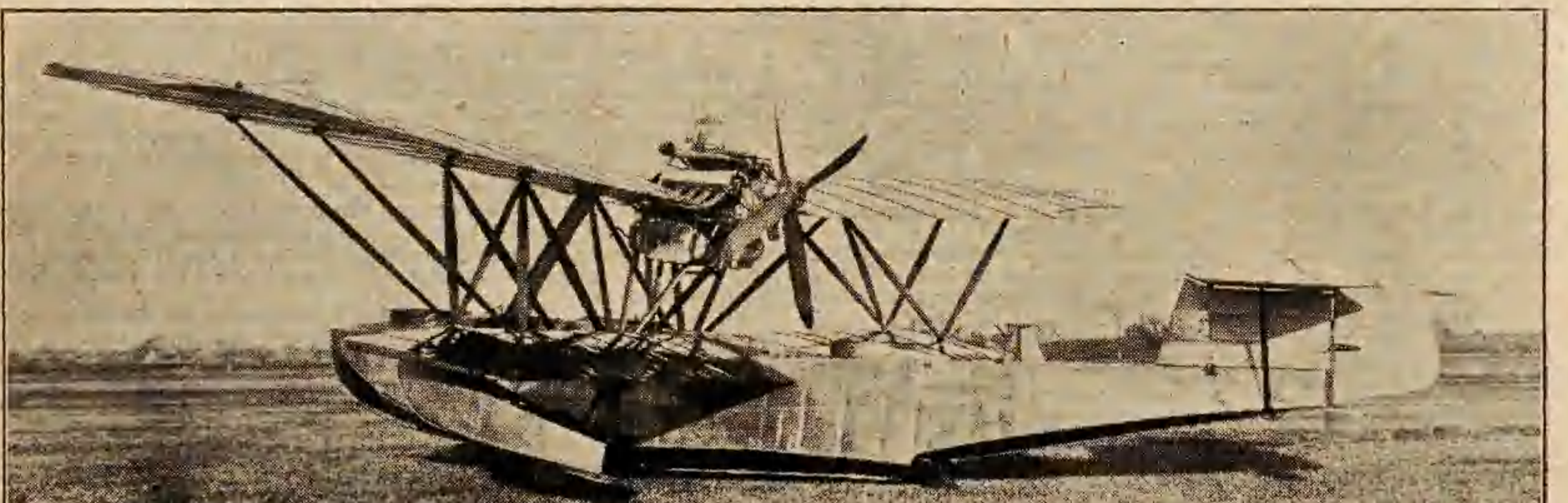
By choosing a lower plane of small chord it has been possible to keep the overall height down to a minimum, and as the hull is of fairly large beam the machine possesses a considerable degree of stability on the water. Thus it will be noticed that in one of our photographs, showing the machine at rest on the sea, there is no list, and neither wing-tip float touches the sea.

The boat hull, as already mentioned, is built entirely of Duralumin, having a girder of this metal running along inside and forming a keelson. The hull is covered with sheet Duralumin, and is divided into 11 watertight compartments, formed partly by the keelson and partly by transverse bulkheads. As in the Vickers "Viking," there are two steps, of which the front one occurs approximately under the centre of gravity, while the rear step is nearly half-way between main step and stern post. The steps are of the open type so as to allow the water to run out easily on taking off.

Although the Fokker Amphibian can be supplied either as a commercial machine or for military purposes, the accompanying photographs show the latter form. There are four seats, arranged as follows :—In the nose is a cockpit for the front gunner ; between this and the wings is a second cockpit,



THE FOKKER AMPHIBIAN : View showing amphibian gear and mounting of Napier "Lion" engine.



THE FOKKER AMPHIBIAN : Three-quarter rear view of machine on land.

in which pilot and engineer are seated side by side, the pilot on the starboard side. Some distance behind the wings is a third cockpit for the rear gunner. The forward cockpit has a set of controls, so that, if necessary, the machine can be piloted from here. When not in use the front controls, and incidentally the gunner's seat, can be folded out of the way.

Communication between the three cockpits is by a tunnel on the starboard side, and the amphibian gear is reached through this from the pilot's cockpit. The wheel axles are hinged on the sides of the hull, and sloping compression struts (telescopic) run from the axle into the top of the hull (through watertight bags), where is situated the gear which raises and lowers the wheels. The handle for operating the landing gear is situated in the pilot's cockpit, and can be reached by either the pilot or the engineer, or even by the front gunner.

The four main petrol tanks, having a total capacity of 600 litres (132 galls.), are placed between the landing gear and the aft gunner's cockpit. A small service tank is mounted in the top plane.

A structure of streamline steel tubes resting on the hull carries in front the two halves of the top plane, while further aft it supports the engine bearers. This structure is so arranged that it is possible to change the engine without interfering in the slightest with the wing structure.

The top plane is characterised by a pronounced dihedral, and is also swept back, while the lower plane has a slight dihedral only. The bracing is in the form of an irregular Warren girder, the sloping members of which are plain double struts, while the vertical (or nearly so) struts are of N formation. Both wings are of wood construction and covered with three-ply. The wing-tip floats are, like the main hull, built of Duralumin.

The Napier "Lion" engine is, as already mentioned, mounted in a cut-out in the top plane, in such a position that it can be easily got at and lifted out by a crane. With its two Lamblin radiators and oil tank it forms a complete unit, and is attached to the tubular structure by four bolts only. A four-bladed "pusher" airscrew is fitted, which consists in reality of two two-bladed screws having thin bosses so as to allow them to be mounted one behind the other on the airscrew shaft.

The tail is of usual type, with a very thick fin, to which is hinged the balanced rudder. The tail plane is of the trimming type, the worm gear being housed inside the fin. Both tail plane and rudder are well clear of the water, and for steering on the sea the tail skid, which is mounted by the rear step, is so shaped as to form a water rudder.

Following are the main characteristics of the Fokker Amphibian: Length o.a., 12 metres (39 ft. 4 ins.); span, top plane, 18·2 m. (59 ft. 8 ins.); span, bottom plane, 10·5 m. (34 ft. 5 ins.); chord, upper, 2·4 m. (7 ft. 10 ins.), lower, 1·8 m. (6 ft.); height, 3·3 m. (10 ft. 10 ins.); weight empty, 1,800 kg. (3,960 lbs.); useful load, 800 kg. (1,760 lbs.); endurance, 4 hours; maximum speed, 125 m.p.h. The machine gets off with full load in 20 seconds.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN DECEMBER 3 AND DECEMBER 16, INCLUSIVE

Route (including certain diverted journeys)	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	23‡	41	6	21	22	2 36	H.P.W.8B G-EBBH (2h. 3m.)	G. (9), H.P.W.8B (3).
Paris–Croydon	24§	58	5	18	18	3 26	H.P.W8B G-EBBG (2h. 40m.)	G. (10), H.P.W.8B. (3).
Croydon–Brussels–Cologne	8	25	6	—	6	3 35	D.H. 18 G-EAWW (2h. 58m.)	D.H. 9 (1), D.H. 18 (1), D.H. 34 (3).
Cologne–Brussels–Croydon	8	17	5	—	4	5 11	D.H. 34 G-EBBR (4h. 48m.)	D.H. 9 (1), D.H. 18 (1), D.H. 34 (3).
Croydon–Rotterdam ...	10	13	10	10	10	2 41	Fokker H-NABM (2h. 9m.)	F. (6).
Rotterdam–Croydon ..	9	13	9	9	5	3 21	Fokker H-NABI (2h. 22m.)	F. (7).
Manchester–Croydon–Amsterdam	12‖	45	—	—	12	4 56	D.H 34 G-EBBQ (4h. 52m.)	D.H. 34 (3).
Amsterdam–Croydon–Manchester	16¶	31	7	3	15	—	—	D.H. 34 (3).
Total for two weeks ...	110	243	48	61	92			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.

‡ Lympne–Le B., 9. § Le B.–Lympne, 5. ‖ Man.–Croy. 6, Croy.–A'dam. 3. ¶ A'dam.–Croy. 7, Croy.–Man. 9.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.). F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. *M.* = Martinsyde. Sp. = Spad. Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes.

Incidental Flying.—Mr. Perry and Capt. Stocken testing Avro and D.H. 9 machines at Croydon for Aircraft Disposal Co.

London-Berlin Air Route

PROGRESS is apparently being made in respect to the Anglo-German air line between London and Berlin, and it is expected that this service will shortly be in operation, both with British and German machines. An Albatross six-seater monoplane, carrying three directors of the Deutsche Luftreederei Co., left Berlin for London on December 14, but had to descend near Bremen owing to fog.

Nieuports for Spanish Army

AFTER keen competition between the Dutch Fokker and the French Nieuport firms for an important tender for 30 aircraft for the Spanish Army, the Nieuport firm have succeeded in scoring the greatest number of points during the performance trials, and have thus obtained the contract. The two types of machines involved were both biplane chasers, fitted with 300 h.p. Hispano-Suiza engines, and it is interesting to note that their performances were nearly identical. It is to be regretted that no British firm competed for this tender, and it is to be hoped this will not be the case when the next tenders are put out next February.

A Successful Flight by "S.C.W." Glider

ON Sunday last Maj. Maurice Wright accomplished a successful flight on the "S.C.W." (Sayers-Courtney-Wright) Glider at Itford, where they—the Gliding Partners—have been carrying out further trials with their 'bus since the Gliding Competition. With little or no wind to help it, the glider started off on Sunday with a splendid zoom, followed by a brief period of hovering. The pilot then started off on a beautiful, flat, glide of about 1½ miles, at the end of which he made a perfect landing. It would seem, therefore, that the "S.C.W." glider is at last satisfactorily adjusted, and we congratulate the partners on having achieved success.

"AVIATION IN INDUSTRY AND WAR"

FOLLOWING a dinner at the Trocadero Restaurant on November 28, a discussion under the above title was opened by Col. Sir Alan H. Burgoyne. The occasion was a Club dinner of the Imperial Industries Club, at which Sir George Wyatt Truscott presided as Vice-President, in the absence of the President, Sir George H. Chubb.

The Chairman, in inviting Sir Alan Burgoyne to speak, reminded those present that Sir Alan 26 years ago made his début in the Club in a prophetic discussion on "Submarines in the Next War," which had proved his great foresight. It was therefore very appropriate that he should now open the discussion upon the selected subject for that evening.

Sir Alan then referred to the tremendous strides made in aviation during the War. Less than a week ago he was going through a statement of the inventions which had had the greatest influence on progress during the last decade, and he was astounded to find that aviation and the internal combustion engine were not mentioned. One astounding factor stood out in military history, namely, that the great soldier of today thinking of the war of tomorrow would envisage it as upon the lines of the war of yesterday; he would never grasp the war of yesterday was a thing finished and gone for ever. We started the War, he continued, with, roughly, 80 aeroplanes, 167 officers and 1,600 non-commissioned officers and men; we ended the War with 22,000 'planes in existence. Between January and October, 1918, we built 26,000 aeroplanes and 29,000 engines. The French had 20,000 'planes, and the Germans nearly as many. We destroyed just on 8,000 aeroplanes between July, 1916, and the Armistice.

He condemned the controversy as to aircraft and ships, but was opposed to spending millions on two ships. There were two ways only in which the British Fleet could be beaten; one was by a superior fleet, and the other by an arm that could ignore the existence of the Fleet. The power of the British Fleet in the War had been muzzled owing to submarines and aeroplanes; and it could not go out unless the German fleet came out too. The development of aviation was continuing. During the late War the biggest bomb dropped in this country weighed 600 lbs., but in two countries today experiments were being carried out with bombs of 2,000 lbs. weight. The air fleet in existence in France today could very easily, on the first day of the outbreak of war, drop 200 tons of explosives on London, and afterwards continue with 70 tons a day without adding a single aeroplane. One could conceive that the Navy of the future would consist of fast aeroplane carriers, still faster light cruisers and infinitely faster destroyers, and a battle would begin by an attempt on both sides to smash one another's 'plane-carriers. Speaking of civil aviation, Sir Alan Burgoyne referred to the sad spectacle of a science brought to such a development during the War being allowed to sink almost into desuetude. If only our Government had taken that keen initiative that poor, poverty-stricken France had taken, we should be in a far better position than we were at the present time.

Lieut.-Col. J. T. C. Moore-Brabazon, M.P., said that aviation was really a nightmare to think of because of its development in the late War. He had hoped it would be a link between peoples. Things had been very bad with aviation for some time, but he expressed the hope that the ebb tide in civil aviation was now over, and that we were started on the flood. In visualising the next war, he would say that the country which got the supremacy of the air could not lose the war. He granted that they wanted other forces to compel a successful victory. The first thing necessary would be to attempt to destroy the enemy's aeroplane works, because by doing that one would stop the enemy's power to reply, and one's own supremacy became greater and greater. Consequently, it was necessary for aeroplane manufacturers to get all the protection they could, and, if possible, get underground. He had just gone through an election, and while he had been bombarded with questions on drink, education, divorce, etc., he had to withstand no pressure on the question of air power.

Sir Sefton Brancker referred to the importance of maintaining the interest of the public in aviation. The Press, he said, had been wonderful in its support, but the public were still lagging behind. Air transport was now in a precarious condition, because it was, as yet, a proposition that did not pay. It could not be expected that a new industry would pay at once, and it was necessary that air transport should be assisted in some way. The public had not yet been educated up to the knowledge that air transport was the way to travel, and until that was done it was up to the Government to see that the industry got through. He thought the friction between the Army, the Navy and the Air Force was a passing phase, and urged the formation of an Imperial De.ence Committee. At present the Services were hampered by the shortage of money. He commended the work of the International Aviation Board as likely to have a good effect, owing to the camaraderie of the air. At present civil aviation was a mere child feeding out of the bottle. Air transport could not affect an air force except in building up a valuable reserve. Civil aviation had four essentials—safety, reliability, comfort and economy, and the first three were not consistent with the fourth. Five years hence, he thought, civil aviation would be paying its way. Engines were becoming more efficient, and did not require overhauling so often. Wooden construction was being replaced by metal construction, and costly petrol would be replaced by heavy oil. Greater reliability meant less insurance. There was no doubt in his mind that just as this nation was the leading nation of sailors, so would it also be the leading nation in the air. British pilots were unequalled, and the same applied to the mechanics. He urged the linking up of the Empire by aeroplane, and hoped at some time or other to see the journey between this country and New York covered in eight hours.

Mr. Handley Page compared the Government assistance being given to air transport in France with that of this country—£15,000 against £150,000—and pointed out that despite this disparity, our machines on the London–Paris route carried 75 per cent. of the passengers who travelled by air. He thought we ought continually to extend the service until it linked up this country with India, and said he believed that was certain to come in time. In his opinion the results achieved by British machines were well worthy of further support for linking up the different parts of the Empire, which was something even more important than aviation.

Mr. A. H. Ashbolt, Agent-General for Tasmania, said that he had been interested in airships for many years, and in 1911 endeavoured to get the War Office to look into the working of an aeroplane by wireless; but in spite of all his endeavours it never got beyond the War Office office door. The Imperial aviation problem should be supported by, if necessary, sacrificing one or even two cruisers. The Government had the power to force first-class mail into the air, and that would overcome all difficulties of subsidies, etc. Important experiments were maturing with heavy oil for engines, and if successful it would be an immense step forward in the safety factor for airships.

Mrs. Yorke Fausset, Capt. Kingston-McCloughry and Mr. Griffith Brewer also contributed to the discussion, and a very enjoyable evening was concluded with a hearty vote of thanks to the Chairman.

Amongst others present were Col. the Rt. Hon. the Earl of Denbigh and Desmond, C.V.O., A.D.C., T.D., Col. Sir J. Roper Parkington, D.L., J.P., Prof. Hugh H. L. Bellot, M.A., D.C.L., Lieut.-Col. the Hon. P. Pelletier (Agent-General for Quebec), Capt. Victor Gordon (Acting High Commissioner for Newfoundland), Sir Basil Mayhew, K.B.E., F.C.A., F.S.S., Major the Hon. H. Fletcher Moulton, M.C., Mr. J. E. Evans-Jackson, Mr. Harold M. Barton, Mr. J. H. Evans-Jackson (Hon. Secretary), etc., etc.

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Syrian Air Routes

THE Syrie-Liban Aero Club, recently formed with the object of developing aviation in Syria, is to be affiliated to the Aero Club of France, and a certain liveliness in aviation matters may be expected in this country in the near future. The French Air service have already organised 50 landing stages, 10 of them fully equipped as regards shelters, revictualling and repairing arrangements. The principal lines thus prepared are Alexandretta, Aleppo and Deir-ez-Zor, on the route to Baghdad; Aleppo, Hama, Homs, Rayak and Damascus, towards Palestine and Egypt; Damascus, Palmyra and Deir-ez-Zor, for the direct crossing of the Syrian desert in four hours; Alexandretta, Latakia and Tripoli for the coastal line.

LONDON TERMINAL AERODROME

Monday Evening, December 18

The most significant event on the European airways this week is the start of the flight by a German commercial aeroplane from Berlin to London. This machine is an Albatros, with accommodation for eight passengers, and is driven by a Rolls-Royce "Eagle 8" motor. The pilot on this flight is Herr Ungerwitter, and it is understood that there are three passengers, all directors of the Deutsche Luftreederei, who are flying to Holland and London to consult with the Royal Dutch Air Service and the Daimler Airway as to the final details for the opening of the London-Berlin service.

Owing to thick fog, which hung over Holland during Friday and Saturday, the machine was compelled to descend at Bremen, and, up to date, no further news has been received.

The Winter Passenger Traffic

In spite of the fact that fog has interfered to a great extent with the regular operation of the various services, over 100 passengers have been carried during the week. Saturday was the only absolutely blank day, and the irony of the situation was that, although Croydon was perfectly clear—and, in fact, ideal for flying—there was fog at all the other terminals; Manchester, Brussels, Paris and Rotterdam all being hidden in dense fog. Even the K.L.M., who are not, as a rule, deterred by inclement conditions, had to call flying off on this occasion.

Handley Page Transport continue to carry the highest average loads, but, having regard to the bookings already being made on the Manchester and Amsterdam routes, it would appear that this distinction will be closely challenged by the Daimler Airway in the coming summer. The Instone Air Line are having some difficulty in getting passengers, although, considering the time of the year, air travellers are really as numerous as can be expected.

The Instone Air Line are anxiously awaiting some result of the conference which is now going on between the Air Ministry and the German Government as to the question of British machines of the size of the "34's" and "18's" flying into German territory. As matters stand at present, I am informed that the Instone Line only has permission to fly until the end of this year, and, unless some arrangement is made in the meantime, the service will be compelled to cease operations then—at any rate until such time as further arrangements are made. Incidentally, the Instone Air Line are receiving enquiries for many special flights which are next to impossible of accomplishment. One, for instance, was for a special aeroplane for a flight to Durban in South Africa and back, and the enquirer wished to know if they had made this flight often, and were familiar with the route! Another was for a special from Paris to Palestine, and was a much more likely proposition. I hear also that a would-be air passenger who had read the Instone advertisement on the side of Basil Foster's office, which makes some reference to New York, enquired at the office for a flight to that city. Another amusing application which has been received—this time by Handley Page Transport—was from a lady, who, being very sensitive to height, and yet at the same time desiring very much to fly to Paris, thought she might get over the difficulty by flying at night—in this way, owing to the darkness, being unable to see "how far she had to fall."

The Surrey Flying Services have been fairly quiet of late, but appear to be busy always in their various workshops. On Sunday, the fine weather brought a few joy-riders down to the aerodrome, and the Surrey Flying Services' Avro was in the air on several occasions.

Season Tickets on the "Airway"

Air season tickets are being issued by the Daimler Airway for the flight between Manchester and London. These cost £100, and are available for 50 single or 25 return flights, and show a saving on a return flight of 10s. Several have already been taken out by business houses in Manchester.

Incidentally, I was given an explanation by a business man of why he and his Manchester colleagues use the air service from Manchester to London. It appears that, although the actual time saved by the air journey is only about an hour-and-a-half, it makes all the difference between arriving in London before or after lunch, and, as the British business man has a liking for discusing business over lunch, quite a number have adopted the flying habit.

The amalgamation between the C.M.A. Air Lines and the Grands Express is still hanging fire, and no definite details have, as yet, been settled. It is their intention to open a service from Paris to Cologne in the new year, but they are in the same position as Instone's with regard to permission from Germany to run a service there.

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EXPERIMENTAL DATA WITHOUT A WIND CHANNEL*

By O. T. GNOSSPELIUS

In his opening remarks the author stated how, in the year 1920, it became evident to him that it was very necessary, if improvements in existing aeroplanes were to be made, to increase our knowledge of the aerodynamic forces by means of which we fly, and in order to do this it became necessary to measure these forces oneself.

"In discussing this question," he said, "with Mr. Jones, the very able chief draughtsman of Messrs. Short Brothers, Ltd., he brought to my notice an article in *Aeronautics* of November, 1911, where the writer, Mr. Ellis Williams, B.Sc., describes a method of measuring these forces by means of swinging models of the desired shape on the end of a pendulum. This seemed a hopeful method, and, at any rate, well within the means at my disposal, which consisted in labour and material which I could acquire in the works.

"The first rough experimental pendulum was constructed of a piece of wood about 2 ins. by $1\frac{1}{2}$ ins. cross section and about 11 ft. long, suitably pivoted. With this we found it was possible to measure lift and drag forces, but the speeds attained were very low; it was necessary to increase the speed. We then constructed a pendulum about 20 ft. long to swing in the large shop; this gave higher speeds, the pendulum being dropped from the horizontal plane, but we found that air currents and flexibility made the movements too erratic to be of any use for measurements.

"We then decided that we must work in a lower, more sheltered shop with a shorter pendulum, and increase the speed by other methods. It was evident that the method of dropping from the horizontal was practical, and it appeared that by raising the centre of gravity of the pendulum to the highest possible point the time of swing would be decreased and the velocity at the bottom of swing increased.

"It must be understood that the method adopted in nearly all these experiments was to hold the model so that the plane of flight was in the plane of the pendulum, lift being measured by the horizontal deflection of the pendulum at the lowest point of swing, and drag by the length of swing of the pendulum.

"The section of the pendulum arm must be cylindrical in order to avoid effects on lift readings due to the pendulum not travelling in a plane path. The pendulum arm was therefore constructed of tube.

"For high speeds it is necessary to keep the centre of gravity of the pendulum high; the lower part of the pendulum must therefore be light, and we constructed it of Duralumin tube of $1\frac{1}{4}$ ins. diameter, extending for about two-thirds of the length of the pendulum. The top third was a steel tube of $1\frac{3}{8}$ ins. diameter telescoping over the Duralumin tube. The pivot originally was constructed with two bearings at right angles, one allowing for the normal swing of the pendulum, and the other allowing for lateral deflection for lift readings. We found, however, that, with this second pivot, the deflections for lift were much too great for practical purposes; we therefore fixed this pivot, the lateral deflections of the tube under the lift forces being quite sufficient for measurement. These deflections are of the order of 3 ins. for maximum lift on normal 18-in. by 3-in. sections. The force causing the deflection can be found with great ease by direct calibration of deflections against known loads. To obtain high speeds we loaded the pendulum by casting a lead weight of about 35 lbs. round the top tube as near the pivot as possible. With this combination and a normal-weight model we were able to obtain a speed of from 45 to 50 ft./sec. at the bottom of the swing, depending on the weight of the model.

"The drag forces are measured by the height of swing of the pendulum at the end of the first swing. Attempts were first made to observe this value by recording a trace of the end of the swing by a marking mechanism on the pendulum, but it was found that, as this measurement was required with great accuracy and the drag forces are very small, the varying frictional forces of the marking mechanism were sufficient to affect seriously the drag measurements. This method was therefore abandoned in favour of a hit-or-miss method, where a pin inserted in a scale was either knocked out or left untouched by the pendulum. With several swings of the pendulum we found that the top of the swing could be located to at least $\frac{1}{16}$ in., which gave very fair accuracy in these measurements.

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* Paper read before the Institution of Aeronautical Engineers, at the Engineers' Club, on December 15.

"Lift forces are converted into absolute coefficients by calculating the maximum speed of the pendulum. Drag forces are calculated from an integration of the speed of the pendulum throughout the swing.

"*Initial Drag.*—It is obvious that the length of swing of the pendulum is a measure of the combined drag of the model and pendulum. It is now necessary to subtract the resistance of the pendulum. To do this in principle it is only necessary to detach the model and replace it by a mass equal to that of the model, with its centre of gravity on the same radius of swing as that of the model. This mass must offer no air resistance. The height of swing of the pendulum must then be observed.

"This problem developed the method of holding the model in a frame. The frame is tubular, and the mass takes the form of lead weights inserted in the arms of the frame. After a time all models were tested in this way on account of observations when pressure plotting, which indicated that air-flow at the ends was affected by end support.

"The angle of the model is measured from a protractor fitted on a stand under the vertical position of the pendulum.

"A light arm carrying a recording pencil is mounted crossways on the bottom of the pendulum. This records lift on a piece of paper held on a suitable frame to the side of the path of the pendulum.

"*Advantages of Method.*—The air through which the mode passes is still, and there can be no question of turbulence or steady flow. Wall effect, which may be great in an ordinary wind tunnel, is greatly reduced. The cost of running the apparatus is very small. The apparatus is cheap, and the power required is one-man power. The accuracy of the measurement appears high. Repeat experiments usually agree to about 1 per cent.

"*Disadvantages of Method.*—The motion is not steady, but accelerated. The motion is not rectilinear. These two facts may cause the apparatus to give erroneous results, but it should be observed that when tests are made on forms tested by the N.P.L. the results are in very fair agreement. Only on some thick sections the results are not the same; on the other hand, Handley Page effects are very obvious.

"*Description of Method of Carrying out Test.*—The model is placed on the frame and run at varying angles for lift; the usual increments of angle are by 2. The model is then set at 0° incidence and run for initial drag. The model is then removed and replaced by weights, and the pendulum drag measured. The model is then replaced and the weights removed to check for initial drag, and if any discrepancy is noted the experiment is repeated. This test for initial drag is most important, and should be carried out with the greatest care. The model is then run through at varying angles for drag measurements.

"*Pressure Plotting.*—This can be carried out satisfactorily on this apparatus. When the necessary holes and passages have been made in the model they must be connected to a small tube carried up the pendulum. This tube is coupled up by means of a thin, flexible rubber pipe to a small inclined U tube filled with alcohol. If the tube is small the necessary mass of alcohol is reduced, and the inertia effect of this mass also reduced. The pendulum is swung in the ordinary way and the motion of the alcohol noted. With practice this can be read to $\frac{1}{100}$ in., with a possible error of $\pm\frac{1}{100}$ in.

"A correction has to be applied for the centrifugal force of the air in the tube down the pendulum. When this correction is applied the results are in agreement with those obtained at the N.P.L. on the same section. The work is a little tedious, but a section can be plotted in one day and invaluable results obtained. These results show our want of a satisfactory theory. Progressive modifications of form do not produce the expected alterations of pressure, and no general conclusions can so far be stated.

"*Movements of Centre of Pressure.*—So far no attempt has been made to measure this quantity, as time and money have not permitted, but it does not seem impossible to devise an apparatus to carry out this work if necessary.

"*Further Possibilities.*—With the pendulum it is possible to observe to a certain extent the effect produced on the air by the passage of any body under test through it. For this it is necessary to create a smoke cloud and swing the model through it.

"Wing-tip vortices," he continued—"first, I think, suggested by Lanchester and later developed by Prandtl—can be observed. These vortices exist, but appear to be not quite as assumed by theory.

"The vortex is non-existent at the angle of no lift, and increases in size and probably in velocity up to the burble point, where the motion changes. With square-ended planes the centre of the vortex occurs on the line of the wing tips, but apparently below it. As far as can be observed the whole of the rotational effect is below the wing.

"With tapered wing tips the centre of the vortex comes in nearer the centre of the model, approximately one-sixth of the span, and the vortex obviously increases in size and apparently decreases in speed of rotation.

"With a biplane two vortices are formed which rotate separately and finally round one another; here the vortices appear smaller.

"The vortices persist for a long period after the passage of the model. They have been observed for 800 or 900-chord lengths.

"*Further Smoke Observations.*—When a model passes through the air a distinct kick is given to the air at considerable distances from the model; this is especially noticeable on the upper side, where the effect is visible up to 8 ft. from the model. What the nature of the kick is is not clear, but it looks like the first swing of a very heavily damped vibration. This may have a bearing on tunnel-wall effect.

"Finally," he concluded, "I should like to try and impress on you the effects that making experiments such as these have on anyone who undertakes them. One becomes impressed by the unsatisfactory nature of usually accepted theories when applied to observed facts.

"Turning to the practical side, the experiments, whilst at times apparently giving illogical results, continue to indicate the possibility of increasing the aerodynamic efficiency of the forms we use. Gliding angles of 1-18 are attainable, and probably much higher figures.

"The Handley Page effect shows the possibility of multiplying lifts by 3; unfortunately, it multiplies drag by 9. Does this not indicate that if we do right we can reduce the drag forces? To do this we must do something new and not copy. Every one who can should take this work up and experiment.

"The present aeroplane is wasteful of power, and for progress we must improve it."

PERSONALS

Married

Lieut.-Col. CUTHBERT EUAN CHARLES RABAGLIATI, late K.O.Y.L.I. and R.F.C., youngest son of Andrea C. F. Rabagliati, M.D., Whinbrae, Ben Rhydding, and grandson of the late Duncan McLaren, M.P., Edinburgh, was married on December 4 at St. Ethelburga's, Bishopsgate, to CLARISSA CATHERINE MELVILL DE HOCHEPIED LARPENT, only daughter of the late John Melvill, ninth Baron de Hochepied, and of the Baroness de Hochepied.

Flight-Lieut. EDWARD THORNTON, R.A.F., only son of the late Edward Thornton, Minister in H.M. Diplomatic Service, and of Mrs. E. D. L. Harvey, was married on December 11, at St. Saviour's, Chelsea, to MARJORIE GABRIELLE, only daughter of Mr. W. R. PIKE.

To be Married

The marriage will shortly take place between RORY ALWYN MACNAMARA SCRASE DICKINS, late 60th Rifles and R.A.F., eldest son of Mr. and Mrs. Alwyn Scrase Dickins, of Heronsgill, Horsham, and BRENDA BAILLIE, of Tismans House, Rudgwick, Sussex, only daughter of Mr. and Mrs. SOUTHBY HEWITT.

Deaths

Capt. JOHN EVELYN HARRISON DAKIN, late Squadron-Commander, R.A.F., who died suddenly on December 8, in South Africa, aged 34, was the son of the late Joseph Harrison Dakin, of Brittany Lodge, Edwardes Square.

Flying Officer BERTRAND REGINALD HARRIS, R.A.F., of 56, Clifton Gardens, Maida Vale, W., died of pneumonia on December 10, at the Royal Naval Hospital, Chatham. Flying Officer Harris, whose age was 27, had been twice mentioned in Despatches.

Item

Lieut. AVIATEUR WILLY COPPENS, D.S.O., M.C., Air Attaché to the Belgian Embassy, left London on December 3, for Baghdad.

THE ROYAL AIR FORCE

London Gazette, December 8, 1922

General Duties Branch

The follg. Flying Offrs. are transfd. to the Reserve :—
CL. A (Dec. 9) :—R. C. Rodger, M.C., D.C.M. ; W. W. Saunders.
CL. B (Dec. 8) :—G. H. Winckworth.

Memorandum.

The permission granted to Sec. Lieut. R. H. Stonnill to retain his rank is withdrawn on joining the T.A. ; Oct. 24.

London Gazette, December 12, 1922

General Duties Branch

The following are granted permanent commns. as Flying Offrs., with effect from dates indicated. *Gazettes* of those dates, appointing them to short service commns., are cancelled :—A. W. Cuddon-Davis ; January 30, 1920 (since promoted. Previously described as A. Bottoms). G. S. Oddie, D.F.C. ; December 12, 1919 (since promoted). H. R. Junor, D.F C. ; December 12, 1919. S. D. MacDonald, D.F.C. ; July 2, 1920. M. W. Nolan ; September 12, 1919.

Flying Offr. E. R. B. Playford is granted permanent commn. in rank stated ; August 25, 1920 (since promoted. *Gazette* August 27, 1920 appointing him to a short service commn., is cancelled ; E. J. Kingston-McCloughry, D.S.O., D.F.C., is granted short service commn. as Flying Offr., with effect from and with seniority of December 5. Capt. G. S. Reed, O.B.E., late I.A.R.O., is granted short service commn. for three years on active list as Flight-Lieut., with seniority August 19, 1920 ; October 1. Pilot Offr. A. D. H. Foster to be Flying Offr. ; October 28.

The following are transferred to the Reserve ; December 12 :—

Class A. Flying Offrs.—E. N. Fenton, J. T. Rogerson.

Class B. Observer Offrs.—H. Alexander, B. J. Malyan, D. H. Murray, A. L. Willcox.

Class C. Flying Offr.—L. J. Hoare.

Observer Offrs.—C. G. Boothroyd, D.F.C., G. R. Terry.

Flight-Lieut. R. J. O. Compston, D.S.C., D.F.C., is placed on half-pay, Scale B ; November 29. Flying Offr. V. R. S. White, M.C., is placed on retired list on account of ill-health contracted on active service ; December 13

Stores Branch

Flying Offr. T. F. Beere is placed on retired list on account of ill-health contracted on active service ; December 13.

Medical Branch

C. V. D. Rose is granted short service commn. as Flying Offr., with effect from and with seniority of November 27. E. F. N. Currey is granted temporary commn. as Flight-Lieut., with effect from and with seniority of November 29.

The following are granted permanent commissions as Quartermasters and Flight-Lieuts. :—W. P. Conolly ; October 13. H. Steele ; September 27.

Memoranda

The following are granted temporary commns. in ranks stated for duty under Directorate of Works and Buildings :—

Wing Comdr.—R. H. T. Jobson ; November 1.

Flying Offrs.—J. J. O'Connor, S. J. Stocks, W. F. Langdon ; April 1. L. H. Morgan-Browne ; November 1. J. M. Morris ; November 24.

Major R. Money, O.B.E., The King's Own Royal R., is granted the rank of Lieut.-Col., R.A.F., on retirement from the Army ; August 17. Lt. H. Chaplin is deprived of permission to retain his rank on conviction by the Civil Power ; August 19.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

Squadron Leaders : A. J. Miley, O.B.E., from Aircraft Depot, Egypt (Middle East), to R.A.F. Depot (Inland Area). (Supernumerary.) 22.11.22. H. G. Smart, D.F.C., from No. 6 Squadron (Iraq Command) to R.A.F. Depot (Inland Area). (Supernumerary.) 5.11.22. F. C. Williams, O.B.E., from Headquarters (Iraq Command) to R.A.F. Depot (Inland Area). (Supernumerary.) 5.11.22. E. A. B. Rice, M.C., from R.A.F. Depot (Inland Area) to command Air Pilotage School (Cadre) (Inland Area). 16.12.22. H. A. Mitchell, O.B.E., from No. 10 Group Headquarters (Coastal Area) to Headquarters, R.A.F. Middle East. 30.11.22. C. P. Ogden, O.B.E., from R.A.F. Depot (Inland Area) to Egyptian Group Headquarters (Middle East). 30.11.22. A. G. Higgins, from School of Technical Training (Men) (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). 13.12.22.

Flight Lieutenants : W. H. Dolphin, from No. 2 Flying Training School (Inland Area) to Aircraft Depot, Egypt (Middle East). 24.11.22. H. Steele, from Army (R.A.M.C.) to R.A.F. Depot (Inland Area), (Supernumerary), on appointment to Permanent Commission as Quartermaster and Flight Lieut. (Medical), on transfer from the Army. 27.9.22. H. Steele, from R.A.F. Depot (Inland Area), to No. 1 Stores Depot (Supernumerary), for duty as Quartermaster (Medical) at the Medical Stores Depot. 27.11.22. H. E. F. Wyncoll, O.B.E., M.C., from R.A.F. School (India) to Headquarters, R.A F., India (Supernumerary). 1.11.22. T. H. McDowell, from R.A.F. School (India) to Headquarters, R.A.F., India (Supernumerary). 1.11.22. W. G. L. Wambeek, from No. 5 Squadron (India) to No. 20 Squadron (India). 27.10.22. F. A. Norton, from No. 267 Squadron (Mediterranean) to H.M.S. "Ark Royal" (Mediterranean). 13.11.22. R. B. Munday, D.S.C., from Headquarters, Coastal Area to Seaplane Training School (Coastal Area). (Supernumerary.) 11.12.22. W. H. L. O'Neill, M.C., from No. 2 Flying Training School (Inland Area) to No. 100 Squadron (Inland Area). 11.12.22. C. E. W. Foster, from R.A.F. Depot (Inland Area) to R.A.F. Base, Leuchars (No. 205 Squadron) (Coastal Area). (Supernumerary). 15.12.22. A. G. Taylor, A.F.C., from No. 5 Flying Training School (Inland Area) to No. 1 Flying Training School (Inland Area). 16.12.22. A. Rowan, from School of Naval Co-operation and Aerial Navigation (Coastal Area) to Headquarters, Coastal Area. 29.11.22. M. J. Cahalane, M.B., from R.A.F. Base, Gosport (Coastal Area), to Aeroplane Experimental Establishment (Coastal Area). 1.12.22. E. F. N. Currey, to Research Laboratory and Medical Officers' School of Instruction (Coastal Area). On appointment to Temporary Commission in Medical Branch. For short course of instruction. 29.11.22. W. P. Connolly, from Army (R.A.M.C.) to R.A.F. Depot (Inland Area). (Supernumerary.) On appointment to Permanent Commission as Quartermaster and Flight Lieutenant (Medical) on transfer from the Army. 13.10.22. W. P. Connolly, from R.A.F. Depot (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). (Supernumerary.) For duty as Quartermaster (Medical) at Halton Hospital. 27.11.22. F. J. Powell, M.C., from No. 28 Squadron (India) to R.A.F. Depot (Inland Area). (Supernumerary.) 31.10.22. M. Thomas, D.F.C., A.F.C., from No. 30 Squadron (Iraq Command) to R.A.F. Depot (Inland Area). (Supernumerary.) 5.11.22. B. McEntegart, from No. 2 Flying Training School (Inland Area) to No. 4 Flying School (Middle East). 30.11.22. W. E. Hodgins, M.B., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to Headquarters, R.A.F., India. (Supernumerary.) 1.12.22. R. G. J. McCullagh, from Air Pilotage School (Cadre) (Inland Area) to R.A.F. Depot (Inland Area). 11.11.22. A. E. Jenkins, from R.A.F. Depot (Inland Area) to Air Pilotage School (Cadre) (Inland Area). 11.11.22.

Lieutenant T. C. C. Monckton, R.A., to Headquarters, Iraq Command. On appointment as G.S.O. 3. (Intelligence.) On attachment to Royal Air Force for two years. 1.10.22.

THE DUKE OF SUTHERLAND AND THE PILGRIMS

SPEAKING at a luncheon given by the Pilgrims to the American Commission for the Adjustment of Foreign Claims, the Duke of Sutherland, Under-Secretary of State for Air, in proposing the toast of the American guests, after paying a general tribute to what America did in 1917 to help the allied powers to victory in the greatest war that has ever ravaged the earth, referred more directly to their co-operation in the air.

"Had the result been a victorious Germany," the Duke said, "she would have shown us scant mercy. It was possible that under Democratic rule she had changed her heart with her coat, and might one day prove herself fitted to enter the Brotherhood of Nations.

"Be that as it may," the Duke continued, "that change of heart might never have come about had not America entered the field against her. It was in the air as well as on sea and land that America exerted her great sinews to help us. But in order to do this to the fullest advantage, it was necessary, in matters so technical as aerial warfare, that she should receive the full value of our experience and knowledge in regard to both aeroplanes and engines, and it was to this end that our Government arranged that all our information should be at her disposal.

"On the entry of America into the War—April, 1917—the first thing she did was to send to this country officers of her Air Force to consult with our Air Board regarding the co-ordination of the aerial policies of the two Governments. At the head of this came Major Bolling. Let us recall the name of this man who did such good work at the time and carried through this agreement, and who afterwards made the supreme sacrifice for the allied cause, and now fills a hero's grave in common with many others of your countrymen.

"Today we welcome Colonel McMullen and the Hon. Harry Knight amongst us, and we charge them to carry to the relatives of Major Bolling the fact that today his name has been recalled in all honour amongst us. We know they will discharge their duties in the spirit of justice and equity that has always ruled the Anglo-Saxon race.

"I venture also to express the hope that the various claimants will co-operate and will welcome as they should the opportunity afforded them by the presence of the American Commission of having their claims settled here in London."

War Honours

In the *London Gazette* of December 19th it was announced that the King has approved of the following rewards for distinguished service in Kurdistan :—

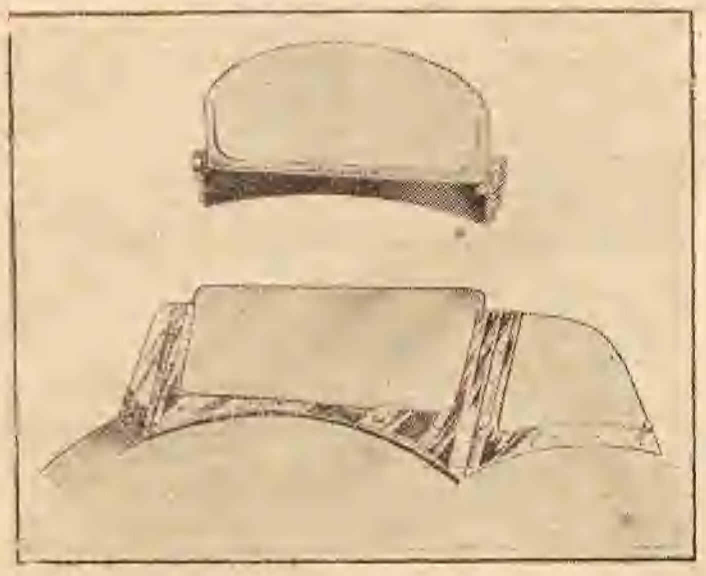
Bar to Distinguished Flying Cross.
Flight-Lieut. W. H. Park, M.C., D.F.C.
Flight-Lieut. F. O. Soden, D.F.C.
Distinguished Flying Cross.
Flying-Officer S. T. B. Cripps.
Flying-Officer G. D. Daly.

Junkers to Visit England

HERR JUNKERS, the famous German aeronautical engineer, whose daring designs and conceptions of all-metal aircraft are well known to readers, will give a lecture to the Royal Aeronautical Society (at the hall of the Royal Society of Arts) on Jan. 4. The subject will be "Metal Aeroplanes," Herr Junkers having specialised in this department, and having carried out exhaustive experiments which make him one of the greatest authorities on steel aeroplane construction in the world. His paper should be of great interest.

PROTECTING THE PILOT

In our last issue some reference was made to the work of Auster, Ltd., of 133, Long Acre, London, and Birmingham, in devising shields for protecting the pilot from wind and rain. Necessarily in the limited space at our disposal then it was impossible to do more than refer to a few of the types. It must not be thought, however, that some of the better known and most popular types have been discontinued, that being far from being the case. Two of the designs which come in that category are now illustrated. They are, first, the simple and neat screen which has proved so successful in service on Avro and Bristol machines, which is appropriately known as Model No. 1 S.C., while the other one is used on the D.H.18 and D.H.34 and a number of other aeroplanes; it has special hinged side wings, and is known as Model No. 52 S.C. Both of these shields have aluminium frames, and are fitted with unsplinterable Triplex glass.



Above, the Auster No. 1 screen for Avro machines; below, the screen No. 52, for D.H.18 and 34 and other machines.

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Annual Dinner of No. 6 Wing, R.N.A.S.

The fourth Annual Dinner of No. 6 Wing, R.N.A.S., Otranto, Italy, was held at the Connaught Rooms on December 9, when about thirty officers attended, the dinner being one of the most cheery so far organised. Wing-Comdr. Edmonds presided, and Admiral Mark-Kerr and Rear-Admiral Howard Kelly, under whose commands the Wing came, were present. After the presidential speech and "The King," Commander Beuttler, in his inimitable manner, proposed the health of "Absent Members," recalling, in a speech in which humour was blended with seriousness, the days spent in Italy. He was followed by Admiral Mark-Kerr, who delivered a striking speech on the need for development of our air services, and by Rear-Admiral Howard Kelly, who spoke of the necessity for co-operation between the Navy and the Air Force at the present time. Group-Comdr. Longmore and one or two other members also spoke, Major Morrison and Flying Officer Leslie causing much laughter by their anecdotes. The dinner ended earlier than in former years, in order that members might have more opportunity of talking over old times, and so was concluded another of the reunions, each of which seems more successful than its predecessor. It is hoped to hold the fifth of the Annual Dinners in December, 1923.

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PUBLICATIONS RECEIVED

The English Dreyfus Case. By David Ockham, 15, Parseval Road, Hampstead, London, N.W. Price 1*s.* By Post 1*s.* 3*d.*

Commercial Art, No. 2, November, 1922. London: Commercial Art, 37, Drury Lane, W.C. Price 1*s.* 6*d.*

Official Gazette of the United States Patent Office, November 21, 1922. Washington: Government Printing Office.

Les Helicopteres. By W. Margoulis. Paris: Gauthier-Villars et Cie., 55, Quai des Grands-Augustins. Price 10f.

Woodworking Machinery Regulations, 1922. *Statutory Rules and Orders,* 1922, *No.* 1196. H.M. Stationery Office, Kingsway, W.C. Price 2*d.*

Handbook on Universal Camera Mounting Air Publication No. 913. Price 1*s.* By post 1*s.* 1*d.* *Rigging Notes, Aero Biplane, Type* 504*K* (100 *h.p. Monosoupape*). Air Publication No. 916. Price 6*d.* By post 7*d.* London: H.M. Stationery Office, Kingsway, W.C. 2.

SIDE-WIND

L'Air, our brilliant French contemporary, is making a big effort to deal adequately with the Paris Aero Show. Several issues are being published dealing with all the exhibits, quite an unusual procedure in French journalism. These numbers can be had by readers who notify *L'Air* at their offices—5, Rue de l'Isly, Paris.

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IMPORTS AND EXPORTS, 1921-1922

Aeroplanes, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "Flight" for January 25, 1912; for 1912 and 1913, see "Flight" for January 17, 1914; for 1914, see "Flight" for January 15, 1915; for 1915, see "Flight" for January 13, 1916; for 1916, see "Flight" for January 11, 1917; for 1917, see "Flight" for January 24, 1918; for 1918, see "Flight" for January 16, 1919; for 1919, see "Flight" for January 22, 1920; for 1920, see "Flight" for January 13, 1921; and for 1921, see "Flight" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
Mar. ...	14	1,471	118,199	166,607	1,565	100
April...	1,370	3,846	138,983	139,995	450	5,880
May ...	3,350	2,416	59,624	167,999	1,818	4,254
June ...	5,181	816	79,713	129,137	—	14,530
July ...	540	1,039	530,628	24,405	860	—
August	343	198	111,595	88,910	—	685
Sept. ...	620	3,043	145,755	71,508	—	44
Oct. ...	4,256	633	101,567	40,225	580	90
Nov....	504	52	144,073	203,437	20	450
	23,016	15,233	1,577,094	1,177,904	7,597	27,156

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motor

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published December 14, 1922

13,901 S. A. Reed. Air propellers. (163,714.)

16,083. Vickers, Ltd., and J. Wearham. Velocity or direction indicators. (188,696.)

19,002. J. H. W. Gill. Screw propellers. (188,717.)

28,703. A. H. F. Fedden, L. F. G. Butler and Bristol Aeroplane Co., Ltd. Starting devices for I.C. engines. (188,923.)

30,470. W. T. Reid and Bristol Aeroplane Co., Ltd. Emergency discharge valves. (188,949.)

30,581. G. Brewer (Krupp Akt.-Ges.). Projector lamps. (188,952.)

APPLIED FOR IN 1922

Published December 7, 1922

16,081 and 16,268. Skywing Aircraft Corporation. Ignition. (181,374 and 181,387.)

28,389. A. L. Davis. Aircraft lamps. (188,625.)

Published December 14, 1922

7,738. V. Spetescu and Magnet Motoren Akt.-Ges. Air-cooled cylinders. (177,510.)

Published December 21, 1922

15,767. Skywing Aircraft Corporation. Electric ignition devices for I.C. engines. (181,358.)

Owing to the Christmas Holidays FLIGHT will be published on Friday next week instead of Thursday.

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

(*Continued from p. xxiv.*)

FABRICS AND YARNS—
Victoria Rubber Co., Ltd., Edinburgh.

FLYING SCHOOL—
Fraser's Flying School, Kingsbury, N.W. 9.

GLIDERS—
Peyret, L., Ingenieur, 23, Rue Lambrecht, Courbevoie sur Seine, France.

GLUES—
Lang Propeller Ltd., Weybridge, Surrey. Weybridge 520-521; "Aerosticks, Weybridge.

INGOT, ALUMINIUM—
British Aluminium Co., Ltd., The 109, Queen Victoria St., London. City 2676; "Cryolite." Cent. London.

INSTRUMENTS (Speed), Watches, &c.—
Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.
Goldsmiths & Silversmiths Co., 112, Regent Street, W. 1. Gerrard 9091 (3 lines).
Smith, S., & Sons (M.A.), Ltd., Cricklewood Works, N.W. 2. Willesden 2335 (7 lines).

INSULATING MATERIALS—
MacLennan, John, & Co., 115, Newgate St., E.C. 1. City 3115; "Vanduara," Cent, London.

LUBRICATING OILS—
Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2. Central 1156 (3 lines); "Cherry," Cent, London.

MACHINING—
Monk Engineering Co., Ltd., Coventry. Coventry 807; "Assistance," Coventry.

MAGNETOS—
British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry. Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—
Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 2323.

METAL PARTS AND FITTINGS—
Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

METAL PARTS AND FITTINGS (Continued)—
Monk Engineering Co., High Street, Coventry. Coventry 807; "Assistance," Coventry.
Rubery, Owen & Co., Darlaston. Darlaston 87; "Roofs," Darlaston.

MODELS—
Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.
D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—
E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.
Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5. Dalston 1893.

PETROL—
Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.
British Petroleum Co., Ltd., 22, Fenchurch Street, E.C. 3

PETROL GAUGE—
W. Ryan Hart, McCreath Taylor & Co., 34, Victoria Street, S.W. 1.

PROPELLERS—
Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds. Roundhay 601 (5 lines); "Propellers," Leeds.
Falcon Airscrew Co., 173, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.
Lang Propeller, Ltd., Weybridge, Surrey. 520-521, Weybridge; "Aerosticks," Weybridge.

PUTTEES—
Fox Bros. & Co., Ltd. (Dept. R), Wellington, Somerset.

RADIATORS AND RADIATOR REPAIRS—
Serck Radiators, Ltd., Warwick Road, Greet, Birmingham. Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—
Rubery, Owen & Co., Darlaston. Darlaston 87; "Roofs," Darlaston.

SKY WRITING—
Savage, Major J. C., 7-8, Norfolk Street, Strand, London, W.C. 2. Central 8971-72; "Skyerta, Estrand, London."

SPARKING PLUGS—
Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15. Putney 2132, 2133. "Kaalgee," Phone, London.

SPRAYING PLANT—
Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1. Holborn 2041; "Aerography," London.

STABILIZERS—
Auto Controls, Ltd., 10, Heddon Street, Regent Street, London, S.W. 1.

TAPES AND WEBBING—
MacLennan, John, & Co., 115, Newgate St., E.C. 1. City 3115; "Vanduara," Cent. London.

TIMBER—
Owen, Joseph, & Son, Boro' High Street, S.E. Hop 3811; "Bucheron," London.

TUBES, ALUMINIUM—
British Aluminium Co., Ltd., The, 109, Queen Victoria St., London. City 2676; "Cryolite," Cent. London.

TYRES AND WHEELS—
Palmer Tyre, Ltd., Shaftesbury Avenue, W.C. 2. Gerrard 1214; "Tyricord," Westcent, London.

WELDINGS, REPAIRS—
Barimar, Ltd., 10, Poland Street, London, W. 1. Gerrard 8173; "Bariquamar," Reg, London.

WIND SHIELDS—
Auster, Ltd., 133, Long Acre, W.C. 2.

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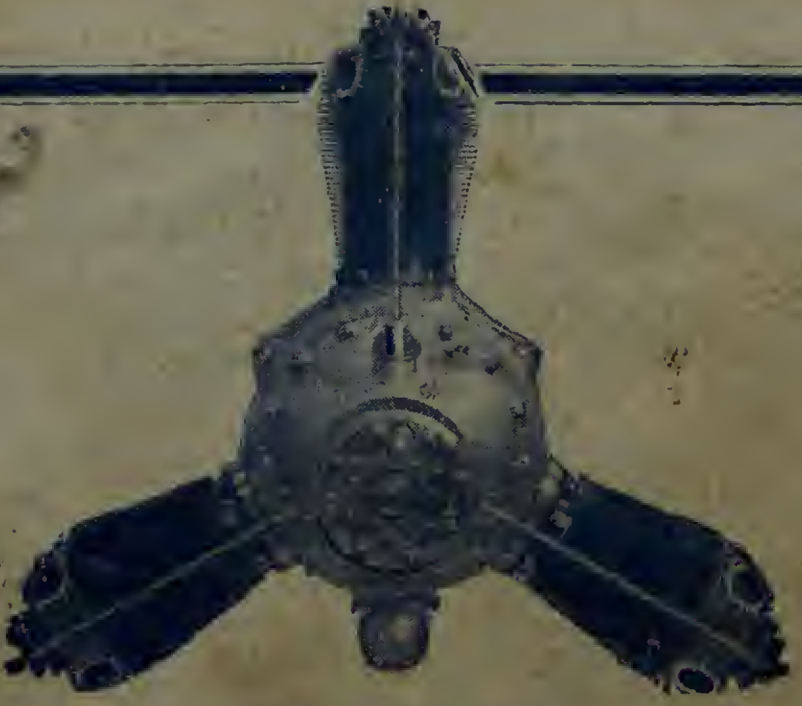

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- Coupé Gordon-Bennett, 1920.
- Italian Grand Cup, 1921—1922.
- Pulitzer Trophy (United States), 1921.
- British Speed Record, 1922.
- Aerial Derby, 1922.
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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Dec. 15– Jan. 2	**Paris Aero Exhibition.**
1923.	
Jan. 3	**F.A.I. Paris Conference.**
Jan. 12	**Lecture, "Seaplane for Commercial Duties," by Maj. D. C. M. Hume, before I.Ae.E.**
Jan. 26	**Lecture, "Wind Tunnel Work at the N.P.L.," by W. L. Cowley, before I.Ae.E.**
Feb. 6–7....	**Third Air Conference at the Guildhall.**
Feb. 9	**Lecture, "Seaplane Design," by W. O. Manning, before I.Ae.E.**
Feb. 23	**Lecture, "Aerofoils," by Dr. A. P. Thurston, before I.Ae.E.**
Mar. 15	**Entries close for Dutch Height Indicator Competition.**
Apl. 12	**Lecture, "Some Controversial Points in Aircraft Design, by F. T. Hill, before I.Ae.E.**
May 11	**Lecture, "Experimental Flying," by Maj. M. E. A. Wright, before I.Ae.E.**
June	**International Air Congress, London.**
Dec. 1	**Entries close for French Aero Engine Competition.**
1924.	
Mar. 1	**French Aero Engine Competition.**

EDITORIAL COMMENT.

Another Year of Aviation

TAKING it all around, the year which is just closing has been a somewhat uneventful one so far as aviation, and especially British aviation, is concerned; 1922 has seen no epoch-making flights such as the London-Australia or Transatlantic flights of previous years, while in ordinary sporting aviation it is to be feared that this country is lagging sadly behind. On the other hand, the period of depression which Britain, in common with all others, has been passing through, certainly appears to be drawing towards a close. Personally we are of opinion that the bottom of the curve has been reached, and that from now onwards there will be a rise, slow at first, but gradually increasing as time goes on. Thus, although there is much in the past year which one must view with regret, there is also a good deal for which to be thankful, and it is quite possible that in years to come 1922 will stand revealed as having been far more full of results than is possible to appreciate at the moment. It is usually the case that not until distance in time has lent perspective can we see things in their true proportions, and we are still too close, even to the beginning of 1922, to have that perspective.

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The R.A.F. in 1922.

As far as the Royal Air Force is concerned, 1922 has certainly not been the dull year of which civilian aviation can complain. We do not propose here to attempt to give even a brief review of what has happened in and to the R.A.F. during the past year. To do so at all adequately would require several issues of FLIGHT. But a few isolated milestones which stand out on the road of progress may be recalled in order to form, as it were, certain fixed points on which future events in the R.A.F. may well be found to pivot.

Thus the believers in and supporters of a strong Air Force may well claim with satisfaction that 1922 was of importance in that it was the year in which the R.A.F. received its *Magna Charta*. It will be recalled that at the Air Conference Capt. Guest reminded some of his critics that the Air Ministry had been engaged in a fight for its very existence.

We all remember the anxiety caused by the attempts of certain reactionary sections of the Navy and the Army, particularly the former, which were working quietly but none the less energetically for a return to the old evil system of separate air services, which in the past led to so much overlapping, duplication and waste. Ultimately came the official announcement that there was no intention on the part of the Government to allow such a retrograde step to be made. Not only so, but it was generally admitted that the R.A.F. is rapidly becoming our first line of defence. Once this realisation becomes general, half the battle is won, and the rest, although of tremendous importance, is but detail in natural evolution. We believe that, although even now there are those who still hope to effect a change in the fundamental organisation of the air service, the new Government will not allow such a step to be taken, and we look forward hopefully to what the coming year will bring.

A second milestone in the life of the R.A.F. has been the taking over of the command of Iraq. For the first time in history an air service has been placed in supreme control of a territory. It is yet too early to be able to form a definite opinion of the success or otherwise of this experiment, but, knowing the R.A.F. and the officers in charge of this responsible task, we have little fear as to the outcome.

A third milestone, and one which will play an extremely important part in the formation of a school of thought in the R.A.F. in the foundation of a policy, and in the building up of the new First Line of Defence, was the establishing at Andover of the R.A.F. Staff College, under the Command of Air-Commodore Brooke-Popham. Quite recently we were privileged to pay a visit to the College, and chronicled its results. It is, therefore, not necessary to go into details here, beyond recalling with satisfaction that the College was opened formally on April 4, 1922, and that already the work is in full swing, and promising well for the R.A.F.

Before leaving the subject of the Royal Air Force, there is one thing of which we should like to remind the present Government, and that is the fact that, if the R.A.F. is to do its Imperial work efficiently and well, it is essential that new types of machines should be forthcoming in reasonably large numbers. During the past year the R.A.F. has had to work mainly with old types, re-conditioned so as to be serviceable in a measure, but being at the best a makeshift which, with the rapid progress being made all over the world, cannot be regarded as adequate for the coming year. It is fatal, in the interests of National safety, to rest satisfied with this policy; nor will it be found to be true economy. It must, therefore, be insisted upon that the placing of orders on a much larger scale during 1923 than was the case in 1922 should be a vital and prime necessity. It is for our new Air Minister, Sir Samuel Hoare, to see that the requirements of the Air Force are not side-tracked.

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Commercial Aviation. It must be admitted that so far as civil aviation is concerned, 1922 was not at all a successful year. During the first part of the year three subsidised British services were operated on the London-Paris route, with the result that there was competition and overlapping of ground organisation. Some time ago this arrangement was altered, thanks to the foresight of General Sir Sefton Brancker, Director of Civil Aviation, and now the three firms subsidised by the Government are operating on three different routes.

It is to be hoped that in the coming year the two new air routes—to Brussels and Cologne in the one case and Manchester-London-Amsterdam in the other—will be considerably extended so as to link up with places farther afield. In spite of the unfavourable report of the C.A.A.B. on Imperial air services, we trust that a step forward will be found possible during 1923, either by the extension across Europe of some of the existing services, or by the adoption of the airship schemes.

The opening in the coming spring of a seaplane service between Southampton and towns in the north of France will mark another step in the right direction.

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Sporting Aviation As already mentioned at the beginning of these notes, the past year has not been a very encouraging one in the matter of sporting aviation. The few flying meetings and competitions held in this country have not been of a nature to draw the eyes of the world towards British aviation. Most of the meetings have been in the main "family affairs" into which the world at large did not enter. In the matter of world's records we have done rather badly; not a single one, with the glorious exception of the Supermarine seaplane record during the Schneider race, standing to the credit of a British machine or a British pilot. It is true that James has come within an ace of beating the speed record of Sadi Lecointe, but now the latter has been eclipsed by the Americans. James on the "Bamel" has a still more difficult task to attain to this great world honour.

Again, in the matter of altitude, distance and duration records, we appear to be nowhere, all these having gone to French and American pilots. This may sound somewhat like a reproach to British enterprise. As a matter of fact, it is, of course, nothing of the sort. The establishment of records, and the taking part in International Competitions, is expensive, and the main reason why we have made such a bad showing is because our constructors have lacked the necessary Government encouragement. Given the latter, and it is a foregone conclusion that our designers and constructors will once again justify such encouragement. Let us see to it, therefore, that 1923 has a different story to tell.

The Schneider race furnished one exception, and showed that when the money is forthcoming—in this case by the very sporting efforts of the Supermarine Aviation Works and the Napier Company—British machines can hold their own against the world.

In the matter of the new sport of gliding we have made a wonderful start, and there is every indication that this sport will become popular.

In conclusion, we thank all our readers for their support during the past year, and wish them

A BRIGHT AND PROSPEROUS NEW YEAR.

FLIGHT

AT THE PARIS AERO SALON.

FLIGHT Stand is at the Exhibit of M. Branger, where FLIGHT can be obtained, and where all communications, Editorial or Advertisement, can be addressed.

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·THE·PARIS·AERO·SHOW·1922

By THE TECHNICAL EDITOR

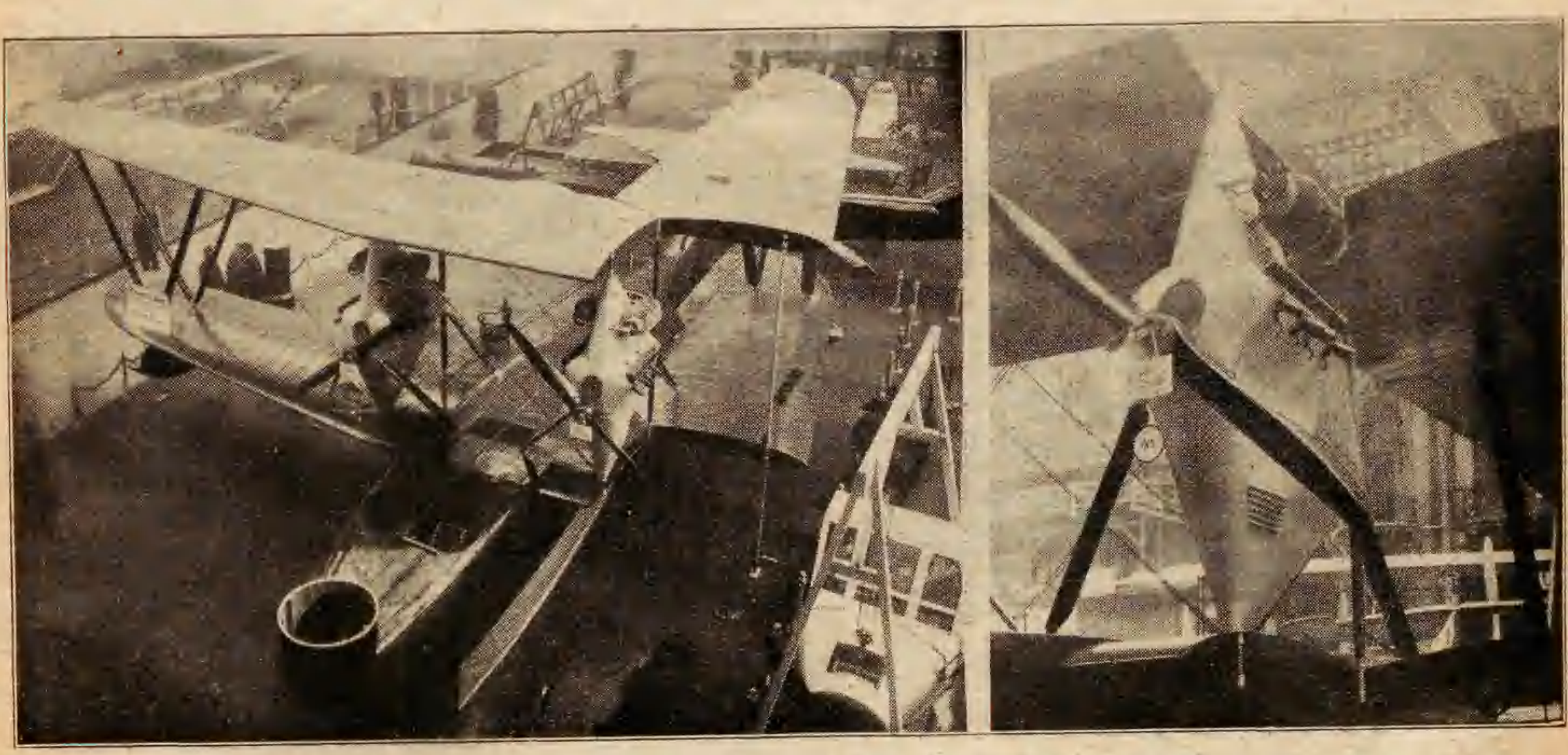
IN our issue of last week we were able to publish a brief account of the machines shown at the Paris Aero Show, illustrated by silhouettes of all the machines, and photographs of some of the more interesting. In the present issue we commence a more detailed reference to the exhibits, dealing with them in alphabetical order. Generally speaking, the Show this year is considerably more interesting than have been previous ones, and, although some of the constructional methods employed may not appeal to us particularly, we think they deserve to be placed on record, especially bearing in mind that conditions in France are very different from those obtaining at home, the objects and methods of French aviation being essentially different from ours. Thus, although we may find nothing much in the French machines suitable for adoption on adaption, we shall at any rate realise in some measure what France is doing, and that in itself is always worth while. As mentioned last week, the features of this year's Show are all-metal (Duralumin) construction, high-lift wings, supercharged engines, and absence of freaks. It is fairly safe to assume that there is not a single machine at the Show which will not fly, while several of them have already been flown. That some of the machines show but little promise may be admitted, but the great majority, if not clever, are at any rate sound, common-sense productions. A few instances of really inspired design are to be found, and the general level is, we think, much higher than has been the case at previous Paris Aero Shows.—ED.

SOCIÉTÉ ANONYME BELLANGER FRÈRES—NEUILLY-SUR-SEINE

ALREADY well known in the automobile world, it is only recently that Bellanger Frères have taken up aircraft construction. At the Paris Aero Show one complete machine is shown, a twin-engined flying boat for use with the French navy. In addition, a "commercial" hull is shown, intended to fit into the same set of wings.

The complete machine, designed by Denhaut, possesses several distinctive features, not only in hull design, but also in the aeroplane details. The boat hull is of the flat-sided variety, with Vee bottom and flat deck. The planking is three-ply wood, and the hull is chiefly remarkable for the fact that there is no step, as we have come to understand the term. In place of the step there is merely a sharp change in the direction of the lower stringers. Behind this "break" there appears to be a short length of hull bottom in which the chine line is slightly concave, although the Vee bottom is retained, extending up to the stern post. It is claimed that this form of hull has been found to get off with a smaller expenditure of power than a similar hull with steps, and that alighting is made with a minimum of shock. It might be pointed out that the break in the lines, corresponding to a step, occurs very far aft, approximately under the rear spar, and therefore, presumably, well aft of the centre of gravity of the machine.

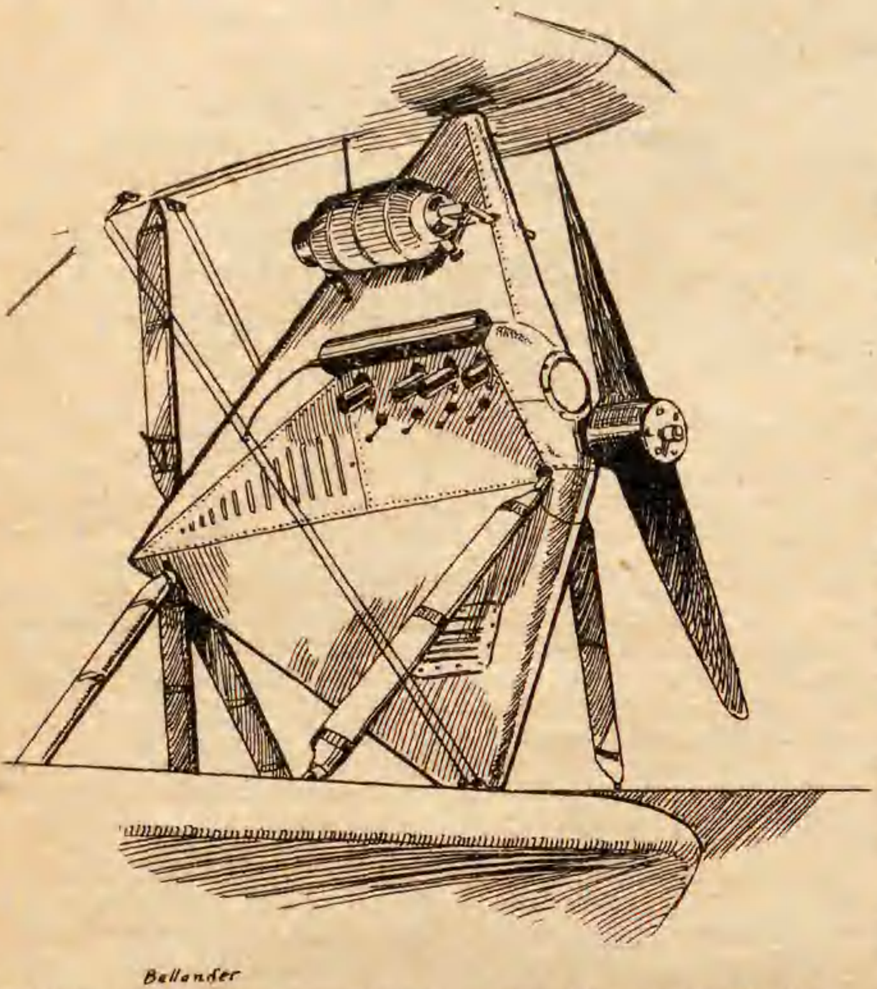
In the extreme nose of the hull is a cockpit for a gunner, the coaming being shaped to take a circular gun-mounting. The cockpit for pilot and engineer is placed approximately half-way between the nose and the leading edge of the lower



THE BELLANGER FLYING BOAT: On the left a view of the machine from the gallery. Note front gunner's cockpit and folded wing. On the right a front view of the port engine.

plane. A considerable distance aft of the wings is another gunner's cockpit.

The wings are of fairly deep camber, and are of unusual plan form in that the trailing edge is straight while the leading edge shows a gentle curve terminating in fairly pointed tips. Both top and bottom planes are fitted with ailerons, these being of high aspect ratio and provided with horn balance. The wing bracing is somewhat unusual, there being a wire-braced centre section between the two engine mountings, followed on each side by a wire-braced bay, and finally, towards the tips, a set of Vee struts.



Sketch showing unusual engine cowling on Bellanger flying boat.

Of very peculiar design are the engine supports and cowls. The engine bearers appear to be carried from the front spars only, or at any rate mainly, and to be connected to top and bottom front spars by the apices of steel tube pyramids. Running back horizontally from the engine to the rear strut is a tail piece, similarly shaped, which serves to streamline the engine housing. The entire engine mounting is cowled in, the only portions projecting being the cam covers, exhaust pipes and sparking plugs. Two Lamblin radiators are mounted on the sides of each engine, and are fitted with the new type fan-shape shutters, operated by a small differential gear.

The main petrol tanks are carried in the hull and in the curved wing roots of the lower plane. A gravity service tank is built into the top centre section.

The tail surfaces are of usual type, with the exception of the fin, which is of quite unusual thickness, being the full width of the hull and formed integral with it.

The commercial hull shown is similar in outward shape except that there are no gunners' cockpits, a cabin seating six passengers being provided instead. As the power of the Hispano engines is 300 h.p. each, the machine uses 100 h.p. for each passenger, which is scarcely a commercial proposition.

Following are the main characteristics of the Bellanger flying boat: Length of hull, 14 ms. (45 ft. 10 ins.); span, 20 ms. (65 ft. 7 ins.); wing area, 70 sq. m. (750 sq. ft.); weight empty, 2,000 kgs. (4,400 lbs.); total loaded weight, 3,500 kgs. (7,700 lbs.); speed, 180 kms./hr. (112 m.p.h.); range with six passengers and a crew of three, 1,000 kms. (620 miles); endurance, 6 hrs.

BOREL S.C.I.M.—PUTEAUX (SEINE)

The machine exhibited by Borel is an all-metal two-seater fighter and reconnaissance biplane with 300 h.p. Hispano engine fitted with one of the Rateau superchargers. The machine is built of metal throughout, Duralumin for spars, longerons, etc., and steel fittings. The fuselage is of tubular construction, Duralumin tubes being used for the longerons and struts, while the fittings are of sheet steel, wrapped around the longerons and secured by tubular rivets passing right through longeron and fitting. It is of interest to note that the diameter of the tubular longerons decreases from nose to stern. The method of reduction is to fit into the steel sockets an aluminium bush, into which the smaller tube fits. Thus at one end of the steel fitting the Duralumin tube just fits, while at the other the bush makes up the difference in diameter between the two tubes. The bracing is piano wire with strainers in the rear portion, while in front the struts more or less triangulate the structure.

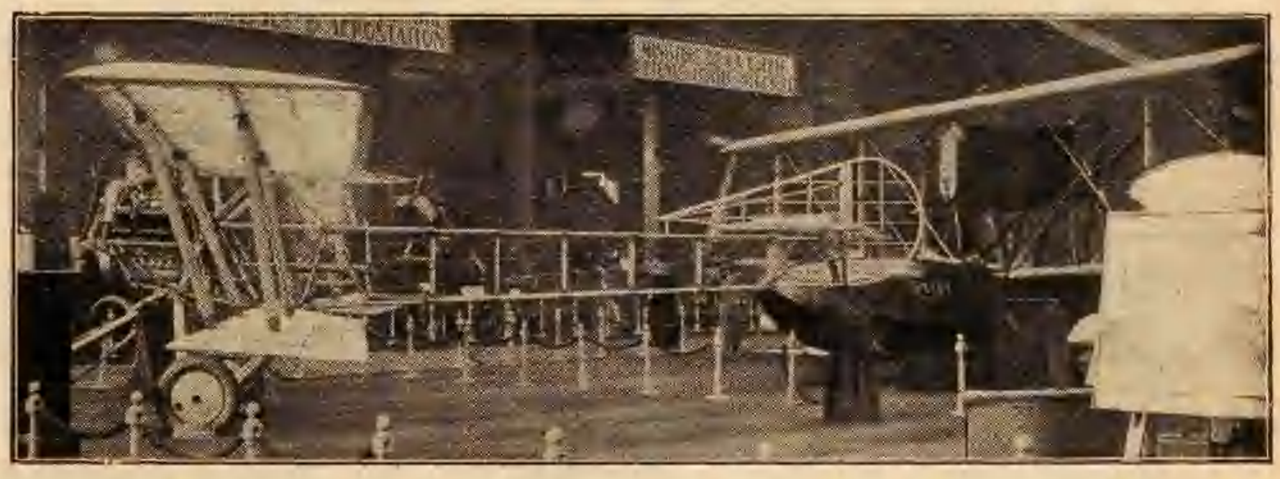
The wings are also built entirely of metal, Duralumin for spars and ribs, and steel for the bracing—wire fittings, etc. While the lower spars are in the form of rectangular-section Duralumin tubes, those of the top plane appear to be built up of Duralumin sheet to form a box section, reinforced internally by channel-section strips riveted to the flanges. The sides of both upper and lower spars have circular lightening holes, those of the upper spars being slightly flanged over, while those of the lower spars are quite plain.

The ribs have channel-section flanges, joined by channel-section stiffeners formed from Duralumin sheet. Leading and trailing edges are formed of sheet Duralumin in the shape of horizontal Vee sections. The top plane, which is of greater chord than the bottom, has an extra channel-section stringer behind the rear spar and trailing edges, as the spars are placed far forward in the wing section. The main spars are placed at a considerable angle to the chord line, presumably on account of the pronounced stagger. The wing fittings are of steel, and are in the form of stirrups going around the spars.

The Rateau supercharger on Borel all-metal biplane.

Wing roots permanently secured to the fuselage pass underneath the main fuselage structure, and a top centre-section is carried on struts. The attachment of end pieces to roots and centre-section is by horizontal unions parallel to, and on the centre line of, the spars.

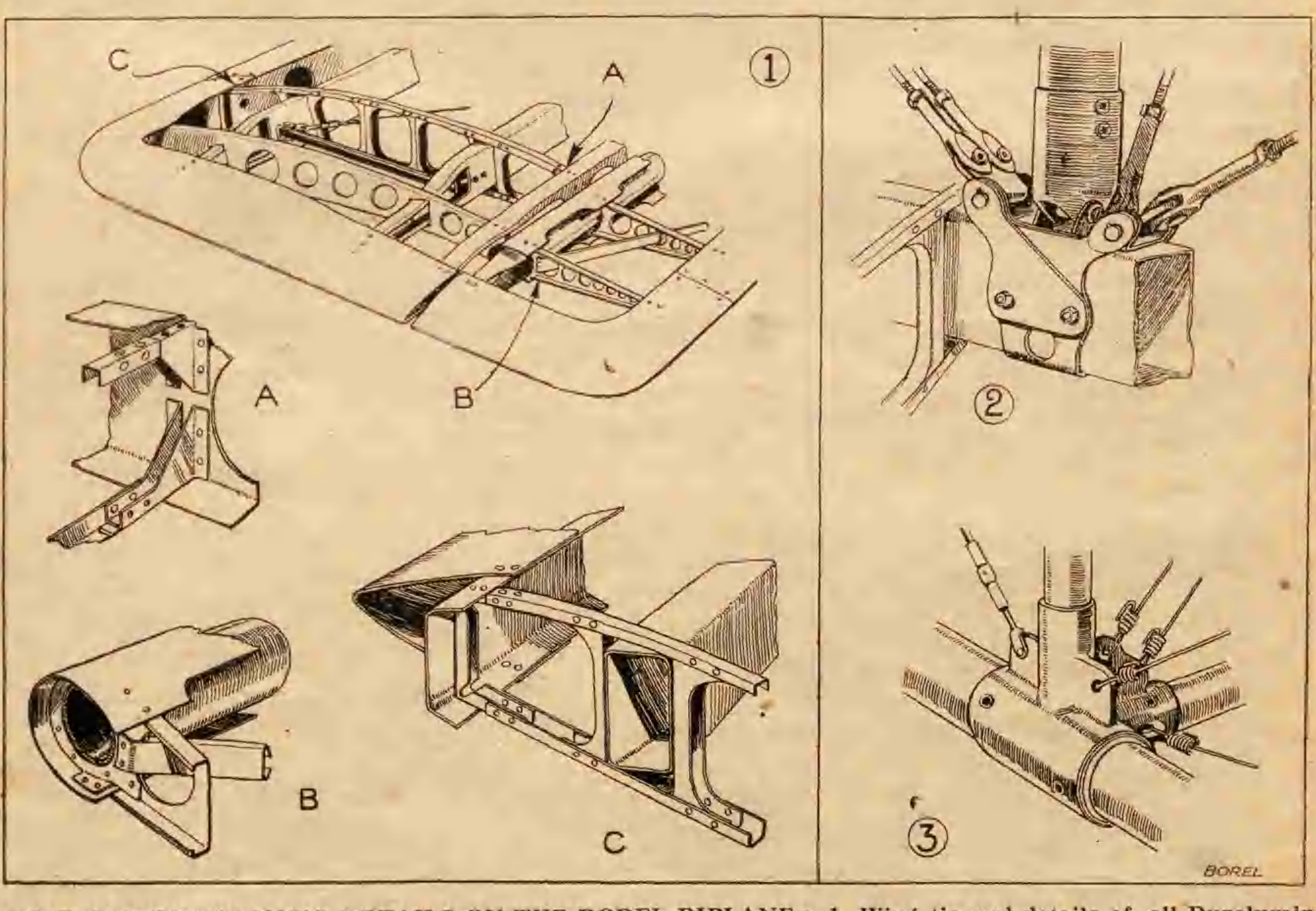
As already mentioned, the Hispano engine is fitted with a Rateau supercharger, while on the rear end of the engine, immediately in front of the pilot, is an Odier engine starter. We believe the machine, fuselage as well as wings, is to be covered with fabric. It is shown in skeleton.



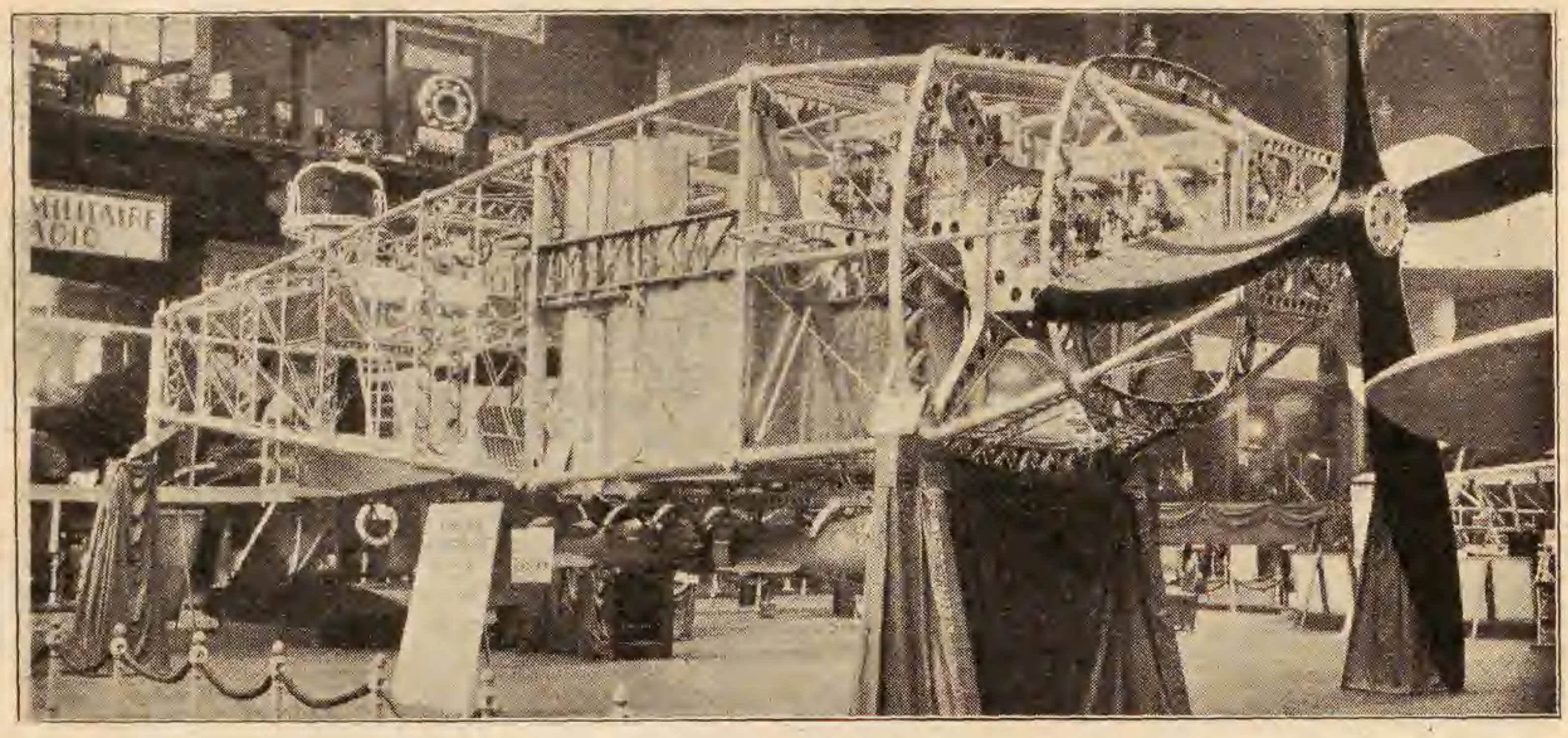
The Borel S.C.I.M. all-metal biplane.

The main characteristics of the Borel Cap. 2, 1922, are as follows; Length o.a., 8 ms. 17 (26 ft. 10 ins.); span, 13 ms. (42 ft. 7 ins.); chord, upper 1 m. 90 (6 ft. 3 ins.), lower 1 m. 25 (4 ft. 2 ins.); wing area, 39 sq. ms. (420 sq. ft.); weight empty, 1,000 kgs. (2,200 lbs.); fuel, 325 kgs. (715 lbs.); useful load, 400 kgs. (880 lbs.); total loaded weight, 1,750 kgs. (3,850 lbs.). Fitted with supercharger the speed at ground level is estimated at 200 kms. (124 miles) per hour. The maximum speed is reached at 5,000 m., where it is 248 kms. (154 miles) per hour, and from then onwards the speed falls off, until at a ceiling of 10,000 m. (33,000 ft.) it is about 175 kms. (108 miles) per hour.

In addition to the complete machine Borel shows a scale model of a huge three-engined passenger machine—a cantilever monoplane, and of an all-metal two-seater night-fighter (C.A.N. 2), also with Hispano engine. The commercial machine (monoplane) is to be fitted with three Lorraine engines of 375 h.p. each, and is designed to carry 30 passengers inside the centre-section of the very thick monoplane wing. It will have a total weight of 22,000 lbs. and a radius of action of 620 miles with full load. The span is 36 ms. (118 ft.) and the total wing area 240 sq. ms. (2,582 sq. ft.). According to wind tunnel tests at St. Cyr, the machine should have a speed near the ground of 202 kms. (125 miles) per hour. With the central engine stopped the estimated speed is 174 kms. (108 miles) per hour. Thus if the full-size machine comes up to the model figures, the power expenditure is only 37·5 h.p. per paying passenger. Asked whether the machine would fly with one of the wing engines stopped, the gentleman in charge appeared to think this doubtful.



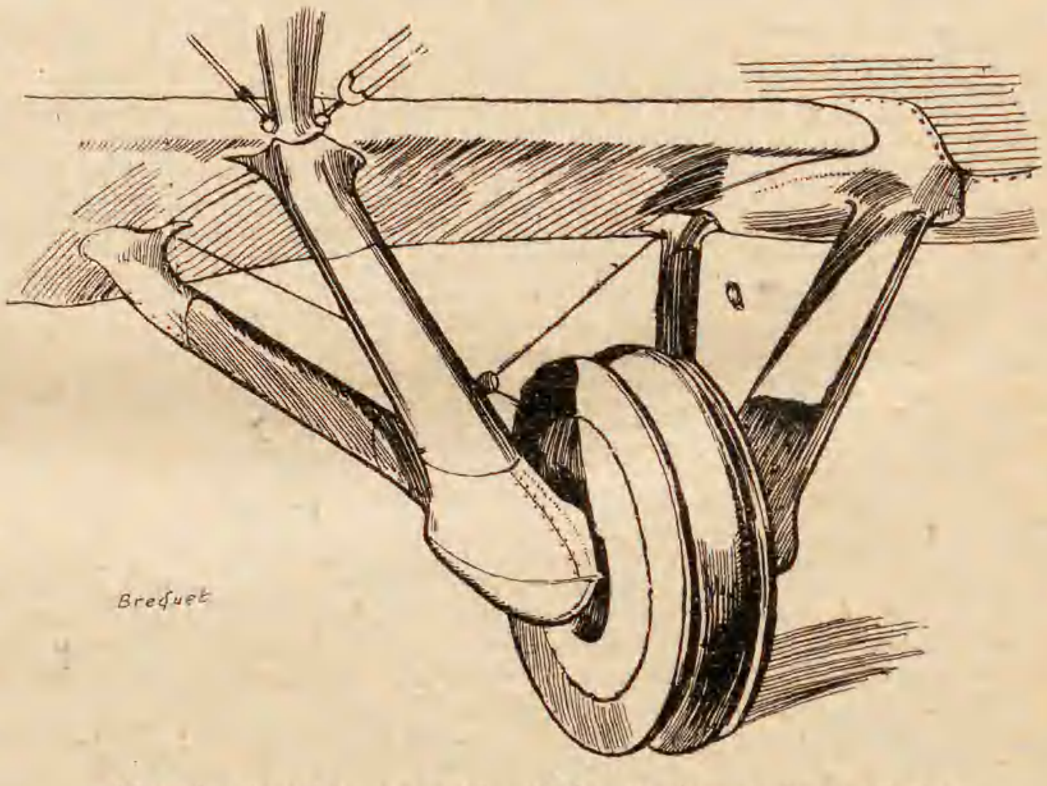
SOME CONSTRUCTIONAL DETAILS ON THE BOREL BIPLANE: 1. Wing tip and details of all-Duralumin construction; the spars are Duralumin tubes of rectangular section, while the ribs are built up of channel sections. 2. Stirrup attachment of wing-bracing wires, and interplane strut socket. 3. A typical fuselage fitting; the Duralumin tube longerons are stepped down in diameter, a bush being inserted in the parallel socket for the smaller tube.



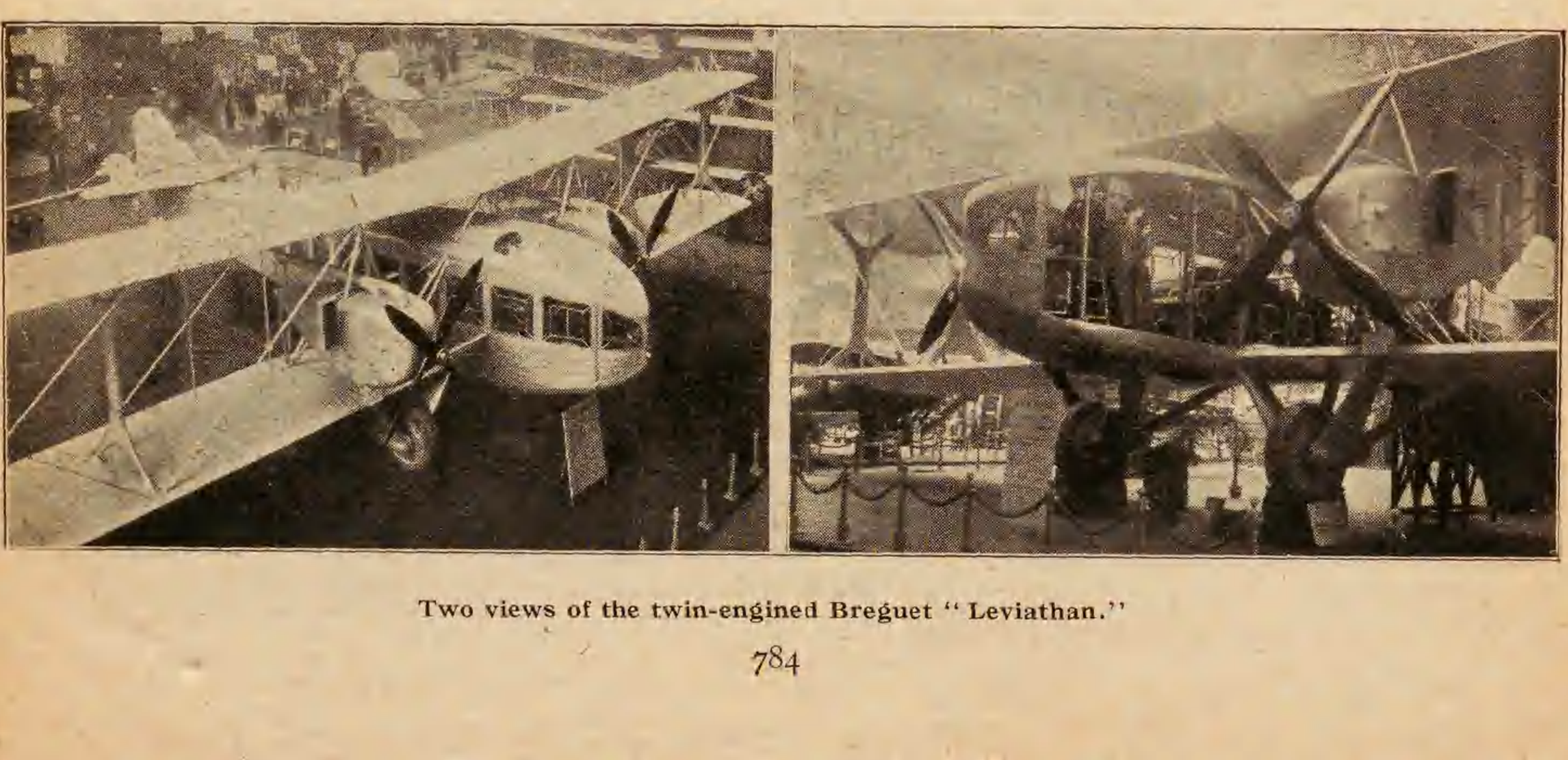
Fuselage of single-engined Breguet "Leviathan."

LOUIS BREGUET—PARIS

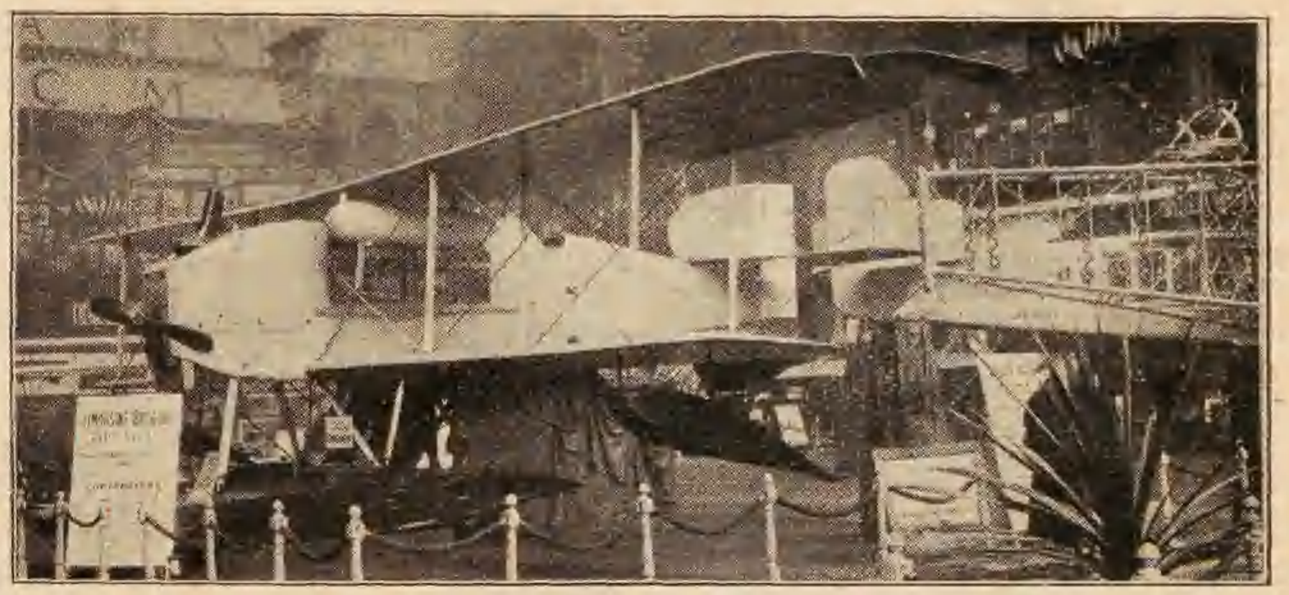
As a wonderful effort in metal construction on a large scale the Breguet "Leviathan" type XXII, wih two Breguett-Bugatti double engines, compels attention by its excellent workmanship and by the very ingenious detail design. When, however, one comes to take into consideration the cost of production and the revenue-earning capacity of the machine as a commercial aeroplane, one cannot help feeling that better value for money could have been obtained with a simpler and cheaper construction in wood. The Duralumin used must have cost a very considerable sum merely as metal. By the time it has been turned into trellis-work frames, channel-section strip covering, etc., and the innumerable small parts riveted together by literally countless rivets, the cost must be tremendous. Before such a machine could be a commercial proposition it would have to be extremely economical to run. Yet according to the estimates of the makers, the useful load—*i.e.*, the lift available for passengers and freight—is 2,200 kgs. (4,840 lbs.), or, on a basis of 480 h.p. each for the engines, the useful load is about 5 lbs./h.p. This figure is reached, or even exceeded, by several British machines which have cost but a small fraction of the price of the "Leviathan."



Sketch showing one side of the undercarriage of the twin-engined Breguet "Leviathan."



Two views of the twin-engined Breguet "Leviathan."



The single-float Breguet seaplane.

That the Duralumin construction does give a considerable saving in structure weight seems evident from the fact that the structure weight of the "Leviathan" type XXII is only 50 per cent. of the total loaded weight, the actual figures being 3,150 kgs. (6,930 lbs.) and 6,400 kgs. (14,080 lbs.) respectively. This is certainly good for a machine of this type, but still it does not appear to offer reasonable repayment for the high first cost.

The Breguet type XXII is a twin-engined tractor biplane, with the double Breguet-Bugatti engines placed on struts between the wings. The fuselage is of a form of construction similar to that of the single-engined "Leviathan," *i.e.*, with tubular Duralumin longerons and built-up lattice-work frames. The bracing is unusual in that the cables are looped over pulleys so that actual duplication of the cables can scarcely have been effected. A most luxurious cabin is provided, with tables in front of all the seats, and as exhibited at the Show the machine has the covering of the cabin removed from the port side, wax figures being symbolical of future passengers. As a piece of showmanship the tableau is very effective. The front portion of the fuselage is covered with very thin Duralumin in the form of narrow channel sections about 1 in. wide, running in a fore-and-aft direction. On the inside these channels are joined together by narrow U-section strips passed over the sides of adjoining channels, the whole riveted together. It appears probable that during flight this form of covering acts like a drum, as it was noticed that if a finger was pressed on the covering a crackling sound resulted.

The wing bracing of the Breguet "Leviathan" type XXII is somewhat unusual. Of main interplane struts there are but two on each side, and these are of the single type with forked ends, first introduced on the Breguet "Sesquiplan" last year. In between these main struts are auxiliary struts, hinged in the centre, through which the bracing cables pass, much after the fashion of the early-type Spads. The landing cables are arranged in a manner similar to the fuselage bracing cables, *i.e.*, they are apparently double, but pass over pulleys at the strut fittings. The main lift wires are in triplicate, a stout cable in the centre, with two smaller cables in front of and behind the larger cable. The end attachments are shown in one of our sketches.

The undercarriage consists of two double and converging Vees on each side, carrying a single, large-diameter Palmer cord tyre. We were not able to ascertain whether or not any springing is provided other than that furnished by the tyre. There is no external evidence of any shock absorbers.

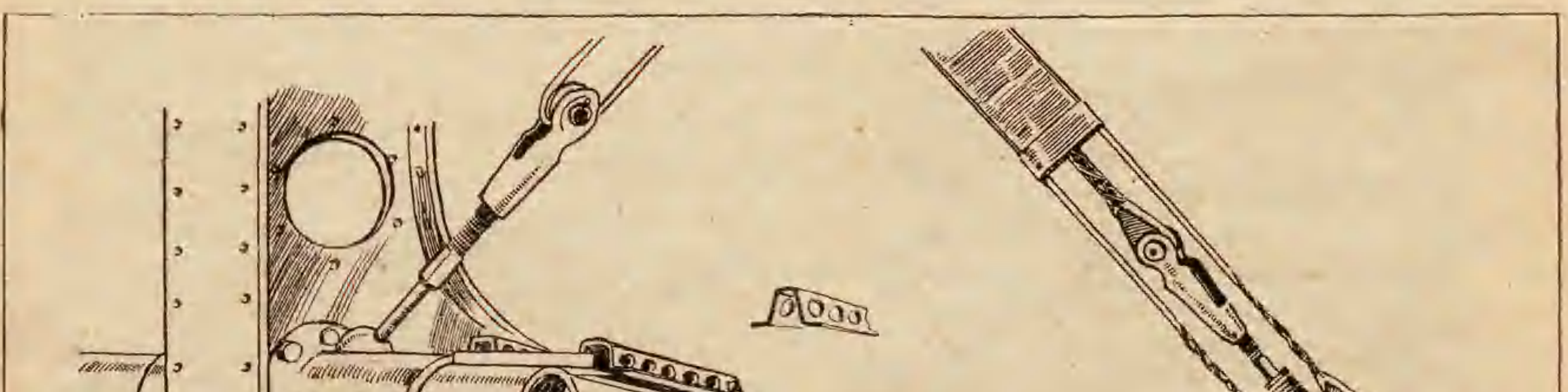
A fuselage of the single-engined "Leviathan" is also shown, the construction of which is exactly similar to that of the twin-engined machine. The 14T single-float seaplane has already been illustrated in Flight, and does not call for any comment.

CHANTIERS AERO-MARITIMES DE LA SEINE

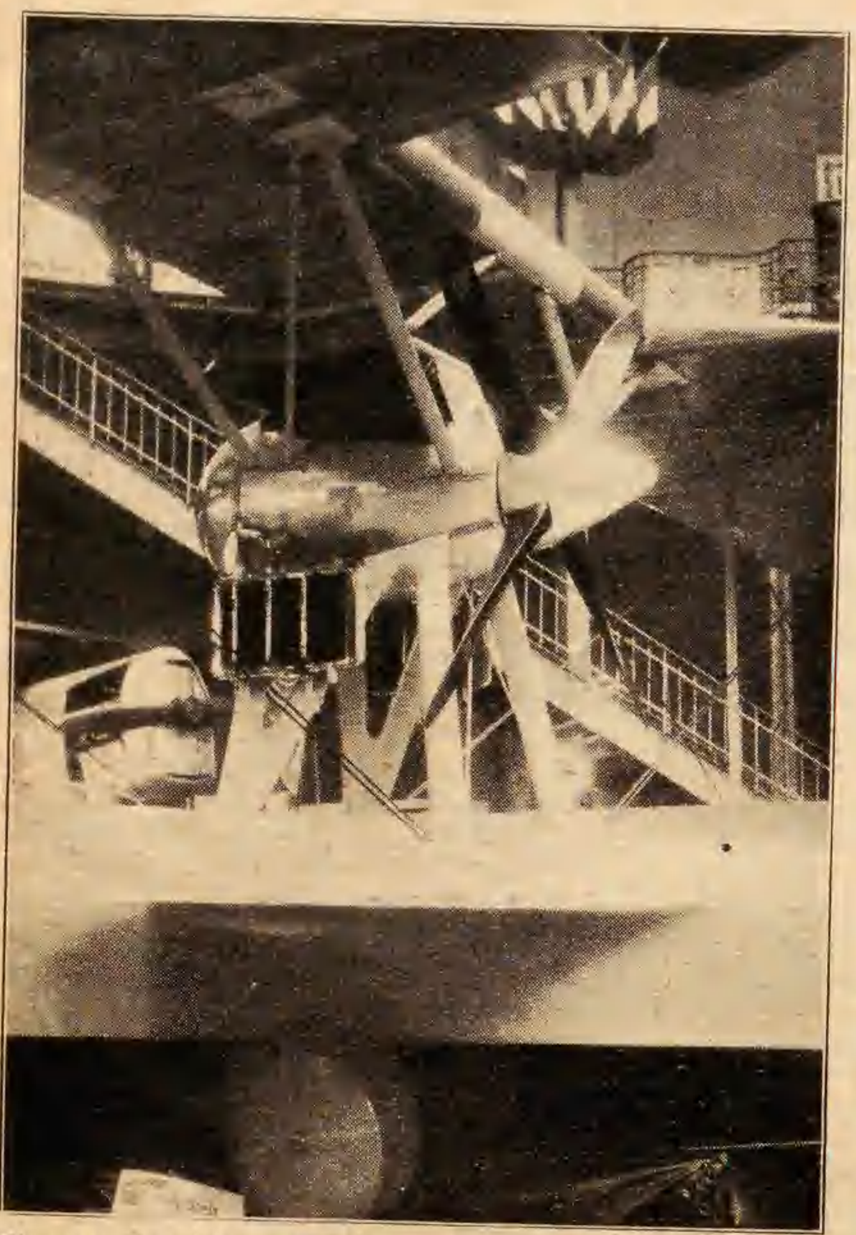
This firm, of which Mr. D. Lawrence Santoni is managing director, is showing a small dual-control school machine of the flying-boat type. The C.A.M.S. 30E is very similar to the Savoia flying boats, the designer, M. Conflenti having been with Mr. Santoni on the well-known Italian firm. It had not been intended to exhibit this machine, and the decision to do so was only made quite recently. Consequently, Mr. Santoni pointed out, the machine was not so nicely finished as it might have been. Nevertheless, unless one is very critical, there is not much to find fault with in C.A.M.S. 30E, and the design is delightfully clean.

The boat hull is of three-ply construction, with flat sides and the hollow cambered step peculiar to all boats of Conflenti's design. A wide cockpit in front of the wings gives ample space for pupil and instructor to sit side by side, and there are two sets of controls, wheels for elevator and ailerons, and foot bars for the rudder.

The wings do not present any unusual features. They are of fairly thick section, and have but one pair of struts on each side. The engine cowling is exceptionally neat, as will be seen from the accompanying photograph, and should provide as good streamlining of the engine as it is possible to get.



FUSELAGE FITTING AND BUILT-UP FORMER OF BREGUET "LEVIATHAN": On the right the peculiar wing-bracing wire fitting, with a stout central cable and two smaller cables front and rear.



The neat engine mounting and cowling of the C.A.M.S. flying boat.

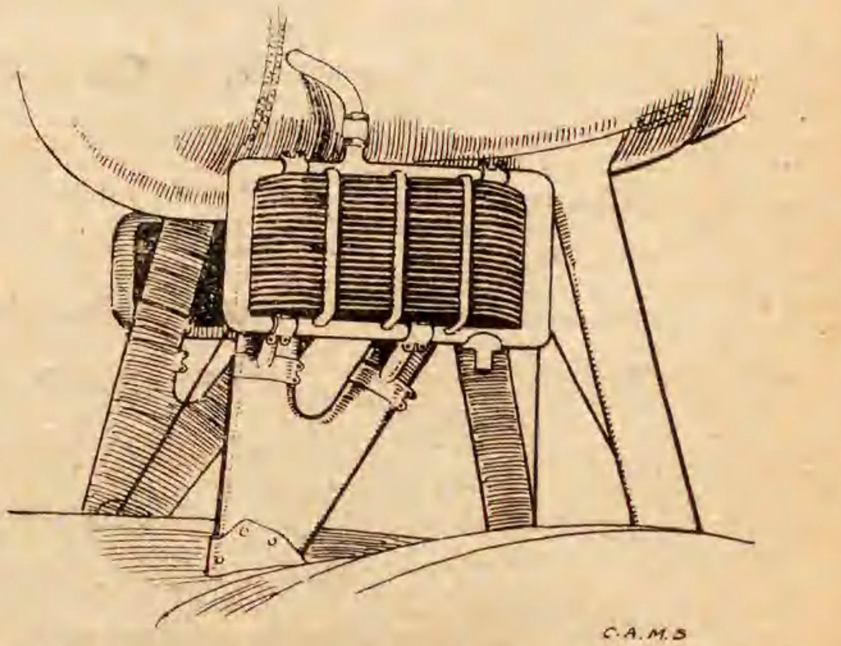
This has been made possible by fitting two very small radiators of an unfamiliar type. At first sight these radiators appear to be Lamblins of special type, but we are informed that they were made by Botali and Clement.

The main characteristics of the C.A.M.S. 30E are as follows: Length o.a., 9·99 ms. (32 ft. 10 ins.); span, 13 ms. (42 ft. 7 ins.) area, 43 sq. ms. (460 sq. ft.); weight empty, 1,080 kgs. (2,380 lbs.); fuel for three hours, 125 kgs. (275 lbs.); useful load, 170 kgs. (370 lbs.); total loaded weight, 1,375 kgs. (3,010 lbs.); landing speed, 60 kms. (30 miles) per hour; maximum speed, 145 kms. (90 miles) per hour.

In addition to the school machine C.A.M.S. produce several other types, among which mention may be made of the racer C.A.M.S. 36, which was built for the Coupe Schneider, but did not get finished in time to take part in the race. It is to be hoped that Mr. Santoni, who will be remembered by readers of FLIGHT as managing director of the British Deperdussin Co. before the War, will come to England next summer to compete for the Schneider Cup.

The C.A.M.S. racer differs from the machine shown in that it is a tractor, with the pilot's cockpit placed aft of the wings. This arrangement has presumably been chosen with a view to providing greater safety for the pilot in case of a crash, and would appear to have a good deal to recommend it.

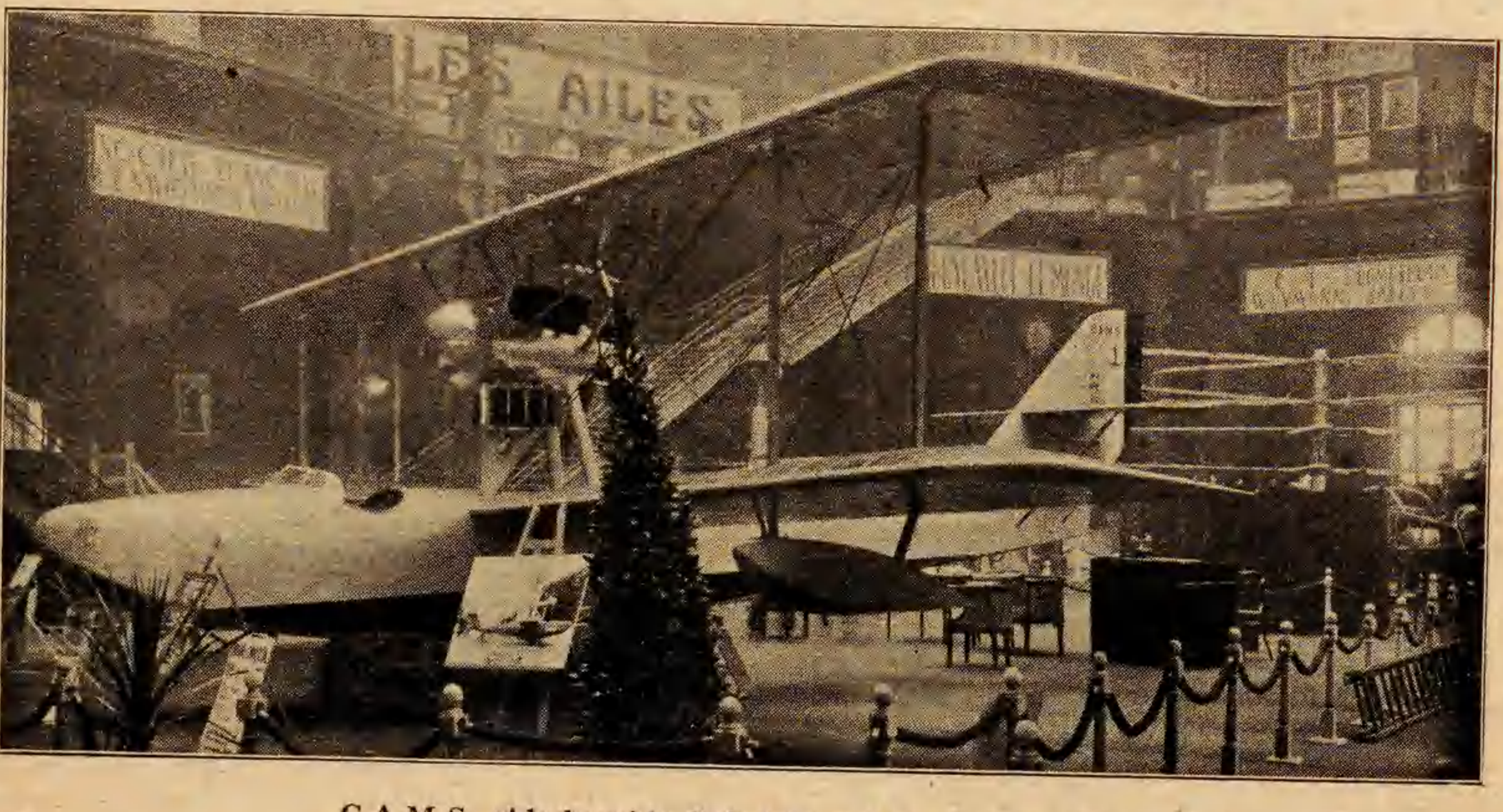
The C.A.M.S. 31 is an *hydravion de chasse*, with 300 Hispano engine. It is a smaller machine than the 30E, and has a maximum speed of about 120 m.p.h.



Sketch showing the small Botali radiators on the C.A.M.S. flying boat.

A large commercial flying-boat is now under construction at the works at St. Denis. This is a twin-engined machine, with two Hispano engines of 275 h.p. each, placed not on the wings but one behind the other above the hull. Thus should one engine fail there is no turning moment, and it is stated that with but one engine running the machine still has a speed of about 80 m.p.h. at 3,000 ft. With both engines running the speed is estimated to be about 110 m.p.h. at sea level. With fuel for 300 miles the paying load of this machine will be 2,150 lbs., or just under 4 lbs./h.p., which is not bad for a twin-engined flying boat.

(*To be continued.*)



C.A.M.S. side-by-side flying boat for school work.

GLIDING, SOARING AND AIR-SAILING

It has previously been recorded in these pages that Mr. F. P. Raynham is at present at Torquay with his glider, where he is to take part in the filming of a production by the Ideal Film Producing Co. to be entitled "The Hawk." It would not, perhaps, be quite playing the game to reveal the plot of the film, but Raynham figures in it as the rescuer of a fair damsel in distress, going to her assistance in his glider, which is to alight by the side of a submarine.

* * *

Unfavourable weather has prevented the film being "shot" up to the present, although several trial flights have been made and at least one attempt at the real "picture." Starting from the cliffs overhanging White Beach, Raynham, on December 14, got well into the air, cleared the edge and went "over the top," gliding a short distance and alighting perfectly on the sea. It appears, however, that the motor launch which is taking part in the film was far less under control than Raynham's glider, and did not manage to get into the picture at all, so that all the work will have to be done again.

* * *

The glider took the sea very nicely, and Raynham is pleased with her, although unsuitable weather has not permitted as much flying as he would have liked. The machine is now much better on the controls than she was at Itford, and a more orthodox aileron control has been fitted. A few extra coats of Cellon dope have resulted in making her watertight, and it appears that, if necessary, the old glider would float for days.

* * *

Not the least exciting part of the work consists in man-handling the glider up a nearly vertical cliff of some 200 ft. in height, and as the only "landing ground" is the sea, gliding in this locality should not be dull work, although waiting for a suitable wind may well become monotonous. The machine is kept at "Seven Winds," and has to be lifted over a wall every time she goes in or out.

* * *

The first French gliding competition, held last summer near Clermont Ferrand, in Auvergne, was not a great successs and the performances attained were in no way remarkable. It appears that the country chosen was unsuitable, and at the second Motorless Aviation Conference, held in connection with the Paris Aero Show, it was decided to hold next year's meeting in the Bay of Vauville, near Cherbourg. The time fixed for the competition is August 6 to 27, and as Cherbourg is not very far removed from London it is to be hoped that a goodly number of British visitors will find their way to the French competition. Probably by then the Supermarine flying boat service will be in operation, and it may be possible to pay a quick visit to the scene of the competition.

* * *

Prizes will be awarded for various types of performances, such as altitude, distance, duration, rising from level ground, etc., and it is stated that the site chosen is ideal for gliding, a cliff of about 400 ft. in height facing the prevailing winds, while at its base is a plain which should form an easy landing ground. Up to the present prizes amounting to close upon £2,000 have been promised.

* * *

At the French Aero Show in the Grand Palais several of the gliders which took part in the Combegrasse meeting are exhibited. First place is naturally given to the Peyret-Maneyrol machine, which is shown with two wax figures pulling on the starting ropes and a passable imitation of Maneyrol, complete with moustache, in the pilot's cockpit. Barbot's Dewoitine monoplane is also shown, having, apparently, had its broken wing repaired.

* * *

On the Gnome and Rhone stand is shown a tiny two-cylinder opposed air-cooled engine said to develop 10 h.p. On closer examination the engine, which is an A.B.C. built at the Le Rhone works, is found to be intended for use on gliders, and as a reduction gear of 3 to 1 is fitted, it should be possible to run the engine at high speed and still get reasonably good propeller efficiency. In a later issue we hope to have something more to say about this engine.

IN PARLIAMENT

Lieut.-Commander Kenworthy, on December 14, asked the Secretary of State for Air, if he will state the relative strength of the Air Force stationed in Europe of Great Britain, the French Republic, and the kingdom of Belgium; whether he can state the relative numbers of fighting, spotting, and bombing machines, respectively of modern construction and fit for service maintained in Europe by these three Powers; and what are the numbers of trained pilots observecs and mechanics, respectively, maintained by these three Powers in Europe on the active List.

Sir Samual Hoare: This question falls into three parts:—

1. *The relative strength of the Air Force stationed in Europe of Great Britain, the French Republic and the kingdom of Belgium.*

The strength of the Royal Air Force at present stationed in Europe, including units temporarily in the Constantinople Area, is approximately 15 squadrons, that of the French Air Service 100 squadrons, and that of the Belgian 14. The average establishment of the British squadrons is, however, 12 machines, whilst that of the French squadrons is 9 and that of the Belgian 10.

2. *The relative numbers of fighting, spotting and bombing machines, respectively, of modern construction and fitted for service maintained in Europe by these three Powers.*

The total number of British Active Service Air Squadrons is 32; of French active squadrons 128; of Belgian active squadrons 14; the average number of the aeroplanes being as given above.

It would not be advisable in the public interest to give the total number of British aeroplanes of each type which are of modern construction and fit for service, and, so far as is known, the Governments of France and Belgium have not made public similar information in regard to the French and Belgian Air Services.

3. *The numbers of trained pilots, observers and mechanics, respectively, maintained by these three Powers in Europe on the active list.*

There are on the strength of the Royal Air Force in Europe at the present time 1,158 trained pilots, 75 observers and 19,421 other ranks employed on ground duties. These figures include personnel employed at Flying Training Schools, Depôts, and other miscellaneous establishments. In the current French "projet de loi" provision is made for the maintenance in Europe in 1922 of 3,039 Flying personnel and 30,477 other ranks employed on ground duties.

The second of these two figures is, however, misleading, since a large number of the personnel employed on ground duties in connection with the French Army Air Service (for example personnel for wireless, recruiting, transport, works, provision of rations and clothing, medical services, etc.) are found from the Army and are not included in the foregoing. This personnel is not budgeted for separately or otherwise distinguished from Army personnel generally, and it is therefore impossible to assess their numbers with accuracy. This consideration also applies in the case of the French Naval Air Service. Figures are not available to classify the flying personnel as pilots or observers.

The Belgian Army, including the Air Service, is at present in process of reorganisation, and, pending completion of this reorganisation, accurate figures for air service personnel will not be available. Prior to reorganisation the approximate total *establishment* was 2,000 all ranks, but this figure is subject to the qualifications made in the preceding paragraph in regard to the personnel of the French Army Air Service.

Major Attlee asked if he will state the total number of military and civil aeroplanes built and building in France, in French possessions, and in European territory occupied by France; the number of squadrons; the number of aircraft in each squadron; and the number and weight of explosive and chemically charged bombs carried by the latest type of French fighting 'plane.

Sir Samuel Hoare: This question falls into four parts:—

1. *The total number of military and civil aeroplanes built and building in France, in French possessions and in European territory occupied by France.*

Exact figures are not available as to the war stocks of aircraft held by the French Government. It is therefore impossible to give a figure for the number of military and civil aeroplanes built; the number on the Civil Register, however, on December 1 was 660. As regards the number building, according to the latest information available, French aircraft manufacturing firms have produced 3,300 machines for civil or military purposes during the first eleven months of the current year, making a monthly output of 300 machines. This figure includes aircraft built for export to foreign countries.

2. *The number of Squadrons.* The total number of squadrons at present maintained by France is 128.

3. *The number of aircraft in each squadron.* The normal establishment of machines held by a French squadron is 8 or 10 according to type.

4. *The number and weight of explosive and chemically charged bombs carried by the latest type of French fighting 'plane.*

The French Government have not, so far as is known, made public any particulars as to the number and weight of explosive and chemically charged bombs carried by their latest types of aircraft.

New Fokker Commercial Aeroplane.

While at the Paris Aero Show we met Mr. Fokker, who showed us photographs of his new commercial aeroplane, the F.V., which is normally a biplane, but so designed that it can, within a very short time, be changed into a monoplane by removing the lower plane. The F.V. has accommodation for eight passengers inside the cabin, and dual controls are provided so that if desired two pilots can always be carried. The machine is fitted with a Rolls-Royce engine, and has a total loaded weight of 3,120 kg. (6,900 lbs.). The empty weight is 1,200 kg. (2,640 lbs.), so that the structure weight must be remarkably low, due to some extent, presumably, to the fact that the machine has thick wings although being a biplane.

The wing area, as a biplane, is 750 sq. ft., giving a wing loading of 9.2 lbs./sq. ft.

NOTICES TO AIRMEN

Importation of Dogs by Aircraft from Abroad

A case having occurred recently of the importation of a dog into this country by air without authority, attention is drawn to the Importation of Dogs Orders of 1914 and 1918 (No. 2), which prohibit the importation of dogs from abroad, whether originally taken from this country or not, unless their landing has been authorised by licence previously obtained from the Ministry of Agriculture and Fisheries (4, Whitehall Place, London, S.W. 1).

(No. 134 of 1922.)

Alternative Cross-Channel Air Route: Weather Reports

1. When bad weather conditions prevail on the normal air route between Croydon and the Channel, reports from certain stations on an alternative route are now available at Croydon and Lympne for communication to pilots of machines in flight.

2. The places for which information is available at these times are the Isle of Grain, North Foreland and Deal.

3. Paragraph 2 of Notice to Airman No. 80 of 1922 is amplified accordingly.

(No. 135 of 1922.)

Holland: Use of Deventer Landing Ground Discontinued

1. The landing ground at Deventer is no longer available for use.

(No. 136 of 1922.)

France: Civil Landing Grounds, Military Aerodromes, etc.

1. *Civil Emergency Landing Grounds.*—The following additional grounds are now available:—

(*a*) *Chatillon-sur-Seine. Position.*—Lat. 47° 51′ N., Long. 4° 35′ E. Situated 1½ kms. to the south of Chatillon, at a height of 264 metres (865 ft.) above sea level. *Dimensions for landing.*—500 by 500 metres. *Supplies.*—No supplies are available. There is a resident caretaker.

(*b*) *Saint Dizier. Position.*—Lat. 48° 38′ N., Long. 4° 55′ E. Situated 3 kms. west of St. Dizier, at a height of 146 metres (480 ft.) above sea level. *Dimensions for landing.*—650 by 600 metres. *Supplies, etc.*—No supplies are available. There is a resident caretaker. *Telephone.*—A telephone has been installed.

2. *Civil Landing Ground, Toulouse.*—The dimensions for landing have been increased to 600 by 600 metres, and three hangars are now available.

3. *Military and Naval Aerodromes.*—The following military or naval aerodromes are additional to those notified in Notice to Airmen No. 97 of 1921. These aerodromes are available for use by civil aircraft *in cases of emergency only*, *i.e.*, when pilots are unable to reach a civil air station. Assistance can only be given by the French military or naval authorities in exceptional circumstances, and, in all cases, only so far as the personnel and material available permit.

(*a*) *Military Aerodromes.*—Behonne (3 kms. N.E. of Bar-le-Duc); Bourg (2½ kms. S.S.W. of Bourg); Bouy (2 kms. S. of Mourmelon-le-Grand); Coetquidan (18 kms. E. of Ploermel, 6 kms. N.N.W. of Guer); Gray (3 kms. S.E. of Gray); La Bêle (7 kms. N.N.E. of Nantes); St. Omer (2½ kms. S.S.W. of St. Omer); Sarreguemines (2 kms. N.N.E. of Sarreguemines); Sissonne (2 kms. E.S.E. of Sissone); Vesoul (3 kms. N.N.E. of Vesoul).

(*b*) *Naval Aerodrome and Airship Station.*—Cuers-Pierrefeu (20 kms. N.E. of Toulon).

(No. 137 of 1922.)

"Rules as to Lights"

1. Attention is drawn to Schedule IV, Section 1, of the Air Navigation Order, 1922, in which are prescribed the lights to be exhibited by aircraft between the hours of sunset and sunrise. In the interests of public safety, it is essential that these "Rules as to Lights" shall be complied with by all owners of registered aircraft.

2. Failure to comply with these provisions will result in liability for penalties under Article 23 of the Order.

(*No.* 139 of 1922.)

France: Night Landing Arrangements, Customs Service at Lyons Aerodrome

1. *Night Landing Arrangements.*—(*a*) The following arrangements for night landing are in use at French aerodromes:—

As far as possible an illuminated "T" is displayed to indicate the direction of the wind, and the landing area is illuminated by one or more searchlights.

Failing the "T," and occasionally in addition thereto, 4 or 5 white lights and one red light are displayed in a row from a lorry, the red light being placed to windward of the white lights. Landings should, therefore, take place in the illuminated zone parallel with the lights and towards the red light.

(*b*) The aerodromes of St. Inglevert, Strasbourg and Marignane are now provided with a portable searchlight for night landings. These aerodromes are only lit when a request from pilots has been received in advance or when aircraft are expected.

2. *Lyons* (*Le Bron*).—A permanent customs service for the clearance of passengers only has been established at this aerodrome.

Freight must be sent to the customs office in Lyons for examination.

(*No.* 140 *of* 1922.)

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LONDON TERMINAL AERODROME

Monday evening, December 25

Christmas traffic has exceeded all expectations, and extra machines have had to be run on several services in an attempt to cope with the demand for seats. Both the Instone Air Line and the Daimler Airway had, however, to close their passenger lists, and refuse bookings, before the end of the week.

The gales during the past week have not interfered to any great extent with the running of the services, except on Wednesday, and even then—when the wind at 2,000 ft. above the Channel was blowing at about 70 miles an hour and Lympne was reporting winds of 50 miles an hour on the ground—the K.L.M. monoplanes carried on as usual. On the outward journey from Croydon to Rotterdam, Mr. Van Der Hoop left Croydon while a 50-mile-an hour south-east wind was reported from Lympne, and expected to have to land there for petrol. However, even the gale seems to favour the K.L.M., for the wind changed round through at least 45 degrees, with the result that Mr. Van Der Hoop was in Rotterdam within 2 hours 6 minutes. The return flight from Rotterdam to Croydon was undertaken by Mr. Pyl, who, after flying against the gale for 3 hours 25 minutes, was compelled to alight at Lympne owing to approaching darkness.

One of the amazing features of this particular flight was that although Mr. Pyl himself was feeling none too grand after his buffeting, and on arrival at Lympne got down from his seat and went round to the cabin-door expecting to find his three passengers very much the worse for wear, they were highly delighted with their flight, and had not suffered in the slightest from sickness.

Manchester "Express" in a Gale

On Friday Mr. Robinson, piloting a Daimler 34 from Manchester to London against a southerly gale, was compelled to land at Huntingdon for petrol, and, after ascending again, was 1 hour 43 minutes in flying the 60 odd miles to Croydon. He tells me that he looked down at the ground at one place, and, after flying steadily for 5 minutes, glanced down again, to find that he was still over the same spot.

I understand that the German "Albatros" which set out from Berlin to fly to London was damaged when it forced-landed at Bremen, and that the flight is to be started again in a "Dornier" some time this next week.

A new D.H.34 was delivered to the Daimler Airway on Wednesday. I understand that this machine is fitted with extra-large petrol tanks in order to obviate the necessity of going down at Lympne, on the journey from Amsterdam to London, when there is a strong head-wind. In practically all other respects the machine is the same as the other 34's in use on the service.

Rain, unfortunately, spoiled the joy-riding on Christmas Day, but Capt. Muir tells me he has a number of holiday "specials" booked up, including one for a lady who is going to fly to a race-meeting on Wednesday.

A record return trip to Manchester was made by a Daimler "air express" on Saturday, the machine making the out-and-return flight in only 3 hours 45 minutes.

OIL COOLING*

By GRANVILLE BRADSHAW.

THE cooling of an internal combustion engine is familiarly known to be one of two types, *i.e.*, water-cooling or air-cooling. With the rapid rise, however, in the volumetric efficiency of engines for aircraft and vehicular use it is becoming more evident every day that any means of cooling an engine which simply depends upon cooling the exterior of the cylinder walls and head is quite inadequate in its scope. It thereby leaves the cooling of the piston to chance, and the need for some more positive means of cooling this vital part is being forced upon us as the power output is increasing. The first symptoms are overheated lubricating oil, and in prolonged runs with many aircraft and racing-car engines the oil was no longer able to adequately lubricate the more highly stressed white-metal bearings.

When it is remembered that the piston-head presents a surface to the high-temperature gases equal to, roughly, one-third of the total combustion space and that the lubricating oil is constantly in circulation against the underside of this head, it is not difficult to understand that a considerable amount of the total cooling of the engine is carried out by the oil itself. (The author referred to Dr. Gibson's paper, read before the I.A.E. in January, 1920, in which this fact was borne out by some figures given which were obtained at the R.A.E.)

From this it can safely be deduced that modern high-efficiency engines are cooled in two ways always in combination, *i.e.*, water and oil-cooling or air and oil-cooling, and the author said he hoped to show that whilst oil-cooling is admittedly only an additional cooling to either of the two generally known forms, it may, by suitable application, provide those remaining advantages necessary to enable that system known at present as "air-cooling" to compete very favourably with the predominant system of water-cooling.

The dual activity of the oil in both lubricating the working parts and in extracting heat from those components in contact with the burning charge does not appear to be fully appreciated by the average designer; at any rate, little appears to have been done scientifically to apply the oiling system in such manner as will produce a high standard of efficiency from both oiling and cooling points of view. The same might be said of the present-day motor-cycle engine or of any engine be it air or water-cooled, if such engine is lubricated by the system (called drip feed) of adding small quantities of fresh oil solely for lubricating purposes instead of the better system of circulating oil in bulk. The inefficiency of the drip-feed system is shown by the fact that in long-distance attempts at Brooklands the rider has to inject several pumpfuls of oil per 2¾ miles lap in order to keep the engine cool. That from 50 to 90 per cent. of this oil is used solely for cooling purposes is readily seen by comparing the consumption of oil in these attempts with the consumption in much larger engines that are more adequately cooled. This excessive consumption should not be taken as an indication that air-cooling is a failure as such, but rather should it be taken as a basis upon which to found an efficient system of both internal and external cooling.

The author's opinion, confirmed by hundreds of tests, is that water-cooling has obtained its present position as a superior system principally because it has been fortunate enough to have associated itself with a better system of internal cooling. The large majority of air-cooled engines handled by the public have been fitted with diminutive crank-cases of equally small external surface lubricated by similarly small quantities of oil, whilst practically all water-cooled engines have been helped out by a large crank-case (frequently with cooling fins) and a constant circulation of a *large* quantity of oil.

The ratio of internal cooling to external cooling of any engine naturally varies enormously with every variation in external crank-case area and quantity of oil in circulation; it also varies with the method of applying the oil and the nature of the circuit in draining back to the crank-case sump or cooling tank. Various full-power tests on small single-cylinder and two-cylinder air-cooled engines, unassisted by a large crank-case cooling area and bulk oil in circulation, have shown that such engines will not continue to function properly for prolonged periods at mean effective pressure approaching 100 lbs. per sq. in. with an air blast of 50 m.p.h. unless a continuous stream of oil is passing through the lubricator and the consumption is consequently excessive. The addition of an oil-circulating system with adequate means of cooling the oil resulted in the maintenance of full throttle for periods of six hours and upwards, with an enormous reduction in carbon deposit and an oil consumption of less than 20 per cent. of the amount that was used when the drip-feed lubricating system was employed.

It would thus appear that there is considerable scope for the improvement of the cooling of modern high-duty engines in the methods used in lubricating these, and that the lubricating system can be improved by the study of the same from both the oiling and the cooling points of view.

An engine fitted with baffle-plates at the base of the cylinders for the purpose of preventing excessive quantities of oil working past the pistons into the cylinders is bad from the point of view of internal cooling, and the author's experience of such engines is that they will not maintain a high mean effective pressure for long periods without producing a hot spot in the centre of the piston and with consequent pinking.

The author referred to some experiments made with an engine of this type, which carbonised on the *under-side* of the piston and "pinked" very badly, where the baffle plates were removed and efficient scraper rings and suitable relief holes incorporated in the piston, with the result that all further deposit on the under-side of the piston was prevented and the pinking period extended.

There can, of course, be no doubt that if *sufficient* oil is passed over a hot surface the temperature can be kept sufficiently low to prevent all vaporisation and carbonisation, but there is a limit to the permissible quantity that can be used, and this is fixed by the efficiency or otherwise of the means for keeping the oil from passing by the rings and into the combustion chamber. The author then dwelt briefly on this problem, stating that a scraper ring chamfered on its contact face so that it slides over the oil on the upstroke and scrapes down the oil on the descending stroke appears to be the most consistent method of keeping down the oil.

The consumption of oil depends upon the two primary conditions: (*a*) the pumping of oil up past the piston and into the combustion chamber, where it burns and passes out of the exhaust, leaving an undesirable residue of carbon; and (*b*) the overheating of the oil, which causes vaporisation and loss in quantity of the lighter grades, according to the temperature reached by the oil or any portion of it.

The first is a matter for mechanical design on the particular engine. The second condition is the one of primary importance. If the oil has to come into contact with any hot spot and the quantity of oil is so small that the temperature cannot be kept down, too much heat may be imparted to the oil in contact and a certain portion of that oil will vaporise and pass out to the atmosphere. This, of course, results in a direct loss and a consequently heavy oil consumption, and there are two ways of obviating this. One is to prevent any oil coming into contact with the point of high temperature. This is extremely difficult and in any case it appears to avoid the adequate cooling of the piston-head, which depends principally on the oil for its maintenance at a working temperature. The other method is to design with this object in view, which is to adequately cool the part in question and to apply some means of cooling the oil afterwards. This seems to be the most rational solution to the problem, aiming as it does at an increase in all-round efficiency.

From the point of view of internal cooling there can be no doubt but that pistons of a suitable aluminium alloy are infinitely preferable to those of cast iron; in fact, it does appear that the greatest advantage of aluminium for pistons is from the internal cooling point of view. The effective cooling surface of the aluminium pistons is greater because the superior heat conductivity of the metal maintains a greater flow of heat into the skirt of the piston, and this offers a greater surface at a higher temperature to the heat-extracting duty of the oil, the amount of heat extracted being, of course, proportional to the difference in temperature between the piston and the cooling medium.

The author said he had produced conditions of internal cooling which have been so efficient in this connection that the two aluminium pistons in an engine of 90 mm. bore have emerged from a 40-hour bench test not only without a trace of carbon on either surface, but with the maximum temperature showing only a slight discoloration in the centre of the head, the remainder of the piston being the original highly polished aluminium finish. In this case the oil never attained a temperature higher than 160° Fahr.

It is possible now to compete with the water-cooled engine even on the point of silence. With a knowledge of the fact that many parts of an air-cooled cylinder can now be safely boxed inside the crank-case, certain valve-gear details can be enclosed and can run in the normal lubricating system. With such an arrangement the author had secured silence in quantity production quite equal to any of the water-cooled engines of a similar size, and this silence has been maintained for upwards of 10 000 miles in a manner quite equal to water-cooled practice.

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* Extracts from a paper read before the Cambridge Aeronautical Society on October 25, 1922.

In aircraft work in particular is water-cooling undesirable. The radiator is heavy but flimsy, there are the none too reliable flexible water joints, the dozens of points of possible leakage, etc., etc.

The eventual cooling of the oil after it has collected the heat from the hot internal parts ought to provide no difficulties in an instance where velocity is high.

The conditions of cooling oil and cooling water are very different, and have to be attacked from quite different standpoints. The fundamental differences are that whilst water will flow practically equally whether hot or cold, oil has viscosity varying very greatly with even small temperature differences. Thus oil cannot be effectively cooled by passing it through a long pipe either finned or otherwise, as the oil coming in contact with the walls of the pipe thickens and forms an excellent insulator for the hot core of oil flowing rapidly down the centre of the pipe. A large radiated oil tank exposed to the air currents available is even worse for similar reasons.

One successful method is to form a radiator consisting of a length of pipe coiled in the manner of a simple spring. The oil is passed through this at a high velocity, and as the hottest, and consequently most viscous, oil passes through at the highest velocity it is flung by centrifugal force to the outer ring of the circle, and thus against the walls of the ring of tubing. Another system is to use tubes like ordinary radiator tubes, and to insert in these a close-fitting spiral, like a corkscrew, slid into a pipe carried the whole length of the tubes, thus imparting a circular motion to the oil.

The author said that his experience was that the walls of the crank-case form the best medium. These can have ribs cast upon them, and the oil can be projected by force against the inner walls, this being readily performed by the crankshaft and other rapidly moving parts within the crank-case.

In the case of an air and oil-cooled aircraft engine of the radial type the majority of the cylinder barrel could be submerged into the crank-chamber, leaving a natural sump and enabling bulk oil in circulation to be used instead of the usual method. The crank-case could be formed with radial ribs, and could conveniently be used as the streamline nosepiece to the aeroplane; thus the whole unit would be self-contained both as regards its internal and external cooling, and it should show a high degree of accessibility. With a vertical or V-type air and oil-cooled engine a small separate oil-cooling radiator would probably have to be placed in some exposed position, but the many other advantages of air-cooling, with its added accessibility, reduction in weight and freedom from narrow temperature limitations, would still be obtained.

The extent to which oil or internal cooling can be utilised is by no means obvious, but that it does form an integral part in the effective cooling system of any high-duty engine there can be no possible doubt.

The author regretted he was unable to give any figures as to the amount of heat that is dissipated from the walls of a crank-case, but he had taken many readings of crank-case temperatures, and these have thrown much light upon the heat-radiating capacity of such. A normal water-cooled aircraft engine of 250 nominal b.h.p. did not attain its maximum crank-case temperature until it had been running for 1½ hours on full load. Its temperature was then 270° F., and it was not provided with any means of cooling the oil. The superficial area of the crank-case was approximately 17 sq. ft., and attention is directed to the possibilities of heat radiation from such a surface at the temperature indicated. The immersing of the greater part of the cylinder barrel in the crank-case added from 5 to 20 per cent. more heat to the oil, according to the amount immersed.

The author stated that oil-cooling possesses great advantages when used in connection with road vehicles in eliminating noise.

The more the air-cooled cylinder barrel is inserted into the crank-case the more are the conditions of a water-cooled engine obtained as regards type and volume of sound.

In concluding, the author pointed out that it is not seriously suggested that oil-cooling can be a complete and effective system as opposed to either of the two systems in common use. Its greatest advantages are found in connection with the simpler system of air-cooling, where it can assist to an extent as high as 30 or 40 per cent.

Even in existing engines a few simple modifications to the lubricating system can improve the effectiveness of the cooling to quite a considerable extent, and the author thought the possibility of improvement by these means justified these notes.

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The International Air Congress, London, 1923

A strong Executive Committee under the chairmanship of Maj.-Gen. Sir F. H. Sykes, G.B.E., K.C.B., C.M.G., M.P., has taken in hand the organisation of the International Air Congress which is to be held in London from June 25 to 30 next year. National Committees have been formed in several countries to prepare lists of names for membership of the Congress, and in other countries lists are being obtained through the Aero Clubs or other representative bodies. Membership is limited to those countries which are members of the Fédération Aéronautique Internationale or signatories of the International Air Convention. The subscription is to be £1 (or its equivalent in foreign currencies) for a Member and 10s. for an Associate Member, who must be a member of the family of a Member. The papers to be read are divided into four groups, which will hold sessions simultaneously, and will cover every aspect of the subject, from fundamental scientific problems to such matters as passport regulations and the organisation of an aerial transport company. The Air Ministry have arranged to hold the Royal Air Force Pageant on June 30, the final day of the Congress. Mr. C. V. Allen having resigned, Lieut.-Col. W. Lockwood Marsh, the Technical Secretary, has been appointed General Secretary of the Congress, the official address of which is—c/o The Royal Aeronautical Society, 7, Albemarle Street, London, W. 1, England.

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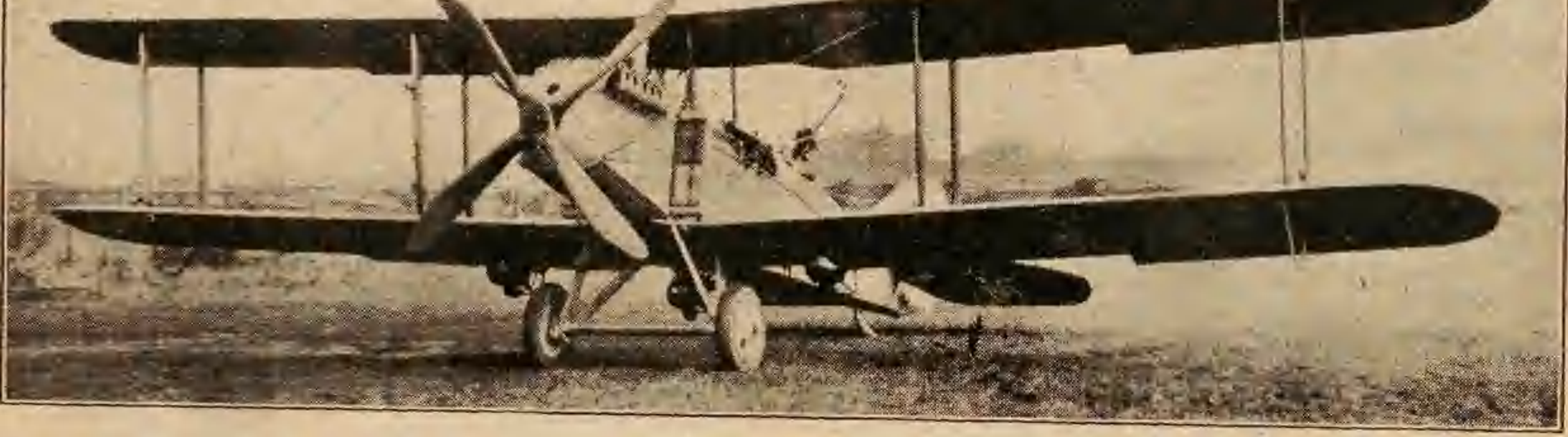

A D.H.9b, with Rolls-Royce "Eagle" engine, remodelled by the Aircraft Disposal Company.

THE ROYAL AIR FORCE

London Gazette, December 15, 1922

General Duties Branch

The follg. are transferred to the Reserve:—

Class A.—Flying Officer W. J. Burr, M.C., M.M.; Dec. 17.

Class B.—Observer Officer J. J. W. Nicholson; Dec. 15.

London Gazette, December 19, 1922

General Duties Branch

Flight Cadet E. Reid, having successfully passed through R.A.F. (Cadet) College, is granted a permanent commn. as Pilot Officer; Nov. 19. Flying Offr. T. M. Elworthy is granted a permanent commn.; Aug. 31. The following are granted short service commns. in ranks stated, with effect from, and with seny. of, dates indicated:—

Flying Offrs.—H. S. Davidson; Dec. 11. J. B. Lynch; Dec. 7. F. E. Vernon; Dec. 7.

Pilot Offrs. on Probn.—D. R. Stewart; Dec. 4. Lieut. J. W. C. Harcourt-Vernon, Northd. Fus., is granted a temp. commn. as Flying Offr. on secd. for four years' duty with R.A.F.; Dec. 5. Pilot Offr. H. J. Toye to be Flying Offr.; Nov. 9.

The following are transferred to Res.:—

Class A.—Flying Offrs.—W. C. Pruden; Dec. 9. C. B. Waters; Dec. 19.

Class B.—P. Christopherson; Dec. 20. E. N. Hewitt; Dec. 12. H. Webb; Dec. 6. *Observer Offrs.*—W. McGowan; Dec. 21. J. S. F. Watson; Dec. 19.

Class C.—Observer Offr.—S. P. B. De Moyse Bucknall; Dec. 19.

Stores Branch

Flying Offr. E. J. Grout is granted permanent commn. in rank stated for accountant duties; Aug. 13, 1921. His name will be placed on gradation list immediately below that of Flying Offr. P. E. D. Addis.

The following are granted short service commns. in ranks stated for three years on active list, with effect from Nov. 23, and with seny. of dates in brackets:—

Flt. Lieut.—J. C. E. Gillham (Nov. 5, 1918).

Flying Offrs.—T. S. James (April 1, 1918), immediately below Flying Offr. A. J. Roberts. F. R. Barton is granted short service commn. as Flying Offr. for accountant duties (Oct. 1). His name will be placed on the supplementary gradation list immediately below that of Flying Offr. W. Vaughan-Shaw.

Memorandum.

Lieut. M. Todd (Black Watch) is granted rank of Capt., R.A.F., on retirement from Army.

London Gazette, December 22, 1922

General Duties Branch

Flying Off. E. P. Dampier is placed on retd. list on account of ill-health and is granted rank of Capt.; Dec. 23.

Memorandum

The permission granted to Sec. Lieut. F. W. Carter to retain his rank is withdrawn on his joining the Army.

London Gazette, December 26, 1922

General Duties Branch

The follg. are granted permanent commissions in ranks stated. *Gazettes* of dates indicated in brackets, appointing these officers to short service commissions, are cancelled:—

Flight Lieut.—G. M. F. O'Brien, D.S.C., Oct. 24, 1919 (Oct. 24, 1919). *Flying Offrs.*—F. G. Gibbons, D.F.C., June 9, 1920 (June 15, 1920). H. G. W. Lock, D.F.C., Oct. 24, 1919 (Oct. 24, 1919), since promoted.

The follg. are granted short service commissions in ranks stated, with effect from, and with seny. of, dates indicated:—

Flying Offrs.—C. N. C. Dickson, A.F.C.; Dec. 18. C. B. Wincott; Dec. 14. *Pilot Offrs. on Probation.*—E. L. W. H. Alms, R. S. Blucke, F. A. Briggs, E. S. Brinsmead, A. W. Daly, B. J. Finn, A. M. A. Forde, J. W. Hardstaff, F. Larman, C. G. H. E. Lumsden, F. C. Marsh, B. C. Mason, C. L. Moores, A. J. R. Moss, E. R. Newbigging, F. J. O'Doherty, O. R. Pigott, F. B. Robinson, J. C. Savory, C. W. A. Scott, G. T. Underhill, A. R. Woodyatt; Dec. 9.

D. K. Whitlock is granted short service commn. as Flying Offr. for three years on active list, with seniority of April 1, 1918 (Jan. 1, 1923). His name will be placed on supplementary gradation list immediately before that of Flying Offr. C. H. Goring.

The follg. are transferred to the Reserve:—

Class A.—Flying Officer R. McK. Jamison, D.F.C.; Dec. 28.

Class C.—Flight Lieut. A. V. H. Gompertz; Dec. 5.

Pilot Officer J. A. R. Stevenson resigns his short service commn.; Dec. 27. Flight Lieut. C. P. O. Bartlett, D.S.C., is placed on retired list on account of ill-health contracted on active service, and is granted rank of Maj; Dec. 27. Flight Lieut. A. Hunter, O.B.E., is placed on retired list on account of ill-health, and is granted rank of Maj.; Dec. 27.

Stores Branch

The name of Flying Officer J. M. Adams will be placed on gradation list of accountant officers immediately below that of Flying Officer C. W. Rogers.

Memoranda

Lieut. T. Lund, late R.A.F., is granted temporary commn. as Flight Lieut. for duty under Directorate of Works and Buildings; Sept. 28. Flight Lieut. T. Lund relinquishes his commn.; Nov. 14.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The undermentioned appointments in the Royal Air Force are notified:—

Air Vice-Marshal P. W. Game, C.B., D.S.O., from Air Ministry to Headquarters, R.A.F., India. (Supernumerary.) Pending appointment as Air Officer Commanding. 7.12.22.

Wing Commanders: G. I. Carmichael, D.S.O., A.F.C., from Palestine Wing Headquarters (Palestine Command) to R.A.F. Depot (Inland Area). (Supernumerary.) 22.11.22. G. I. Carmichael, D.S.O., A.F.C., from R.A.F. Depot (Inland Area) to Air Ministry (Dept. of C.A.S.) (D.O.I.). 11.12.22.

Squadron Leaders: G. G. A. Williams, from Aircraft Depot, Egypt (Middle East) to command No. 1 Squadron (Iraq Command). 10.11.22. H. A. Michell, O.B.E. The name of this Officer is as now stated, not "Herbert Arthur Mitchell," as described in R.A.F. Bulletin No. 93, dated 12.12.22. G. S. Marshall, O.B.E., D.P.H., D.T.M. (Medical), from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Depot (Inland Area). (Supernumerary.) Whilst attached to Chemical Warfare Experimental Station, Porton. 13.11.22. T. S. Rippon, O.B.E., from Headquarters, R.A.F., Middle East, to R.A.F. Depot (Inland Area) (Supernumerary.) 22.11.22. D'Arcy Power, M.C., from Headquarters, Iraq Command, to No. 1 Squadron (Iraq Command). 24.10.22. J. Rothwell, M.B., from Aircraft Depot (Iraq Command) to R.A.F. Depot (Inland Area). (Supernumerary.) 6.11.22. J. Rothwell, M.B., from R.A.F. Depot (Inland Area) to R.A.F. Hospital, Cranwell. 5.1.23. R. W. Ryan, M.B., from R.A.F. Hospital, Cranwell, to School of Technical Training (Men) (Inland Area). 8.1.23. G. W. Williamson, O.B.E., M.C., from Airrcaft Depot (India) to Headquarters, (Iraq Command). 5.11.22. T. F. Hazell, D.S.O., M.C., D.F.C., from No. 55 Squadron (Iraq Command) to command No. 45 Squadron (Iraq Command). 1.11.22. T. F. Hazell, D.S.O., M.C., D.F.C., from No. 45 Squadron (Iraq Command) to command No. 55 Squadron (Iraq Command). 21.11.22. T. H. England, D.S.C., A.F.C., from R.A.F. Cadet College (Ground Wing) (Cranwell) to Aircraft Depot (Iraq Command). 13.12.22. A. R. C. Cooper, from School of Photography (Inland Area) to Station Commandant (Iraq Command). 13.12.22. E. H. Johnston, O.B.E., from No. 24 Squadron (Inland Area) to command No. 45 Squadron (Iraq Command). 13.12.22. W. B. Cushion, from Headquarters, Coastal Area to Headquarters, R.A.F., India. 13.12.22.

Flight Lieutenants: A. Jukes, M.B.E., from R.A.F. Depot (Inland Area) to No. 25 Squadron (Constantinople Wing). 7.12.22. B. McEntegart. Reference to the notification concerning this Officer which appeared in R.A.F. Bulletin No. 93, dated 12.12.22, for "No. 4 Flying School" read "No. 4 Flying Training School." R. J. Sanceau, from No. 1 Group Headquarters (Inland Area) to Air Ministry (Dept. of A.M.P.). 11.12.22. F. P. Adams, from Air Ministry (Depot of C.A.S.) (D.O.I.) to Inland Area Aircraft Depot (Inland Area). 15.1.23. A. C. Collier, from No. 24 Squadon (Inland Area) to Air Ministry (Dept. of C.A.S.) (D.O.I.) 1.1.23. G. S. Reed, O.B.E., to Headquarters (Iraq Command) on appointment to Short Service Commission. 1.10.22. J. C. E. Gillham, from R.A.F. Depot (Inland Area) to Aircraft Depot (Iraq Command). On appointment to Short Service Commission in Stores Branch. 23.11.22. R. J. Aherne, M.C., from No. 45 Squadron (Iraq) to No. 84 Squadron (Iraq). 1.9.22. P. A. Hall, M.B., B.A., from No. 84 Squadron (Iraq) to No. 45 Squadron (Iraq). 1.9.22. T. Montgomery, M.B., D.P.H., B.A., from No. 30 Squadron (Iraq Command) to Baghdad Combined Hospital (Iraq Command). 30.10.22. A. Briscoe, M.B., from Headquarters (Iraq Command) to No. 55 Squadron (Iraq Command). 23.10.22. J. C. T. Fiddes, M.B., from Headquarters, R.A.F. (Iraq), to Aircraft Depot (Iraq). 22.8.22. J. A. Perdrau, M.D., from School of Technical Training (Men) (Inland Area) to R.A.F. Depot (Inland Area). 12.1.23. R. J. O. Compston, D.S.C., D.F.C., from No. 1 School of Technical Training (Boys) (Halton) to Half-pay List. 29.11.22. R. A. Courtney, M.B.E., from Headquarters (Iraq Command) to Basrah Group Headquarters (Iraq Command). 9.10.22. W. F. Anderson, D.S.O., D.F.C., from No. 45 Squadron (Iraq Command) to No. 55 Squadron (Iraq Command). (Supernumerary). 22.11.22. E. R. B. Playford, from No. 31 Squadron (India) to No. 28 Squadron (India). 31.10.22. W. A. Kingston, from Headquarters (Iraq Command) to Aircraft Depot (Iraq Command). 5.11.22. R. W Chappell, from No. 24 Squadron (Inland Area) to No. 70 Squadron (Iraq Command). 13.12.22. A. Latimer, from No. 11 Wing Headquarters (Inland Area) to Aircraft Depot (Iraq Command). 13.12.22. A. M. Blake, A.F.C., from No. 5 Flying Training School (Inland Area) to No. 70 Squadron (Iraq Command). 13.12.22. R. F. L. Dickey, D.S.C., from School of Naval Co-operation and Aerial Navigation (Coastal Area) to No. 6 Squadron (Iraq Command). For duty as Adjutant. 13.12.22. F. L. Luxmoore, from No. 24 Squadron (Inland Area) to No. 45 Squadron (Iraq Command). 13.12.22. I. M. Matheson, from Armament and Gunnery School (Inland Areg) to No. 70 Squadron (Iraq Command). 13.12.22. I. L. Wincer, from No. 2 Flying Training School (Inland Area) to Aircraft Depot (Iraq Command). 13.12.22.

Lieutenant C. E. Driver, M.C. (The King's R.) to Headquarters (Iraq Command). On appointment as G.S.O. 3 (Intelligence). On attachment to Royal Air Force for two years. 1.10.22.

Captain J. C. E. Gillham, from Army (R.A.O.C.) to R.A.F. Depot (Inland Area). On attachment to Royal Air Force, pending appointment to Short Service Commission. 15.11.22.

Lieutenant (Acting Captain) T. S. James, from Army (R.A.O.C.) to R.A.F. Depot (Inland Area). On attachment to Royal Air Force, pending appointment to Short Service Commission. 15.11.22.

Major H. K. Clough, O.B.E., from Army (Half-pay List) to R.A.F. Depot (Inland Area), on attachment to R.A.F. for two years, pending embarkation overseas for duty as D.A.A.G. in Iraq. 15.11.22. From R.A.F Depot (Inland Area) to Headquarters, Iraq Command. On appointment as Deputy Assistant Adjutant-General. 23.11.22.

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Aircraft in the Navy.

THE Official Navy List for December, just published, contains for the first time lists of the aircraft attached to the Royal Navy. Two groups are working with the forces at home and one with the Mediterranean Fleet. No. 10 Group, with headquarters at Lee-on-Solent, includes the Observers' Training School at that place, with six Fairey float planes; two squadrons at Gosport, each with twelve ship planes, and a torpedo development flight, with three ship planes; the School of Aerial Navigation at Calshot, where there are thirteen boat planes; and the seaplane station at Cattewater, now used for storage only. No. 29 Group, with headquarters at North Queensferry, includes two squadrons at Leuchars, one with six and one with twelve ship planes respectively.

Of the aircraft carriers, Argus, Ark Royal, Eagle, and Furious, only the first-named has aircraft attached to her, drawing machines as requisite from the base at Leuchars. In the Mediterranean Group there is one squadron, No. 267, at Calafrana, Malta, with twenty machines, of which nine are unerected. The base at Alexandria is in charge of a care-and-maintenance party, but there is a temporary base at Feneraki, with seven seaplanes, and the aircraft carrier Pegasus has four.

PERSONALS

Married

The marriage of Flight-Lieut. ROBERT HUGH HANMER, M.C., R.A.F., eldest son of the Rev. Hugh and Mrs. Hanmer, The Rectory, Whitchurch, Salop, and Miss MARY HELEN SPENS, youngest daughter of Mr. and Mrs. Nathaniel Spens, Palace Gate Mansions, Palace Gate, took place on December 19 at Holy Trinity Church, Brompton. Flight-Lieut. G. Ingpen was best man.

Sqdn.-Ldr. JOHN TUDOR WHITTAKER, Officer Commanding R.A.F. in Ireland, was married on December 20 at St. Mark's Church, Ballysillan, to KATHLEEN MARY FINLAY, youngest daughter of the late F. W. Finlay and Mrs. F. W. Finlay, Wolfhill, Belfast.

To be Married

A marriage has been arranged between GEOFFREY PLUNKET CONYNGHAM GREENE, late Flight Lieutenant, R.N., of Waterpoort, Northern Transvaal, younger son of the Right Hon. Sir Conyngham Greene, G.C.M.G., K.C.B., and Lady Lily Greene, of Belmore House, Lymington, Hants, and DAPHNE MARGARET, only daughter of Col. and Mrs. GERARD LEATHER, of Middleton Hall, Belford, Northumberland.

The engagement is announced between HAROLD MORGAN LEWIS (late Lieut., R.A.F.), third son of Dr. and Mrs. B. MORGAN LEWIS, Sunnyside, Pontypridd, and DORIS MAUD, only daughter of Major and Mrs. W. LEWIS, Pentwyn, Sion Hill, Bath.

The engagement is announced between E. J. KINGSTON McCLOUGHRY, B.A. Camb., D.S.O., D.F.C., second son of Mr. and Mrs. James Kingston McCloughry, of North Adelaide, and FREDA LEWIS, second daughter of Sir ALFRED and LADY LEWIS, of Coneybury, Lower Kingswood, Surrey.

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ROYAL AERONAUTICAL SOCIETY NOTICES

Lectures.—The following lectures will take place at the Royal Society of Arts, John Street, Adelphi, W.C. 2, during the month of January:—

January 4, at 5.30 p.m.—Professor Junkers on "Metal Aeroplanes."

January 11, at 3.0 p.m.—*Juvenile Lecture.* Mr. R. A. Frazer on "Testing Model Seaplanes."

January 18, at 5.30 p.m.—Major J. D. Rennie, on "Flying Boats."

W. LOCKWOOD MARSH,
Secretary

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THE MODEL ENGINEER EXHIBITION

THE Model Engineer Exhibition opens for the sixth time at the Royal Horticultural Hall, Westminster, on Friday, January 5, for one week.

This year the Exhibition will eclipse all previous efforts to amuse and amaze. Model boats, model engines, model railways, models of every conceivable size, sort and description will fill the vast hall already set down as much too small for the requirements of the Exhibition.

In the Model Boat Section there will be dozens of models of battleships, liners, sailing yachts and motor boats. Among them will be the remarkable display made by the Victoria Model Steamboat Club whose exhibit at the recent Small Craft Exhibition attracted the studious attention of His Majesty the King.

Admiral Sir Reginald Bacon, who will be remembered as having been so closely identified with the work of the Dover Patrol during the War, and himself a very keen model engineer, is offering a Silver Challenge Cup for the best bit of amateur work in the Show.

Another interesting feature will be the Model Making Championship of Great Britain which will be decided during the week the Exhibition is open, a Championship Cup being offered for the best piece of work by a competitor who is not a model maker by profession.

No mechanical exhibition can be said to be complete these days without wireless, and the very latest plant to suit the pocket of every type of visitor will be shown on quite a number of stands. At frequent intervals during each of the days the show is open demonstrations of broadcasting will be given by some of the leading experts.

As usual, the working model railway tracks will be a great feature, and will be in three tiers—the topmost being an electric railway, the intermediate a clockwork railway and the lower a steam railway capable of hauling a considerable number of passengers.

Another wonderful display in the railway world will be the application of wireless to the working of a railway train. Mr. Raymond Phillips, of wireless fame, will give a series of demonstrations of the wireless control of trains running on an elevated track, the train starting, stopping and reversing by the simple operation of touching a switch a long way off with no other connection but the ether between it and the engine.

The Loan Section will house a great prize, the original model of a locomotive made nearly a hundred years ago by the father of the present Sir John Thorneycroft, the famous engineer.

As in previous years, there will be a collection of aeroplane models of various types and sizes, both flying models and exact scale models.

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PUBLICATIONS RECEIVED

Rigging Notes. F.5 Boat Service. Air Publication 905. London: H.M. Stationery Office, Kingsway, W.C. Price 9*d*. net. By post 10*d*.

Report of Contest Committee on National Airplane Races. Selfridge Field, Mt. Clemens, Michigan, October 12–14, 1922.

British Rainfall, 1921. *Meteorological Office—Air Ministry.* London: H.M. Stationery Office, Kingsway, W.C. 2. Price 12*s*. 6*d*. net; by post 12*s*. 11*d*.

Report on the Commercial, Industrial and Economic Situation of China in July, 1922. By H. H. Fox, C.M.G., F.R.G.S. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 1*s*. 9*d*. net.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: **cyl. = cylinder; I.C. = internal combustion; m. = motor**

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published December 21, 1922

14,536. C. V. TRELEAVEN. Screw propeller. (189,158.)
22,280. T. R. MACMEHEN. Screw propellers. (189,201.)
23,790. G. P. GRENFELL, J. ROBINSON and others. Directional wireless systems. (189,266.)
25,220. LUFTSCHIFFBAU ZEPPELIN GES. and P. JARAY. Airship sheds. (169,968.)

Published December 28, 1922

23,129. W. T. REID and BRISTOL AEROPLANE CO., LTD. Aircraft under-carriages. (189,531.)
27,378. H. BOLAS and G. G. PARNALL. Shock absorbers. (189,605.)
27,954. H. BOLAS AND G. G. PARNALL. Shock absorbers. (189,618.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xxii).

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FLIGHT BUYERS' GUIDE AND TRADE DIRECTORY—*continued.*

FABRICS AND YARNS—
Victoria Rubber Co., Ltd., Edinburgh.

FLYING SCHOOL—
Fraser's Flying School, Kingsbury, N.W. 9.

GLIDERS—
Peyret, L., Ingenieur, 23, Rue Lambrecht, Courbevoie sur Seine, France.

GLUES—
Lang Propeller Ltd., Weybridge, Surrey.
Weybridge 520-521; "Aerosticks, Weybridge.

INGOT, ALUMINIUM—
British Aluminium Co., Ltd., The 109, Queen Victoria St., London.
City 2676; "Cryolite," Cent. London.

INSTRUMENTS (Speed), Watches, &c.—
Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.
Goldsmiths & Silversmiths Co., 112, Regent Street, W. 1. Gerrard 9091 (3 lines).
Smith, S., & Sons (M.A.), Ltd., Cricklewood Works, N.W. 2. Willesden 2335 (7 lines).

INSULATING MATERIALS—
MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent, London.

LUBRICATING OILS—
Wakefield, C. C., & Co., Ltd., Cheapside, E.C. 2.
Central 1156 (3 lines); "Cherry," Cent, London.

MACHINING—
Monk Engineering Co., Ltd., Coventry.
Coventry 807; "Assistance," Coventry.

MAGNETOS—
British Thomson-Houston Co., Ltd., Lower Ford Street, Coventry.
Telephone 278; "Asteroidal," Coventry.

METALS (Anti-Friction)—
Hoyt Metal Co., Ltd., Deodar Road, Putney, S.W. 15. Putney 1323.

METAL PARTS AND FITTINGS—
Brown Bros., Ltd., Great Eastern Street, London, E.C. 2.

(Continued from p. xxii.)

METAL PARTS AND FITTINGS (Continued)—
Monk Engineering Co., High Street, Coventry.
Coventry 807; "Assistance," Coventry.
Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

MODELS—
Jones, A. E., Ltd., 25, Eversholt Road, Camden Town, N.W. 1.
D.A.P., Replingham Road, Southfields, S.W. 18.

PARACHUTES—
E. R. Calthrop's Aerial Patents, Ltd., 423a, Edgware Road, London, W. 2. Paddington 6332.
Spencer, C. G., & Sons, Ltd., 59a, Highbury Grove, N. 5. Dalston 1893.

PETROL—
Anglo-American Oil Co., Ltd. (Pratt's), Queen Anne's Gate, S.W. 1.
British Petroleum Co., Ltd., 22, Fenchurch Street, E.C. 3

PETROL GAUGE—
W. Ryan Hart, McCreath Taylor & Co., 34, Victoria Street, S.W. 1.

PROPELLERS—
Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds. Roundhay 601 (5 lines); "Propellers," Leeds.
Falcon Airscrew Co., 113, Cottenham Road, Holloway, N. 19. Hornsey 910 & 2472.
Lang Propeller, Ltd., Weybridge, Surrey.
520-521, Weybridge; "Aerosticks," Weybridge.

PUTTEES—
Fox Bros. & Co., Ltd. (Dept. R), Wellington, Somerset.

RADIATORS AND RADIATOR REPAIRS—
Serck Radiators, Ltd., Warwick Road, Greet, Birmingham.
Victoria 531 (3 lines); "Nerleak," Birmingham.

SHEET METAL WORK STAMPINGS AND PRESSINGS—
Rubery, Owen & Co., Darlaston.
Darlaston 87; "Roofs," Darlaston.

SKY WRITING—
Savage, Major J. C., 7-8, Norfolk Street, Strand, London, W.C. 2.
Central 8971-72; "Skyerta," Estrand, London.

SPARKING PLUGS—
Robinhood Engineering Works, Ltd., The, Putney Vale, S.W. 15. Putney 2132, 2133.
"Kaalgee," Phone, London.

SPRAYING PLANT—
Aerograph Co., Ltd., 43, Holborn Viaduct, E.C. 1.
Holborn 2041; "Aerography," London.

STABILIZERS—
Auto Controls, Ltd., 10, Heddon Street, Regent Street, London, S.W. 1.

TAPES AND WEBBING—
MacLennan, John, & Co., 115, Newgate St., E.C. 1.
City 3115; "Vanduara," Cent. London.

TIMBER—
Owen, Joseph, & Son, Boro' High Street, S.E.
Hop 3811; "Bucheron," London.

TUBES, ALUMINIUM—
British Aluminium Co., Ltd., The, 109, Queen Victoria St., London.
City 2676; "Cryolite," Cent. London.

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Palmer Tyre, Ltd., Shaftesbury Avenue, W.C. 2.
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